H N P D I S C U S S I O N P A P E R

Economics of Tobacco Control Paper No. 27

Smallholder Tobacco Growing in Indonesia:

Costs and Profitability Compared with Other Agricultural Enterprises

John C. Keyser and Nila Ratna Juita

February 2005

Tobacco Free Initiative
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HEALTH, NUTRITION, AND POPULATION
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Health, Nutrition and Population (HNP) Discussion Paper

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ECONOMICS OF TOBACCO CONTROL PAPER NO. 27

SMALLHOLDER TOBACCO GROWING IN INDONESIA:

Costs and Profitability Compared With Other Agricultural Enterprises

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Background Paper prepared for the World Bank Study on the Economics of Tobacco and Tobacco Control in Indonesia, with financial support from SIDA and US CDC/OSH. Completed May 2003, Revised September 2003.

Abstract: This supply-side study compares the financial costs and returns for smallholder tobacco farming with a selected range of smallholder crops that either complement tobacco or offer long-term diversification potential. It is a first step to understanding how tobacco farmers might be affected if the demand for tobacco fell in Indonesia, and to what extent farmers might be able to adjust by shifting to other crops, and the implications this might have for their incomes. The analysis is based on a set of 24 original per hectare crop budgets estimated specially for this study to reflect the actual costs and returns for tobacco and other farm enterprises in upland and lowland tobacco growing regions of Central Java to the best extent possible. These original budgets cover eight distinct crop enterprises including Virginia-kretek tobacco and seven other crops that either complement tobacco or offer diversification potential. To provide the broadest possible indication of relative costs and profitability of different enterprises, several production levels are considered for each commodity including low, medium, and high-input management. The analysis suggests that chilli, potatoes, nilam, and oranges offer a potential for similar (or better) net profits and rates of return than tobacco. However, the markets for these alternative enterprises are generally far more limited than those for tobacco, and considerable investments may be needed to help smallholders to succeed with these crops, such as the development specialised support services and the expansion of private trading networks. Especially in the case of perennial crops with a long maturity period, a shift away from tobacco can be difficult or risk because of less certain cost structures, unknown market outlets, high establishment costs, and limited availability of seasonal and long-term credit. Considerable efforts will be required to overcome these and other practical barriers for tobacco farmers to take advantage of the diversification opportunities this report suggests are available.

Keywords: tobacco, tobacco leaf, cloves, Indonesia, tobacco policy

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ACRONYMS AND ABBREVIATIONS

CASER	Centre for Agro-Socio Economic Research, Bogor
FAO	Food and Agricultural Organization of the United Nations
GKG	*Gabah kering giling*, dry un-milled rice.
GKP	*Gabah kering panen*, wet un-milled rice
INSTIPER	Institut Pertanian Stiper, Yogyakarta
PTPN-X	*Perseroan Terbatas Perkebunan Nusantara X* or Estate Plantation X, Ltd
TBN	*Tembakau Bawah Naungan* or tobacco under shelter
USAID	United States Agency for International Development

CURRENCY EQUIVALENTS

Local Currency = Indonesian Rupiah (IDR)
USD 1.00 = IDR 8,900
IDR 1,000 = USD 0.1123

WEIGHTS AND MEASURES

1 hectare (ha) = 2.417 acres
1 kilogram (kg) = 2.204 pounds
1 quintal (qt) = 100 kilograms
1 kilometre (km) = 0.62 miles

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FOREWORD

In 1999, the World Bank published "Curbing the Epidemic: governments and the economics of tobacco control", which summarizes the trends in global tobacco use and the resulting immense and growing burden of disease and premature death. By 1999, there were already 4 million deaths from tobacco each year, and this huge number is projected to grow to 10 million per year by 2030, given present trends in tobacco consumption. Already about half of these deaths are in high-income countries, but recent and continued increases in tobacco use in the developing world is causing the tobacco-related burden to shift increasingly to low- and middle-income countries. By 2030, seven of every ten tobacco-attributable deaths will be in developing countries. "Curbing the Epidemic" also summarizes the evidence on the set of policies and interventions that have proved to be effective and cost-effective in reducing tobacco use, in countries around the world.

Tax increases that raise the price of tobacco products are the most powerful policy tool to reduce tobacco use, and the single most cost-effective intervention. They are also the most effective intervention to persuade young people to quit or not to start smoking. This is because young people, like others with low incomes, tend to be highly sensitive to price increases.

Why are these proven cost effective tobacco control measures –especially tax increases– not adopted or implemented more strongly by governments? Many governments hesitate to act decisively to reduce tobacco use, because they fear that tax increases and other tobacco control measures might harm the economy, by reducing the economic benefits their country gains from growing, processing, manufacturing, exporting and taxing tobacco. The argument that "tobacco contributes revenues, jobs and incomes" is a formidable barrier to tobacco control in many countries. Are these fears supported by the facts?

In fact, these fears turn out to be largely unfounded, when the data and evidence on the economics of tobacco and tobacco control are examined. The team of about 30 internationally recognized experts in economics, epidemiology and other relevant disciplines who contributed to the analysis presented in "Curbing the Epidemic" reviewed a large body of existing evidence, and concluded strongly that in most countries, tobacco control would not lead to a net loss of jobs and could, in many circumstances actually generate new jobs. Tax increases would increase (not decrease) total tax revenues, even if cigarette smuggling increased to some extent. Furthermore, the evidence show that cigarette smuggling is caused at least as much by general corruption as by high tobacco product tax and price differentials, and the team recommended strongly that governments not forego the benefits of tobacco tax increases because they feared the possible impact on smuggling, but rather act to deter, detect and punish smuggling.

Much of the evidence presented and summarized in "Curbing the Epidemic" was from high income countries. But the main battleground against tobacco use is now in low- and middle-incomes countries. If needless disease and millions of premature deaths are to be prevented, then it is crucial that developing counties raise tobacco taxes, introduce comprehensive bans on all advertising and promotion of tobacco products, ban smoking in public places, inform their

citizens well about the harm that tobacco causes and the benefits of quitting, and provide advice and support to help people who smoke and chew tobacco, to quit.

In talking to policy-makers in developing countries, it became clear that there was a great need for country-specific analytic work, to provide a basis for policy making, within a sound economic framework. So the World Bank and the Tobacco Free Initiative of the World Health Organization (as well as some of the WHO regional offices and several other organizations, acting in partnership or independently) began to commission and support analysis of the economics of tobacco and tobacco control in many countries around the world.

The report presented in this Economic of Tobacco Discussion Paper makes a valuable contribution to our understanding of the issues and likely economic impact of tobacco control in a specific country setting. Our hope is that the information, analysis and recommendations will prove helpful to policy makers, and help result in stronger policies to reduce the unnecessary harm caused by tobacco use.

Joy de Beyer

Tobacco Control Coordinator
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The analysis also draws on first-hand discussions with smallholder farmers, farmers' representatives, commodity traders, and others with primary knowledge of current farm and market conditions in Temanggung and Klaten Regencies around Yogyakarta held during a 10-day mission from 31 March to 9 April, 2003. This paper would not have been possible without the kind help of each individual and the author is grateful for everyone's assistance. Septina Agraita Rahmawati served as interpreter and data assistant throughout the10-day mission. Special thanks also go to Sjaful Bahari, Ayu Cornellia, James Gingerich, Zubaidi Rachmat, Gede Wibawa, and to Stephen Mink who provided helpful advice and review comments. The research was carried out for the World Bank under the supervision of Ayda Yurekli, Health Economist.

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I. INTRODUCTION

A. PURPOSE AND SCOPE OF THE STUDY

1. The World Bank commissioned this study as one of several background papers for an analysis of the economics of tobacco and tobacco control in Indonesia. This supply-side study aims to provide improved insight into how the financial costs and returns for smallholder tobacco farming compare with a selected range of smallholder crops that either complement tobacco or offer long-term diversification potential. It is a first step to understanding how tobacco farmers might be affected if the demand for tobacco fell in Indonesia, and to what extent farmers might be able to adjust by shifting to other crops, and the implications this might have for their incomes. Farmers are understandably concerned at the possible negative welfare and financial impact that a fall in tobacco leaf prices/demand could have. The study notes that even though several apparently profitable alternatives exist, successful crop diversification and substitution may need significant support.

2. Agricultural production begins with the decisions farmers make and the objective of this analysis is to help policy makers and other sector participants develop an improved understanding of how smallholder options in tobacco areas compare in terms of total production costs, farmer profitability, investment requirements, labour needs, employment generation, and other matters of private and social importance. To the extent government is involved with the promotion of different agricultural enterprises, the analysis can also help identify some policy implications for diversification options.

3. The analysis is based on cost of production data from upland and lowland tobacco regions in Central Java and was prepared using a spreadsheet template created specifically for this study. While the present focus is on understanding the relative costs and returns for tobacco and other smallholder crops that can be grown in these specific tobacco areas, the template can be used to examine a far broader range of agricultural options and financial parameters than considered here.

4. This analysis is only a start, but the approach and spreadsheet models could be used to do additional work to help answer specific policy questions and build a more reliable picture of the costs and returns for different farming enterprises in Central Java and other parts of Indonesia. Without a clear methodology for assessing the consequences of different management decisions, sector planning can easily become an exercise in guesswork based on presuppositions about which crops are best for farmers and what policies are needed to promote sector growth. This is especially true with respect to discussions over tobacco control (where experience in Indonesia shows public health measures can have unforeseen implications for farmer income) and related debates around the need for crop diversification and importance of a long-term shift away from tobacco. The analysis aims to provide an improved understanding of these and other supply-side issues to be considered as Indonesia looks to promote continued agriculture sector growth and diversification.

B. OBJECTIVES

5. Within this context, the main objectives of the analysis are:

(a) To illustrate a range of indicative costs and returns for smallholder tobacco and other crops under progressively intensive input use and overall management conditions;

(b) To demonstrate how the potential earnings from tobacco compare with those for other smallholder enterprises that complement tobacco and/or offer diversification potential in upland and lowland tobacco growing areas.

(c) To consider the implications of long-term price change on the profitability of tobacco and other enterprises;

(d) To provide brief, but sufficient background data on recent sector performance and current farming systems to interpret the numeric data for each commodity; and

(e) To demonstrate a practical approach to farm budget analysis that can be used to examine a far broader range of agricultural enterprise and policy issues than possible during this limited exercise.

C. Approach, Data and Limitations

6. The quantitative analysis is based around a set of 24 original per hectare crop budgets estimated specially for this study to reflect the actual costs and returns for tobacco and other farm enterprises in upland and lowland tobacco growing regions of Central Java to the best extent possible. These original budgets cover eight distinct crop enterprises including Virginia-kretek tobacco and seven other crops that either complement tobacco or offer diversification potential as shown in Table 1. To provide the broadest possible indication of relative costs and profitability of different enterprises, several production levels are considered for each commodity including low, medium, and high-input management.

Table 1: List of Enterprises Analysed

	Suitable Region		Region Covered by Model	Remarks
	Upland	Lowland		
TOBACCO				
Virginia-kretek	X		Upland	Original budgets (3 levels)
TBN/Na oogst*		X	Lowland	Sample contract only
STAPLE CROPS				
Rice		X	Lowland	CASER/USAID analysis
Groundnuts	X	X	Lowland	Original budgets (3 levels)
Corn	X	X	Lowland	Original budgets (3 levels)
HORTICULTURE				
Chilli	X	X	Midland	Original budgets (3 levels)
Potatoes	X		Upland	Original budgets (3 levels)
Carrots	X		Midland	Original budgets (3 levels)
Garlic	X		Upland	Original budgets (3 levels)
PERENNIAL CROPS				
Nilam	X	X	Lowland	Original budgets (3 levels)
Oranges*	X	X	Lowland	INSTIPER analysis.
Coffee, vanilla, etc., etc.*			Discussion only	Financial data not available.

* Data not included in rankings of financial indicators (Appendix 3).

7. The data used to prepare each financial model are based on a various sources including farmer surveys carried out by a student research team from the Institut Pertanian Stiper (INSTIPER) in Yogyakarta and other firsthand discussions during a 10-day mission to Indonesia with smallholder farmers, crop traders, farmer representatives and others with primary knowledge of farm conditions in upland and lowland tobacco areas around Yogyakarta. While every care has been taken to ensure that the crop models provide as realistic picture of the financial costs and returns for tobacco and other agricultural enterprises as possible, it was not always easy to interpret the student survey data and the draft nature of this study should be emphasized. Moreover, farm practices can vary widely in different parts of Indonesia and the financial data should not be interpreted as a definitive measure of actual costs and returns for individual growers. A very good area for further research would be first to verify the

specific coefficients applied in each crop model and then to expand the analysis to cover a broader range of commodities and specific locations. It is hoped that university researchers at INSTIPER or some other appropriate institution may want to carry on with this agenda and build on the methodology to expand this first-step analysis.

8. In cases where data limitations meant that it was not possible (or expedient) to develop an original set of multi-level production budgets, a variety of other approaches have been used to derive similar financial indicators that can be compared as directly as possible with the results for every other enterprise. As shown in Table 1, these different approaches were specifically necessary for TBN/Na oogst tobacco, rice, and oranges. Details of the different methodologies used for the analysis of these crops are given in Section IV with results for that enterprise.

9. The study, while offering some useful insights, has some clear limitations that must be borne in mind. First, although the study identified several crops that were profitable in addition to tobacco, it did not examine the availability of technical, financial and marketing support for these crops. Therefore, even though some farmers were realizing relatively high net financial returns from other crops, the feasibility of increasing production of those crops would need to be carefully studied, to understand the financial, technical, marketing or other support that would be needed for farmers to begin switching from tobacco. Alternative crops that appear to be potentially profitable may not, in practice, be available options given the existing situation.

10. Second, the study area was limited to two regencies (Temanggung and Klaten) near DI Yogyakarta in Central Java where 23% of Indonesia's total tobacco crop was produced in 2000. And the study looked only at two of the three types of tobacco grown in Indonesia, the dark sun-cured Indonesia-type tobacco mostly used for kreteks (also called Virginia-Kretek or Voor-Oogst) and dark air-cured Ta/Na Oogst tobacco used for cigar production and produced mainly for export. There is also some Virginia tobacco grown (used for white cigarettes and kreteks. The Indonesia type accounts for about 64% of all tobacco production in Indonesia, followed by Virginia (25%) and dark air-cured Ta/Na Oogst (11%). Central Java produced 27% of all the Indonesia-type tobacco in 2001, but less than 1% of Virginia and Ta/Na Oogst type tobacco. Given the diverse production systems and different types of leaves used for cigarette/kretek production in Indonesia, the results of this study are not fully representative of all farmers, but they do provide a good understanding of the status of smallholder tobacco farmers in one important tobacco-growing area.

11. Third, the study did not examine the situation of clove farmers or the profitability of clove production in Indonesia. Both tobacco and clove farmers are vulnerable to changes in domestic demand for white and kretek cigarettes in Indonesia, because they both sell mainly to domestic manufacturers. Furthermore, both tobacco and cloves are expensive to produce. For example, the cost of domestic tobacco production was approximately Rp.30,000/kg (US$3.37/kg using Rp. 8900/US$ exchange rate), but the 2003 farm-gate prices for tobacco did not cover this cost, ranging from Rp. 20,000/kg (US$2.24/kg) to Ro.25,000/kg (US$2.80/kg. These prices were comparable with the price of imported leaf from China – US$2-$3/kg (which supplied 66% of Indonesia's tobacco imports), but lower than imported leaf prices from Zimbabwe – US$5kg (7% market share) and the USA – US$9/kg (5% market share) (Gain Report # ID2023, USDA 2002)[1]. In 2002, the Minister of Industry and Trade banned clove imports to Indonesia through decree No.538/2002 dated 5 July 2002, in order to protect Indonesia's clove farmers, because the relatively low price of imported cloves would have forced domestic clove prices down.

12. Although this study sheds some light on the situation of smallholder tobacco farmers, and how a future fall in domestic demand for tobacco might affect them, further work is needed to understand how

[1] USDA Foreign Agricultural Service: Gain (Global Agriculture Information Network) Report: www.fas.usda.gov/attache

best to help them to adjust to possible future changes in the tobacco market, and to examine the situation of clove producers in Indonesia.

D. Report Structure

13. To address the objectives described above, this paper is presented in five sections. The rest of this section provides a short contextual overview of tobacco production and marketing in Central Java and brief comments on clove farming, and then provides a summary of main findings from the quantitative analysis, which is recommended to readers with limited time.

14. Section II describes the methodology and basic assumptions used for the analysis. The quantitative results are discussed in Section III. The paper concludes in Section IV with brief commentary on the overall results and recommendations for continued research.

15. Following the narrative text there are three appendices with complete details of the main spreadsheet work. Appendix 1 gives a summary of all price, yield, and investment cost assumptions used to construct the original enterprise models. The complete set of enterprise budgets is given in Appendix 2. In Appendix 3, the results for each enterprise are ranked by different indicators to show how each possibility compares from a variety of financial perspectives.

E. Context: Overview of Tobacco Farming in Indonesia

16. Indonesia is the 7th largest tobacco-growing country in the world with significant numbers of farmers engaged in tobacco growing. In 2000, 925 thousand farmers grew tobacco either full time or part time, producing 157 thousand MT tobacco leaves (2.5% of global tobacco production). Most farmers produce other crops in addition to tobacco, but they often receive a higher cash income from tobacco than for any other crop.

17. Many tobacco farmers, especially in Java where large cigarette manufacturers are concentrated, sell their crops directly to cigarette companies. Others sell their crops to traders/middlemen in the form of cut tobacco leaves. Traders/middlemen usually cure the leaves for 2 to 3 days before reselling them to cigarette companies.

18. More than 98% of Virginia tobacco is used domestically to manufacture *kretek* cigarettes in which the crop is blended with cloves and other aromatic ingredients. Local consumers are the largest market for Indonesian kretek cigarettes, but Virginia tobacco still accounts for some 4% of total agriculture sector exports and contributed USD 172.3 million in gross foreign exchange earnings in 2001. Lowland tobacco, on the other hand, is more than 98% for export and is mainly sold on a pre-negotiated basis to buyers in Europe and other foreign markets to manufacture cigars. The total gross value of all tobacco exports in 2001 was USD 274.9 million including USD 91.4 million of unprocessed tobacco leaves; manufactured cigars accounted for only about 1.5% of total tobacco exports. Roughly 175,000 hectares were planted in Indonesia to all tobacco varieties in 2002.[2]

19. According to USDA data, tobacco leaf production in Indonesia decreased by 14% between 2000 and 2003 (157 thousand MT in 2000 to 135 thousand MT in 2003). Lower sales of cigarettes and kreteks in Indonesia and hence lower demand for local tobacco leaf is likely to have been an important influence in reducing the supply of leaf, but other factors also affect yields and production levels: weather conditions, the availability of technical and financial support to farmers, quality of seeds, and availability of pesticides/fertilizers. Farmers in Indonesia can be vociferous in expressing their concern about changing market conditions when they face lower prices or lower demand for their crops. The incomes and welfare of many small farmers may be highly vulnerable to market changes. Therefore, it is

[2] Trade and production data from FAO Stat (www.fao.org).

especially important in Indonesia to understand the situation of tobacco farmers, how changing demand for cigarettes and kreteks might affect them, how feasible it might be financially and technically for them to switch to new crops to substitute for lost income from tobacco, and what difficulties farmers face if they wish to change their crop production mix.

20. Important upland areas for Virginia-kretek tobacco include parts of Central Java (Temanggung Regency, Wonosobo, etc.), East Java (Bojonegoro Regency, Madura, etc), and Lombok in West Nusa Tenggara. Major lowland areas for cigar tobacco include parts of Central Java (Klaten Regency), East Java (Jember and Besuki Regencies), and North Sumatra (Deli Regency). The analysis here is based exclusively on data from upland and lowland areas in Central Java (mainly Temanggung and Klaten respectively) and it must be kept in mind that very different conditions could apply in other tobacco growing areas than covered here. Indonesia is an incredibly diverse country and the present study does not aim to provide a comprehensive picture of the costs and returns for tobacco in each of the many different locations where it is produced.[3]

21. One particularly important characteristic of Central Java, for example, is that farm sizes are normally extremely small with only about 0.25 to 0.5 hectares total land available to most households. While farm sizes in upland areas are perhaps slightly larger than in the lowlands, a clear challenge for smallholders in all parts of Central Java is to seek the maximum income from a very small parcel of land. This factor is important to keep in mind since no matter how attractive the rates of return are from an investment in agriculture, there is still a need for a high income earning crop to be included as part of the rotation. Tobacco has traditionally played this role in many of Indonesia's densely populated areas with a suitable climate, and any successful diversification strategy will need to ensure at least as much farmer income over the long-run. Because it is unlikely for any single crop to play as important a role as tobacco has in the past, any move to diversification will likely require new investments in market infrastructure and support services focused on high-value crops and improved farmer understanding of the available crop options.

22. In terms of actual production systems, it should also be noted from the outset that tobacco in Central Java is only one part of a complex rotation of different crops. In the upland tobacco areas, for example, Virginia-kretek tobacco may be considered the foundation crop around which most other agriculture production revolves, but is still grown during just one of three crop rotations per year and many other farm and non-farm enterprises are also important to each household's livelihood strategy. While there are many variations to the basic pattern depending on specific climate and location, a typical practice in upland areas is to follow tobacco almost immediately with corn, soybeans or some other relay crop that grows well before the start of the heavy rains. Then when that crop (or crops) is harvested, a second rotation of mixed intercrops such as garlic, green beans, cabbage, or onion is planted depending on the length of maturity for each product and time available before the next tobacco cycle must begin.

23. Less traditional crops are also being introduced in upland areas such as potatoes and even perennial crops like oranges, coffee, and nilam, which can be grown either as a permanent intercrop or pure stand on existing tobacco land. Because Virginia tobacco is mainly produced on volcanic mountains with a rough topography, irrigation is not normally possible in upland tobacco areas and this does impose some restrictions on crop opportunities. Conditions also vary greatly with elevation in that higher up areas generally produce a better quality tobacco and are more suitable for certain rotation crops than other areas further down. Most upland tobacco is grown by independent smallholder farmers rather than by a large estate.

[3] In Lombok, for example, there are numerous two-story, brick, diesel-fired leaf drying structures that are small-farmer owned and operated. These systems entail very different capital and operating costs from the crop budgets presented in this study of Central Java and would be a good focus for additional research.

24. In the lowland areas where a broader leaf tobacco is grown to manufacture cigars, a completely different system is in effect. While some regional variations may apply in different parts of Indonesia, lowland production in Central Java is mainly a reserve of the large parastatal company, PTPN-X. Importantly, this company does not actually own any of its own land for tobacco production and instead manages a system (first established by the Dutch colonial administration) in which it leases land from individual smallholders on a rotating basis. According to the terms of these agreements, PTPN-X assumes full responsibility for all aspects of crop production (including the procurement of crop inputs, construction of temporary irrigation canals and pumping stations, mobilization of hired labour, etc.) and then buys the tobacco from each landowner for an agreed price.

25. During the rainy season, lowland tobacco must be grown under cloth shelters with supplemental irrigation. Appropriately, this crop is known as *Tembakau Bawah Naungan* or TBN meaning "tobacco under shelter." In the dry season when rainfall is more moderate, protective shelters are not needed and the crop can be grown in the open with only natural irrigation. This type of tobacco is known as *Na oogst* and is less expensive to produce than TBN, but yields a lower quality leaf. PTPN-X is responsible for the cost of all infrastructure needed for lowland tobacco and pays an allowance to the landowner to recover their fields from these facilities when the system is moved to another location.

26. Implicit to this system of rotation farming, small landowners in lowland areas only have the opportunity of leasing their land to PTPN-X for tobacco production once every three to four years (equivalent to some nine or twelve crop cycles). Depending on the farmer's access to irrigation, typical crops grown in these lowland areas include rice, soybeans, groundnuts, and chilli. Farmers in some locations also give small areas to nilam, oranges and other high-value perennials as a way to supplement their income and provide more diverse earnings. A study of rice farmers in Klaten Regency, for example, found that roughly 1/3 of total household income comes from rice (including cash sales and household retentions), 1/3 from other agricultural crops, and 1/3 from family remittances and other non-farm sources.[4]

27. While any attempt to project the future impact of shrinking tobacco markets on household income is beyond the scope of the present study, these background factors all suggest that Indonesian growers may be reasonably well positioned to cope with gradual long-term change. In the first place, farmers in upland and lowland areas already seem to have fairly diverse sources of income and so should be relatively well prepared for a gradual shift in specific production patterns. Moreover, while specific public health policies could have (and indeed already have had) a major impact on the profitability of tobacco, local demand for kretek cigarettes remains strong and there are few signs of a long-term decrease in the number of Indonesian smokers. Lowland farmers are perhaps more vulnerable to a long term change in smoking habits in that cigar tobacco is grown mainly for export (and indeed about 20% less land was given to cigar tobacco in 2002 than at the start of the 1990s), but even in these cases, the unique characteristics of Indonesian tobacco are likely to ensure a strong place for smallholder participation in global cigar markets for many years to come.

F. CLOVE FARMING

28. Clove farmers may also be affected by efforts to reduce smoking in Indonesia. Although cloves are used for other purposes, 63% of Indonesia's total clove crop is used for making kreteks (World Clove Report- July 2003)[5] Kreteks account for between 85 to 88 percent of the domestic market for tobacco products. Kreteks contain 40% cloves, 30% Indonesia type tobacco and 30% Virginia type tobacco.

[4] Pearson, et. al. (2003).

[5] http://www.spizes.com/spiceonline/cropreport/reports/200372183.asp?cropid=183

29. Indonesia is the single largest clove producer in the world; producing 79 thousand MT or 63% of global clove production in 2000. Most (98%) of the cloves are produced by smallholder farmers; the rest are produced by commercial (1.6%) or government-owned farms (less than 1%). More than half of all clove farmers are located in 2 provinces: in 1999, Central Java had 394 thousand farmers (33%) and West Java had 240 thousand farmers (20%). More than half of the cloves produced came from 5 provinces: Central Java (13%), Central Sulawesi (12%), South Sulawesi (11%), West Java (11%), and North Sulawesi (10%) in 2001.

30. The domestic market for cloves has been through some difficult times recently. From 1996-2000, total land devoted to cloves shrank by 13 percent from 492 thousand ha in 1995 to 430 thousand in 2000; there was a 12% decrease among small farmers and a 32% decrease among commercial clove farmers. Total production fell by 12% from 60 thousand MT to 53 thousand MT during this period. This suggests that the kretek industry turned to imported cloves to satisfy its increasing demand while domestic clove production decreased.

31. It appears that the price of cloves, marketing regulations, and a high dependency on the domestic market played a significant role in the fall in domestic production between 1990 and 1998. In 1992, presidential decree No.20/1992 stipulated that cloves would be purchased from farmers by Village Unit Cooperatives (KUD) at a price fixed by government. Then the KUD could sell cloves at a fixed price to the clove marketing monopoly BPPC, which was established in 1990. If the world market price increased, the BPPC would apply the increase to clove prices when selling the cloves to kretek manufacturers. The result was that clove farmers often received a price that was well below the world market price during this period. When the BPPC was abolished in 1998, farm-gate clove prices increased sharply by 95% compared to the price in 1997. In 1999, clove prices increased again by 169% over 1998 domestic prices because of the currency devaluation during the financial crisis of 1998-99. With the return to more market-driven mechanisms, domestic sales of cloves increased 22% from 108 thousand MT in 1997 to 139 thousand MT in 2002 and the number of clove farmers was reported to increase from 1.18 million in 1999 to 1.48 million in 2002.

32. Although the interest of clove farmers and tobacco farmers are both closely tied to trends in domestic demand for kreteks and other cigarettes, marketing, trade and pricing policies for the two commodities have differed, and the situation and future prospects of clove farmers are not considered in this report, but may also need consideration.

G. Summary of Main Findings of Study

33. The main findings of this study are perhaps best read by turning to Appendix 3 where the financial results for each enterprise are ranked by selected indicators to show how the different crops and management possibilities compare from a variety of financial perspectives. While these indicators do not show which crops a farmer would be most likely to choose or which enterprise could serve individual households best, the data do point to a number of important trade-offs between different management decisions and can help identify areas of possible growth.

34. As shown by the financial indicators in Appendix 3, the overall the results of the analysis are encouraging and suggest that there are many other crops likely to offer a potential for similar (or better) net profits and rates of return than tobacco. While the markets for these alternative enterprises are generally far more limited than those for tobacco (such that no single enterprise could ever be expected to play the same dominant role), the analysis shows that chilli, potatoes, nilam, and oranges all have the potential to provide as much or greater total profits than tobacco and may even yield better rates of return to a farmer's an investment in labour and other production costs. As Indonesia looks to the future, therefore, agricultural planners may do well to focus on the type of investments smallholders need to succeed with these new enterprises, such as the development specialised support services and the expansion of private trading networks to areas where tobacco is now grown. Especially in the case of

perennial crops with a long maturity period, the shift away from tobacco can difficult or very risk in terms of less certain cost structures, unknown market outlets, high establishment costs, and limited availability of seasonal and long-term credit. Considerable efforts will be required to overcome these and other practical barriers for tobacco farmers to take advantage of the diversification opportunities this report suggests are available.

35. With respect to total production costs, the data show that tobacco is relatively expensive to produce and demands large cash expenditure before sale at each management level. Compared with other enterprises, only chilli and high input garlic appear to require more cash before sale than Virginia-kretek tobacco. The data also show that tobacco requires a very large amount of labour, estimated at 521 to 918 days per hectare depending on the intensity of management. Especially at the more profitable medium and high input management levels, therefore, these labour requirements are considerably more than for most other crops and likely to require some producing households to hire in labor.

36. From the income side, the data show that tobacco offers some of the best potential for high producer profits compared with most other activities. Although the estimated profits rank somewhere near the middle of all other enterprise variations with low-input management, the total income more than doubles at the medium and high-input levels where only potatoes and chilli seem likely to offer a potential for greater income. Because the costs of production for tobacco are also much higher at these more profitable management levels, however, many households may have little choice but to produce at the least profitable low-input level and so could perhaps enjoy more income and better rates of return from a gradual shift to other, less traditional, crops. This is not to say that all farmers could ever switch entirely to chilli, potatoes, oranges, nilam or any other single crop since the market demand for these commodities is much smaller than for tobacco. Over time, however, there does at least appear to be good financial reason to give increased priority to these enterprises as possible substitutes for some of the income currently generated by tobacco.

37. In terms of protection from shrinking tobacco markets, the data suggest that average farmgate prices for upland tobacco could fall by some 46-76% from the assumed levels on average before the crop would return a financial loss. Although Indonesia's ability to compete in world tobacco markets also depends on the costs of production compared with other tobacco growing countries, this finding is important and suggest that tobacco is likely to remain an attractive crop option under progressively difficult market conditions for some time to come. This statement is not to suggest that Indonesia can afford to be complacent in terms of promoting new crop enterprises in tobacco areas, but the relatively robust results do at least suggest that time may be on Indonesia's side as it works to develop other high-value crop substitutes.

38. Because the question of price is so extremely important to the long-term future of tobacco production, a sensitivity analysis of the effects of a policy introduced in 2002 to cap the tar and nicotine content of kretek cigarettes was carried out. Under this policy farmers were told that cigarette manufacturers could no longer use what had always been considered the very highest grades of tobacco (i.e. the leaves with the highest tar and nicotine content after ripening) in as great of quantities such that the prices for C-grade tobacco and above were cut by 50-90%. As a result of these new prices, the analysis here shows that tobacco went from providing a positive income of some IDR 4.1 to 10.0 million (USD 465 – 1,132) per hectare under normal conditions, to an estimated *net loss* of IDR 3.2 to 4.2 million (USD 371 – 477) per hectare in 2002.

39. While this specific public health measure has now been rescinded in favour of mandatory labelling of tar and nicotine content on cigarette packs, these data are a clear example of how anti-smoking measures can sometime have a major unforeseen effect on farmer income. It may not have been possible to predict such a dramatic impact on crop profitability when the policy to cap tar and nicotine content was devised, but the analysis clearly demonstrates the importance of looking at this risk in some

detail and suggests that greater attention should be given in the future to ensure that new public health measures at least have a more neutral price effect.

40. Other than tobacco, the alternative crops are divided into three broad categories including staple crops (rice, corn, and groundnuts), horticultural crops (chilli, potatoes, carrots and garlic), and perennial crops (nilam and oranges). First, with respect to staple commodities, the data show this group of products only provides about 28 – 37% as much total income compared with upland and lowland tobacco. For this reason, it is unrealistic to expect that such staples could ever substitute for tobacco in terms of total cash income. Any loss of tobacco revenue from shrinking tobacco markets for households that do not have the ability to grow and market some other high-value substitute could be particularly severe. On the other hand, rice, groundnuts, and corn together with other staple rotation crops like soybeans do play many important roles in terms of their contribution to household food security and maintenance of soil fertility and should not be neglected in the further analysis of diversification opportunities or formulation of effective development strategies.

41. Of the horticultural crops, the four commodities covered here include some of the highest and lowest value farm products selected for analysis. At specific management levels, for example, chilli and potatoes appear to far surpass tobacco in terms of the potential for total farmer income and attractive returns to total production costs and labour input. On the other hand, the financial indicators for carrots and garlic are some of the poorest results compared with all other enterprises and show that these specific products yield very little profit and poor rates of return at most management levels.

42. Finally, with respect to the perennial crops, the data suggest that nilam and oranges have good potential to surpass tobacco in terms of total farmer income and attractive rates of return to labour and other production costs. Success with a perennial enterprise, however, depends on being able to afford the initial establishment costs before the crop produces its first income. Intercropping with tobacco, rice and/or other seasonal commodities can help smooth this cash flow requirements during establishment, but farmers must still weigh the benefit of future returns from a long-term investment in a perennial compared with the more immediate need for a regular income from a seasonal activity. Unlike staple and horticultural crops, which are normally grown in rotation with tobacco, any land given to a perennial enterprise automatically takes away from the total space available for tobacco.

43. Many additional conclusions besides those noted above can be drawn from the detailed financial indicators calculated for this study. Farmers, agricultural administrators, government policy makers, and international donors are all likely to interpret the data differently with an increased emphasis on their particular area of concern. Once a basic set of enterprise models have been prepared, however, it is very easy to use computer software to test the effects of alternative yield, price, and input-use assumptions. At the very least, it is hoped that the analysis helps to demonstrate the benefits of this approach to sector review. The methodology adopted here cannot point to optimal farm strategies for individual growers, but can help to understand some of the trade-offs farmers and agricultural policy makers face on a day-to-day and long-term basis.

II. METHODOLOGY

44. In describing the methodology, the indicative nature of this study should first be emphasised. Although great care has gone to ensure that the analysis reflects the actual costs and returns for smallholder tobacco and other crops in Central Java to the best extent possible, the actual situation for individual growers can vary greatly depending on local climate, regional market opportunities, different factor prices (including local minimum wage rates), and the relative use of family vs. hired labour for specific tasks among other considerations.

45. It is therefore necessary to think of the results that follow as a continuum of possibilities rather than a literal expression of the actual costs and returns for individual growers. It should also be emphasized that the analysis cannot point to optimal or best farm strategies. Profitability, risk, operating costs, and investment requirements are critical to the process of farm decision-making, but only tell part of the story. Many other demand-side factors, including long-term price trends, consumer preferences, and processing capacities must all be considered in deciding which enterprises should be promoted and how best to allocate scarce investment resources.

A. General Considerations

46. Probably the two main challenges in preparing the type of meaningful enterprise budgets needed for this indicative study are first to apply realistic yield and input assumptions and second to value these basic coefficients in a consistent and proper way. While someone may always want to query the type of prices and production coefficients the analyst applies, the aim is not to present a scientifically precise picture of farm conditions based on an extensive survey or detailed estimates of supply and demand elasticities. The analyst must still strive to present a realistic picture of current cost structures, but it is equally important to compare each enterprise on as common as grounds as possible in order to understand the general impact of different management decisions and likely effects of new tobacco control measures.

47. **Management levels**. In this context, the analysis is based on a spectrum of management possibilities broadly intended to reflect typical and improved smallholder practices. Farmers all make their own decisions based on personal circumstances this approach helps to minimize the need for statistical accuracy in that most farmers should fall somewhere within the overall management continuum. This approach can also be used to identify where the greatest benefits from intensification might be found and how the management options for different crops compare.

48. Each successive management level is based on progressively more intensive input use (improved seeds, fertilizer, agri-chemicals), improved crop husbandry (timelier planting, better weed and pest control, etc.) and better yield results. In broad terms, ***low-input*** management is meant to reflect fairly basic farm practise characterised by relatively little use of purchased inputs and generally unimproved management. Because farmers producing at this level tend to be the most cash poor, low-input farmers are assumed to use relatively more family labour than hired labour compared with the other, more advanced production levels. Next, the second, or ***medium-input*** level is intended to reflect the type of increment small farmers could realistically achieve from a modest expenditure on additional inputs and improved crop husbandry. Finally, the third, or ***high-input*** management level, is meant to reflect the type of output a good farmer might realistically expect by using most recommended inputs and generally sound crop husbandry.

49. **Per hectare analysis.** So that the results for each management level can be compared directly, the analysis is carried out exclusively in per hectare terms. Because most smallholder farmers in Central Java only have access to some 0.25 to 0.5 hectares of land in total, however, it must be kept in mind that the results discussed here tend overstate the true costs and returns for individual growers by a considerable extent. More detailed analysis based on typical plot sizes and combinations of crops grown throughout the year for a typical farm would be required to build a better understanding household income sources and the relative importance of tobacco in a typical crop cycle.

50. **Data collection and limitations.** As described, a research team from the Institut Pertanian Stiper (INSTIPER) in Yogyakarta facilitated local data collection and provided much of the crop budget information used for this analysis. Detailed Methodology Guidelines were provided to the local team in advance of a 10-day mission to Central Java during which field visits were carried out in the major tobacco growing areas around Yogyakarta. During this mission, discussions were held with smallholder

farmers, tobacco traders, farmer representatives, extension workers and others with firsthand knowledge of current farm conditions and smallholder cost structures.

51. The INSTIPER team also provided a volume of data from current and past student research projects on the costs of production for tobacco and other crops. Although these surveys gave a broad overview of the costs and returns for different enterprises, it was sometimes difficult to interpret the student data and estimate reliable per hectare budgets that reflect typical low, medium, and high-input management practices. This is partly due to the small sample size of the surveys in which only 20-40 farmers were interviewed for each enterprise. Because of this, meaningful averages could not be calculated for low, medium, and high input farmers without the risk of outlying results distorting the overall picture. Indeed, many farmers in each area may produce well beyond the boundaries of the management spectrum captured by the student data with some growers using significantly more advance or more basic technologies than indicated here.

52. For these reasons, there is a strong imperative to verify the production budgets to ensure the models cover a realistic spectrum of management possibilities. While every possible effort has been made to ensure the crop models provide a reasonably accurate picture of current farm conditions, the analysis should be seen as a starting point for further investigation. It would be extremely helpful, for example, to take a closer look at such factors as the yield responsiveness to fertilizer, the amount of labour required for specific tasks, and the relative use of hired vs. family labour by different categories of farmer as some of the factors with the greatest bearing on overall costs and profitability. It was not always possible to gauge these and other key production coefficients with great confidence from the INSTIPER data and this limitation should be kept in mind when interpreting the results that follow.

B. Main Assumptions

53. This section describes the main assumptions and procedures applied during the construction of original, multi-level enterprise budgets. While every effort was made to ensure that the results for other commodities are as comparable as possible, the same procedures do not apply to the coverage of TBN/Na oogst tobacco, rice, and oranges. Full details of all yield, price, and investment costs assumptions are given in Appendix 1.

54. **Yield.** Yield assumptions are intended to reflect the output farmers in Central Java can expect in a year with normal growing conditions using the inputs costed in each production model. These assumptions are based on INSTIPER survey data and other information collected during field work including primary discussions with farmers and other crop experts with first hand knowledge of current growing conditions.

55. **Agricultural conditions.** Output assumptions applied at each management level reflect the type of yield a farmer might realistically expect in a year with "normal" rainfall and other "typical" growing conditions. Sensitivity test of the impact of drought or other unusual growing circumstances could be modelled as a next step using the basic enterprise templates.

56. **Location.** All production budgets are based on conditions in the upland and lowland regions around Yogyakarta in Central Java. As shown in Table 1, some crops can be grown in both upland and lowland areas. In these cases, the analysis covers only one indicative location corresponding either with the main area of production or a mid-range location somewhere between the two primary tobacco areas. More detailed research is needed to identify any possible differences in yield, input use, and factor prices that may apply between these upland and lowland areas which may have significant impact on costs and profitability.

57. **Prices.** The analysis is carried out exclusively in financial terms using observed market prices that prevailed at the time of local data collection (March 2003). Considerable care was taken in deciding on specific price levels to ensure a realistic relation between the value of different crop inputs and

outputs. By applying this set of standard price assumptions to the analysis of each commodity, any risk of distorting the results with more favourable prices for some particular factor is minimized. This approach is important in cross-commodity comparisons so that each activity is compared on as equal grounds as possible.

58. **Imputed prices.** Unless noted, imputed prices refer exclusively to the implicit opportunity cost value of self-saved seed and other crop inputs for which direct cash expenditure is not required. This distinction is important because crop enterprises with a large cash requirement may be difficult for an individual smallholder to afford.

59. In the specific case of self-saved seed the imputed value is estimated with references to the foregone income from selling that crop plus a 50% premium to account for the cost of storage and possible price increases between harvest (when local supplies are plentiful) and the time of planting (when local supplies are more scarce). An imputed value for family labour has not been estimated since this input is treated differently as discussed below.

60. **Crop marketing.** For all crops, it is assumed that a village trader comes to the rural area and buys the product directly from the farmer at the immediate farmgate. Such practice is common in Indonesia since buyers further up the marketing chain generally discourage farmers selling directly at the factory and prefer instead to deal with a few established traders or wholesale agents (middle-men) known to them personally rather than thousands of individual farmers. Because each link in the marketing chain naturally takes their own cut from the final retail price, there could be some significant opportunities to improve crop profitability for primary producers by promoting new marketing systems that bring farmers closer to the final buyer.

61. **Labour.** The relative use of family and hired in each crop budget is based on typical practices reported by individual farmers with a proportionate adjustment made to account for the rigor of each management level and maximum number of days available to carry out specific tasks. At the low input level, for example, farmers are assumed to make relatively more intensive use of family labour to save costs compared with medium and high input farmers for whom cash finance is not normally as great a constraint.

62. For hired labour, the standard wage rate used for all tasks is set at IDR 8,000 (USD 0.90) per day. This is an approximate average of the different wage rates reported during field work which varied from IDR 4,000 (USD 0.45) to IDR 15,000 (USD 1.69) depending on the difficulty of the task, number of hours worked, and whether male or female labour is used. Because hired labour account for a significant share of total production costs, actual wages rates and the specific use of family vs. hired labour for specific tasks can have a major impact on total costs and profitability. It would be extremely useful to focus on this component of the enterprise models in particular during any possible follow-up or verification exercise.

63. **Family labour.** An imputed wage rate for family labour has not been estimated. Family labour does not require an actual expenditure of cash and its best value is given only by the foregone wage that could be earned from employment in the next best alternative. Rather than risk potentially serious error by estimating an opportunity cost price, therefore, the approach taken is to simply reinterpret crop profits as the returns to family labour. Whether or not it makes sense to continue with farm production, therefore, depends in part on each grower's own judgement of whether the daily returns from agriculture are better than they could earn by some other type of enterprise.

64. **Tillage.** All tillage for the crops analysed here (except perhaps rice, where CASER/USAID data were used) is assumed to be carried out manually using a combination of hired and family workers. Because of the intensive system of rotation farming operated in Central Java, however, the labour spent on tillage for one crop often benefits the next crop making it difficult to know exactly how to charge the cost of this labour in the enterprise models. While many different approaches could be used, the approach

here was to charge labour only to each specific crop it directly benefits. Therefore, because the main tillage in most areas begins with tobacco production, a larger amount of labour is included in the budget for this enterprise than most other crops.[6]

65. **Transport costs.** For the transportation of fertilizer and other heavy inputs to the farm, a standard price of IDR 5,000 (USD 0.56) per 50kg bag is added to each production budget. The only exception to this is the case of manure where the standard price of IDR 450,000 (USD 50.56) per 5mt load already includes transportation to the farm. For crop outputs where some form of transportation is needed before sale (drying of tobacco, for example) a standard price of IDR 5,000 per 40kg basket is added to the total cost.

66. **Crop financing.** Credit obligations are included as a cash cost after sale in each production budget. Because farmers all make different arrangements for crop finance, the analysis is based on a simple assumption that 35% of all cash costs before sale (excluding hired labour) are covered by a loan to be repaid with 50% flat interest. Some farmers may borrow for more than this share of total crop costs, but not all loan disbursements are taken on day one and so would attract less interest overall. The use of 50% flat interest is based on typical rates charged by village moneylenders, which are one of the most common sources of crop finance for an individual smallholder due to the many problems of accessing credit through formal financial institutions. More detailed analysis of alternative financing arrangements could be carried using the basic enterprise models to examine different types of finance that might be promoted under some new smallholder financial services project for example.

67. **Exchange rate.** A financial exchange rate of IDR 8,900 = USD 1.00 has been applied to convert foreign and domestic prices as needed. Because the exchange rate for the Indonesian Rupiah has fluctuated greatly since the Asian monetary crisis, a good area for further analysis would be to consider the impact of alternative exchange rates on crop profitability.

68. **Investment costs.** The annual per hectare cost of durable investment items with a useful life spread over more than one season have been estimated for upland and lowland regions. Briefly, the approach taken was to determine the so-called capital recovery cost of each fixed investment required by different crops. Specifically, this cost is the payment per single crop rotation that will repay the cost of the fixed input over its useful life and provide an economic rate of return on the investment. This approach has the advantage over the simple division of an input's value by its useful life as it accounts for the fact that if the farmer did not purchase the input, the money could have been invested in some other on- or off-farm enterprise.[7]

69. Capital recovery costs have been estimated for different sets farm equipment including a standard cost for a set of basic hand tools (hoe, sickle, sprayer, storage shed, etc.), specialised tobacco equipment (drying mats, chopping knife), and incremental chilli equipment (additional sprayers, watering cans, etc.). On this basis, standard enterprises such as groundnuts and corn only have to cover the capital recovery cost of basic hand tools whereas Virginia-kretek tobacco must cover the cost of basic hand tools plus the

[6] A good area for further research would be to look at this question of labour allocation between different crops in more detail. This is one area in particular where it was difficult to interpret the INSTIPER survey data and, in nearly every case, different allocations of hired labour (including assumptions about the length of a typical workday) can have a major effect on crop profitability.

[7] Annual cot per hectare = purchase price of implement * per hectare share of use * capital recovery factor. CRF = ((1+i)^n)*i/(1+i)^n-1 where i = real interest on savings and n = number of years in the implement's useful life. For more detailed information on this methodology see Monke and Pearson (1989), *The Policy Analysis Matrix for Agricultural Development*, Cornell University Press, Ithaca; or Gittinger JP (1982), *Economic Analysis of Agricultural Projects*, Economic Development Institute of the World Bank, 2nd Edition, Johns Hopkins University Press, Baltimore and London.

additional cost of specialized tobacco equipment. Chilli must cover the cost of basic hand tools and incremental chilli equipment. For tobacco, three levels of specialized equipment requirements have been estimated based on the number of drying mats and other requirements to produce at the low, medium, and high input management levels respectively.

70. A similar approach has been applied to the analysis of nilam, which is a perennial crop grown over a 3-year cycle. In this case, the establishment costs in Year 1 before the nilam comes into full production are capitalized and treated as an investment item. Because nilam gives some yield in Year 1, however, this income is also taken into account and treated as a negative cost to derive the overall capital recovery cost for the establishment of this enterprise.

C. Financial Indicators

71. The spreadsheet models calculate a range of financial indicators that help interpret the costs and profitability of each enterprise. Unless noted, all values are expressed in per hectare terms to allow cross-commodity comparisons.

72. **Production costs.** A total of nine different measurements of production costs are calculated for each enterprise as described below. Of these measures, cash costs before sale, imputed costs before sale, total variable costs, and total production costs (which include all cash and imputed costs before sale plus long-term depreciation) are probably the most important to understanding how farmers might see the financial requirements of each enterprise.

- **Cash costs before sale** are inputs that must be paid for before the crop is sold including purchased seed, fertilizer, agrochemicals, hired labour, and transportation. These costs must either be financed with seasonal credit or income from some other on- or off-farm activity.
- **Imputed costs before sale** are inputs that do not require an actual cash expenditure such as recycled seed or manure fertilizer collected from the farmer's own animals. The value of these inputs is given by the best approximate opportunity cost value as described above. These costs do not include family labour.
- **Total costs before sale** are the sum of all cash and imputed costs identified above and represents the total financial outlay (excluding family labour) required to produce each commodity using the skills and inputs assumed for each management level.
- **Cash deductions after sale** include all cash costs incurred after the crop is sold such as land tax, market fees, and credit repayment. These costs normally represent less of a burden since they are incurred when the grower should be relatively flush with money after their product is sold.
- **Total cash costs** are the sum of all cash costs incurred both before and after crop is sold.
- **Total variable costs** are the sum of all cash and imputed costs (excluding family labour) incurred on a seasonal basis.
- **Capital recovery costs** measure the per hectare share of depreciation on fixed investments as described above.
- **Total production costs** include all variable costs (cash and imputed costs excluding family labour) and depreciation on fixed investments.

- **Total cost per ton** is a simple measure of the total production costs divided by total yield and is useful for cross-country and other comparisons based on different technology.

73. **Farmer income.** Farmer income is measured in gross and net terms. Gross profit shows the seasonal income from each enterprise; net profit measures the ability of each activity to cover the long-term depreciation of fixed assets.

- **Gross profit** = total revenue – total variable costs (excluding family labour)
- **Net profit** = gross profit – capital recovery costs

74. **Rates of return.** The returns to variable and total costs are measured as follows. Enterprises with a high ratio provide a better return to the expenditure on variable and fixed inputs than those with a low ratio.

- **Return to variable costs** = gross profit / total variable costs
- **Return to total costs** = net profit / total production costs

75. **Labour.** In addition to the estimated number of days of family and hired labour required for each enterprise, the gross profit per day of family labour and per day of total labour are calculated as follows. Because farmers all use different combinations of family and hired labour, the return per day of total labour is probably the more meaningful of these two indicators.

- **Gross profit per day family labour** = gross profit / days family labour
- **Gross profit per day total labour** = gross profit / days total family and hired labour

D. SENSITIVITY INDICATORS

76. Of the risks farmers face, variations in yield and price are among the most important. These risks are particularly evident in the case of tobacco due to the crop's sensitivity to climatic variation and other mounting pressure from international health organizations, anti-smoking groups, and new trade and market protocols among other factors. Because fluctuations in yield and price are of direct importance to farmer profitability, the yield and price at which (all else being constant) each enterprise would return a net profit equal to zero has been calculated. A crop that is able to withstand a relatively large drop in price or yield before returning a financial loss is said to be more robust than those where only a small variation results in the loss of all profits.

77. When considering crop risk, farmers must make an additional calculation of how likely a variation in yield or price will be. A crop that is able to withstand only a small variation before returning a financial loss could be entirely acceptable from the farmer's point of view if the crop is certain to attract the expected price or the yield is known to be very stable. Speculative enterprises with less certain price and output structures involve greater risk no matter how large a variation is needed to erode all profits. As all investors do, farmers must consider ways of spreading their risk between crops that return a high profit and those that provide a stable income.

III. DISCUSSION OF FINANCIAL RESULTS

78. This section presents the quantitative results for all activities analysed by major crop grouping. For each activity, a brief description of relevant production and marketing issues is followed by a narrative interpretation of the detailed financial indictors. Concise summary tables for each enterprise accompany this discussion. The complete set of enterprise model is given in Appendix 2 and the financial indicators from these budgets are ranked in Appendix 3 by key financial indicators to show how each crop compares from a variety of perspectives.

79. No matter how the results are interpreted, it should be stressed before proceeding with this section that the analysis has been prepared mainly to stimulate discussion of various opportunities for agricultural growth and diversification and cannot point to optimal or best farm strategies for individual tobacco growers. Profitability, risk and production costs are important to the process of farm decision-making, but only tell part of the story. Each grower must consider their own cash flow requirements, distance to market, local climate and personal preferences among other factors in deciding which crops to grow. Many other farm enterprises besides those covered here also offer diversification potential including spice crops, tea, coffee, citrus, medicinal plants and speciality vegetables. These and other crops all have the potential to provide an important source of farm income and the challenge for each grower is to find the mix of enterprises that works best for them.

A. TOBACCO

80. As described, there are two main types of tobacco grown in Indonesia including a type of Virginia tobacco used to manufacture kretek cigarettes and a broader leaf tobacco used to manufacture cigars. Virginia-kretek tobacco is mostly produced in the upland areas and cigar tobacco is produced in the lowlands. Cigar tobacco is grown under shelter as TBN tobacco in the rainy season and in the open as Na oogst tobacco in the dry season.

Virginia-kretek tobacco

81. In specific upland areas of Central Java (around Sindoro and Sumbing mountains, for example), Virginia-kretek tobacco is the main agricultural activity and the production of most other crops revolves around this enterprise. In these upland tobacco areas, Virginia-kretek tobacco is normally planted early in the dry season (mid-March to early-April) on plots ranging from just 0.1ha to 1 ha per household (a plot of 0.25 to 0.4ha may be considered typical). Harvesting generally begins at the start of July and continues through until the end of September with higher quality leaves and better prices usually prevailing later in the season. Before the leaves can be sold, they are first ripened in a heap covered by banana and coconut leaves for four to seven days and then sorted on the basis of quality. Sorted leaves are then chopped either by hand or with a cutting machine and left to dry on rattan mats in the sun before being packed in 40kg baskets.

82. In this way, most smallholder tobacco is sold as a “dry chop” to any number of small traders or local collectors working on behalf of the large cigarette manufacturers who come to the village and negotiate a price based on quality directly with the farmer. There are three major cigarette companies in Indonesia that manufacture kretek cigarettes including Gundang Garam, Jarum, and Bentoel. Although the tobacco industry is competitive between these companies, individual farmers often have little leverage in negotiating with the village traders and must normally accept whatever price is offered. Smallholder farmers in some areas have the option of selling tobacco directly to the large factories, but the prices offered at the factory gate tend to be lower than those from a village trader.

83. Quality designations for Virginia-kretek tobacco range from A to F where A-grade tobacco is the lowest and F is the highest because of the improved colour, taste, and thickness of the leaf. Mostly, the top leaves of the plant give the best quality, and farmers in higher elevations generally produce a greater percentage of better quality tobacco than those at low elevations. Importantly, tobacco leaves from about C-grade up contain a higher tar and nicotine content after ripening and so are traditionally the most sought after by cigarette manufacturers. In a normal year there is often as much as IDR 20,000 to 30,000 (USD 2.25 to 3.37) difference between A-grade tobacco and the better quality D, E, and F-grades. F-grade tobacco is the best quality and is called *srintil*.

84. Tobacco seedlings must be transplanted from a nursery usually established in late January to produce a strong flush of young plants at the start of the planting season. Farmers may either grow their own nursery or buy young plants from a neighbour or other commercial producer. The usual price for young seedlings is IDR 15,000 – 30,000 (USD 1.69 – 3.37) per 1,000 plants and an analysis of nursery production carried out for this study found that it costs and estimated IDR 17,360 and 10,240 (USD 1.95 – 1.15) to produce 1,000 plants on an individual or large commercial scale respectively. Whether or not it makes financial sense for a farmer to grow their own nursery, therefore, depends on whether they expect to pay more than IDR 17.36 per plant along with a variety of other considerations such as the risk of using bought seedlings vs. the additional financing burden (cash requirement) of growing their own nursery. For the commercial unit, the cost per plant of IDR 10.24 shows this can be a lucrative business assuming a minimum selling price of IDR 17.36.[8]

85. Financial results for Virginia-kretek tobacco produced at a mid-elevation with a typical distribution of different quality leaves are given in Table 2. These data are based on the typical selling prices prevailing in a so-called "normal" year. Because these prices were dramatically affected in 2002 by a (now rescinded) policy that sought to impose strict caps on the tar and nicotine content of kretek cigarettes, a sensitivity test looks at the effects of this policy on crop profitability as described below.

Table 2: **Financial Indicators for Virginia-Kretek Tobacco (normal prices).**

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
YIELD (Kg dry chop per ha)	600	950	1,200	600	950	1,200
PRODUCTION COSTS (per ha)						
Cash before sale	7,605	9,873	12,907	855	1,109	1,450
Total variable costs	8,404	10,844	14,162	944	1,218	1,591
Total production costs	**9,029**	**11,571**	**14,911**	**1,014**	**1,300**	**1,675**
Total cost per ton	15,048	12,180	12,426	1,691	1,369	1,396
LABOUR						
Hired labour (days/ha)	316	430	568	316	430	568
Family labour (days/ha)	205	263	350	205	263	350
Total labour (days/ha)	**521**	**693**	**918**	**521**	**693**	**918**
Gr. return per day total labour	9.1	13.7	11.8	1.03	1.54	1.32
FARMER PROFIT (per ha)						
Gross profit	4,766	9,471	10,822	536	1,064	1,216
Net profit	**4,141**	**8,745**	**10,073**	**465**	**983**	**1,132**
RATES OF RETURN						
Return to variable costs	0.57	0.87	0.76	0.57	0.87	0.76
Return to total costs	0.46	0.76	0.68	0.46	0.76	0.68
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-33%	-42%	-40%	-33%	-42%	-40%
Chg in price to np = 0	-46%	-76%	-68%	-46%	-76%	-68%

[8] The per hectare analysis of crop profitability assumes the farmer buys seedlings from an outside nursery for IDR 25,000 (USD 2.81) per 1,000 plants. Normally, there are 17,000 to 18,000 individual plants per hectare.

86. Several conclusions may be drawn from these data. First, in terms of total production costs, the analysis shows that tobacco is relatively expensive to produce and demands large cash expenditure before sale at each management level. Compared with other enterprises, only chilli and high input garlic require more cash before sale than Virginia-kretek tobacco. The data also show that tobacco requires a very large amount of labour at some 521 to 918 days per hectare depending on the intensity of management. Especially with medium and high input management, these labour requirements are considerably more than for every other enterprise except chilli and are likely to impose a severe burden on individual households (especially for poorer households with a shortage of active workers and limited capacity to pay for hired workers). Taken together, these very high costs mean that many tobacco farmers may have little choice except to produce somewhere around the low input level, which is notably less profitable and gives lower rates of return to all production costs (including labour) than appear possible in cases where the grower can afford medium or high-input management.[9]

87. In terms of farmer income, the data show that tobacco offers some of the best potential for high producer profits compared with every other activity. Although the estimated profits rank somewhere near the middle of all enterprise variations with low-input management, the total income more than doubles at the medium and high-input levels where only potatoes and chilli seem likely to offer an potential for greater income. Importantly, this conclusion is not to say that all farmers could ever switch to chilli and potatoes since the total market demand for these crops is much smaller than for tobacco and other specific skill and resource constraints also limit the substitution potential of these crops in the long-run. Oranges are another example of a potential long-term substitute in that the net profits from this crop could perhaps far exceed the current income from tobacco, but here again, less certain market conditions together with very high establishment and production costs for oranges mean that tobacco is still likely to be a far more practical option for in the majority of cases.

88. With respect to the returns to labour, it may be noted that tobacco provides a daily income greater than typical minimum wages in Central Java at all production levels. Nevertheless, at a range of just IDR 9,100 to 13,700 (USD 1.02 to 1.54) these daily returns are lower than for every other enterprise analysed here except carrots, garlic, and rice, which sometimes provide an income less than minimum wage.

89. In terms of the cost per ton, the data show it costs about IDR 12.1 to 15.0 million (USD 1,400 – 1,700) to produce Virgina-kretek tobacco. Although specific taste and quality differences between the Indonesian and Zimbabwean Virginia tobacco mean that a direct comparison of production costs is not entirely fair, it is perhaps interesting to note that the costs of smallholder tobacco in Central Java are about USD 500 to 800 greater per ton compared with small-scale Virginia tobacco in Zimbabwe and about USD 400 to 600 greater per ton compared with large-scale commercial producers.[10] Although the farming sector in Zimbabwe has undergone significant change since these cost calculations were made two years ago, Zimbabwe has long been one of the world's leading producers of flue-cured Virginia tobacco and these estimates could suggest that Indonesia may have an increasingly difficult time competing in the global tobacco markets in the future. An interesting area for further analysis would be to compare the costs per ton for Indonesia with other major tobacco producing countries such as Brazil, USA, and China.

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[9] Because of the very intense system of rotation farming practiced in Central Java, it was difficult to know exactly how to attribute the labour for common tasks such as land tillage between different enterprises. As described in the methodology section, the approach taken was to assign labour costs to the budget for the immediate crop for which that task is performed. In practice, this means that about 50-60 additional days labour are required for tobacco since land cultivation typically begins with this enterprise (for most other crops it is assumed that only a quick cultivation is carried out between rotations). Further analysis could look at the impact on crop profitability of sharing this labour cost more evenly between different rotation enterprises.

[10] Calculations based on data from Keyser, 2001 and 2002.

90. Regarding the sensitivity indicators, the data for Virginia-kretek tobacco show that the crop could withstand approximately a 33% to 42% reduction in yield from the assumed levels before this enterprise would return a net loss or approximately a 46% to 76% reduction in overall average price. These results are encouraging and suggest that tobacco has the potential to remain profitable under significantly more adverse production and marketing conditions than assumed here. Although a comparison with other enterprises such as nilam, groundnuts, corn, and potatoes shows that these other crops may offer relatively more protection from variations in yield and price than tobacco, the results for tobacco are still quite favourable and suggest that there are likely to be strong incentives for Indonesian farmers to continue with this enterprise.

91. Because the question of price is so extremely important to the long-term future of Virginia-kretek tobacco, a more detailed sensitivity analysis of the effects of a policy introduced in 2002 to cap the tar and nicotine content of kretek cigarettes was carried out. Specifically, in this season farmers were told that because of the new restrictions on kretek production the most profitable tobacco grades from C and above could no longer be used in as great of quantities as before so that the prices for these leaves would have to be cut. In practice, this led to an estimated 50% to 90% price reduction of these normally very high-value grades with dramatic overall effects on crop profitability as shown in Table 3, which show that Virginia-kretek tobacco went from providing a **net profit** of some IDR 4.1 to 10.0 million (USD 465 to 1,132) per hectare under "normal" conditions to giving a **net loss** of IDR 3.3 to 4.2 million (USD 371 to 477) per hectare in 2002.

Table 3: **Sensitivity Analysis of 2002 Prices for Virginia-kretek Tobacco.**

	Typical Prices (IDR '000)		Difference	
	Normal Year	2002	IDR '000	% change
FARMGATE PRICES (IDR '000 per kg dry chop)				
A	6.0	6.0	-	0%
A+	8.5	8.5	-	0%
B	12.5	12.5	-	0%
B+	17.5	17.5	-	0%
C	20.0	10.0	(10.0)	-50%
C+	22.5	8.5	(14.0)	-62%
D	25.0	7.5	(17.5)	-70%
D+	35.0	7.0	(28.0)	-80%
E	40.0	6.0	(34.0)	-85%
E+ to F	45.0	5.0	(40.0)	-89%
LOW INPUT				
Financial Indicators (IDR '000/ha)				
Total costs	9,028.9	9,028.9	-	0%
Net profit	4,141.1	(3,913.9)	(8,055.0)	-195%
Other indicators				
Return to total costs	0.46	(0.43)		
Chg in yield to np = 0	-33%	85%		
Chg in price to np = 0	-46%	43%		
MEDIUM INPUT				
Financial Indicators (IDR '000/ha)				
Total costs	11,571.2	11,571.2	-	0%
Net profit	8,744.6	(3,299.0)	(12,043.6)	-138%
Other indicators				
Return to total costs	0.76	(0.29)		
Chg in yield to np = 0	-42%	44%		
Chg in price to np = 0	-76%	29%		
HIGH INPUT				
Financial Indicators (IDR '000/ha)				
Total costs	14,911.0	14,911.0	-	0%
Net profit	10,073.0	(4,243.0)	(14,316.0)	-142%
Other indicators				
Return to total costs	0.68	(0.28)		
Chg in yield to np = 0	-40%	44%		
Chg in price to np = 0	-68%	28%		

92. While this policy on tar and nicotine content has now been rescinded (in favour of a new approach for mandatory labelling on cigarette packs), and it is expected that prices in 2003 will return to their "normal" average, these data clearly demonstrate the importance of proper analysis any potential public health measure might have on agriculture profits. While the type of sensitivity test carried out here is static and certainly cannot answer all of the questions about farmer income that need to be considered in trying to formulate new tobacco control policies, the type of analysis done here was vary easy to carry out with the basic enterprise template and it is hoped this example of how the crop models can be used might inspire others to think of similar ways to work with the basic methodology.

TBN/Na oogst tobacco

93. As described in the background section, a completely different system applies to the production of lowland tobacco grown under shelter during the rainy season as "TBN" tobacco or in the open during the dry season as "Na oogst" tobacco. Because these crops are grown almost entirely under the direct management of PTPN-X using a land-lease system it was not possible to estimate an individual smallholder enterprise model as was done for Virginia-kretek tobacco. To still give some idea of the costs

and profitability of this commodity, however, it is useful to review some of the key provisions of a typical lease agreement as a basis for comparison with other smallholder enterprises.

94. Essentially, the contracts used for TBN/Na oogst spell out the different rights and responsibilities of individual landowners and PTPN-X and then describes how the value of the tobacco crop and final payment to landowners will be determined. On this basis, landowners who participate in the tobacco scheme are entitled to the following payments:

- Advance payment at the start of the production season equivalent to as much as IDR 1 million (USD 112) per hectare.
- Final payment within 10 days after the last tobacco has entered storage based on an agreed price of IDR 7,600 (USD 0.85) per kg in the most recent production season and a guaranteed minimum yield of 1,100kg/ha if the land is given in March, 1,050kg/ha if given in April and 700kg/ha if given in May.
- Payment for land recovery equivalent to as much as 40 days minimum wage employment equal to IDR 423,400 (USD 47.57) plus an additional allowance for any land passed over by a large irrigation canal.

95. On this basis, the effective net income per hectare of TBN/Na oogst tobacco works out as shown in Table 4. In cases where the yield is greater than the guaranteed minimum, farmer income would, of course, be higher than indicated.

Table 4: Guaranteed Minimum Payments for Lowland Tobacco (TBN/Na Oogst)

	Advance Payment (Start of season)	Guaranteed Minimum Crop Value	Minimum Payment for Land Recovery	Total Net Payment
IDR '000 per ha				
Plant in March (1,100kg min)	1,000.0	8,360.0	423.4	8,783.4
Plant in April (1,050kg min)	1,000.0	7,980.0	423.4	8,403.4
Plant in May (700kg min)	1,000.0	5,320.0	423.4	5,743.4
USD per ha				
Plant in March (1,100kg min)	112.35	939.32	47.57	986.90
Plant in April (1,050kg min)	112.35	896.62	47.57	944.20
Plant in May (700kg min)	112.35	597.75	47.57	645.32

Note: Advance deducted from final total payment.

96. In terms of final income (excluding any wages for time spent working on the crop), the results above are roughly comparable with the estimated net profits for Virginia-kretek tobacco. Compared with rice, groundnuts, and other typical lowland enterprises, however, the data show that TBN/Na oogst tobacco can provide significantly more income and so is an important crop for lowland farmers when the opportunity to produce tobacco comes around. Indeed, one very important advantage of the TBN/Na oogst production system from the farmer's point of view is that PTPN-X is responsible for all production costs so that there is zero financing burden for farmers who lease their land to tobacco production. The only cost to the farmer of TBN/Na oogst is the foregone opportunity of using their land to grow another (generally lower value) crop.

B. STAPLE CROPS

97. As shown in Table 1, two basic grains (rice and corn) and one other staple rotation crop (groundnuts) have been considered for the comparison with tobacco. All three crops are widely grown in the lowland areas between rotations of TBN/Na oogst tobacco. In upland areas, corn and groundnuts are

the most widely grown due to the rough terrain and limited irrigation capacity for rice. Other important staple crops grown in rotation with tobacco include soybeans and cassava with a vast range of other commodities also grown on a smaller scale. Of these commodities, soybeans and groundnuts have the important advantage of being a leguminous crop and so help to restore nitrogen to the soil after the heavy depletion caused by tobacco.

98. As a commodity group, the analysis shows that staple crops provide only about 28% to 37% as much total income compared with Virginia-kretek and TBN/Na oogst tobacco. For this reason, staple crops such as those covered here could never be expected to substitute for tobacco in terms of total cash income. Any loss of tobacco revenue from shrinking markets for households that only have access to these staple crop options could be particularly severe. On the other hand, rice, groundnuts, and corn together with other staple rotation crops like soybeans do play many important roles in terms of their contribution to household food security and maintenance of soil fertility and should not be neglected in the further analysis of diversification opportunities or formulation of effective strategies to assist smallholder farmers adjust to new market realities.

Irrigated and Rainfed Rice

99. As the most widely consumed staple food, rice is of obvious importance to Indonesia with more than 11 million hectares of land are given to this crop on a typical annual basis.[11] Assuming a typical plot size of 0.25 hectares and 2 crop rotations per year, this means that some 22 million individual households (10% of the total population) are engaged in rice production on a regular basis. Smallholder farmers produce about 95% of all rice in Indonesia. While only 20% of total rice farmers regularly produce a surplus for cash sale, those who do may sell about 50% to 75% of their total crop and save the rest for home consumption. Indonesia's five principal rice-producing areas are Klaten (Central Java), Kediri (East Java), Majalengka (West Java), Sidrap (South Sulawesi), and Agam (West Sumatra).

100. Unsurprisingly, an enormous volume of literature on the profitability, efficiency, competitiveness, environmental impact and just about every other aspect of rice production already exists in Indonesia and is continually being updated by expert researchers working on this specific crop. It would be unwise to think that this quick financial study could contribute much of an original perspective on rice production and the specific policy issues rice researchers are focused on including the social cost and benefit of floor prices, efficiency of domestic production, competitiveness with other Asian producers, etc. Certainly, policy researchers could use the enterprise templates developed for this study to help address these and other rice issues from the farmer's financial perspective, but any such analysis would require more time to refine the crop models than available here.

101. For these reasons, the approach taken was simply to borrow existing financial data from a recent CASER/USAID research project on the profitability of rice farming in Klaten (where TBN/Na Oogst tobacco is also widely grown) and to adapt these data as nearly as possible to the standard used for the rest of this study.[12] Because the CASER/USAID team used their own methodology, however, these results are not directly comparable with those for other enterprises where original (multi-level) production budgets were prepared. It was not possible, for example, to calculate a net profit based on long-term depreciation costs or to determine which costs are incurred before or after crop sales. To the extent there are major seasonal price variations, further analysis could also look in more detail at the imputed value of household retentions compared with the potential earnings from cash sale.

102. Bearing these limitations in mind, the CASER/USAID data still give a reliable overview of the costs and returns for rice that may be compared (at least in a general sense) with the results for tobacco and other lowland enterprises. The financial indicators for rice are summarized in Table 5 and cover four

[11] FAO Stat.

[12] Data from CASER/USAID (2002). See Pearson, *et. al.* (2003) for a discussion of specific policy implications for Klaten and other regions where similar CASER/USAID research was carried out.

management levels ranging from rainfed production to fully modern technical irrigation as shown. Because two rice crops can be produced in a single year, the analysis also covers production during the wet and dry seasons.

Table 5: Financial Indicators for Lowland Rice

	Rainfed		Simple Irrigation		Semi-Technical Irrigation		Technical Irrigation	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Production								
Yield (Kg GKP/ha)	3,780	3,970	4,810	4,900	5,370	5,880	5,900	6,360
Price (IDR/kg GKP)	850	950	850	950	850	950	850	950
Value (IDR/ha)	**3,213,000**	**3,771,500**	**4,088,500**	**4,655,000**	**4,564,500**	**5,586,000**	**5,015,000**	**6,042,000**
Variable Costs (IDR/ha)								
Fertilizers	391,986	422,408	417,027	460,845	415,370	497,154	506,515	489,402
Other agro-inputs	260,253	120,688	273,930	260,680	187,145	262,542	260,780	187,302
Hired labour	726,138	716,585	879,028	931,000	848,997	1,173,060	862,580	1,462,164
Capital	189,567	147,089	134,921	148,960	255,612	262,542	235,705	175,218
Total	**1,567,944**	**1,406,770**	**1,704,905**	**1,801,485**	**1,707,123**	**2,195,298**	**1,865,580**	**2,314,086**
Gross Profit (IDR/ha)	**1,645,056**	**2,364,731**	**2,383,596**	**2,853,515**	**2,857,377**	**3,390,702**	**3,149,420**	**3,727,914**
USD/ha	184.84	265.70	267.82	320.62	321.05	380.98	353.87	418.87
Labour (days/ha)								
Hired labour	91	90	110	116	106	147	108	183
Family labour	14	54	36	48	36	22	36	24
Total	**105**	**144**	**146**	**165**	**142**	**169**	**144**	**207**
Rates of Rerurn								
Return to var costs (gr. profit/vc)	1.05	1.68	1.40	1.58	1.67	1.54	1.69	1.61
Return per day total labour (IDR)	15,693	16,446	16,365	17,329	20,112	20,066	21,939	18,015
Sensitivity Indicators								
Yield to give gross profit = 0	1,845	1,481	2,006	1,896	2,008	2,311	2,195	2,436
% Chg in yield or price to GP = 0	-51%	-63%	-58%	-61%	-63%	-61%	-63%	-62%

Source: CASER/USAID (2002).

103. In terms of the comparison with other crops, the estimated gross revenues for rice range from just IDR 1.6 to 3.7 million (USD 185 to 419) and are considerably less than for other suitable lowland enterprises such as tobacco, nilam, oranges, and chilli. Compared with other, lower-value enterprises, however, the estimated gross profits from rice are roughly comparable with the returns from groundnuts and corn. At some management levels, rice provides more income than corn and groundnuts, but at other management levels these other crops seem to do better.

104. With respect to the returns to variable costs, the results for rice range from 1.05 to 1.89 and are among some of the best results for this indicator of the entire study. In addition to basic cultural and food security reasons, therefore, this indicator helps to explain why rice is normally given such high priority by so many farmers. The sensitivity indicators are also very good and suggest that rice could withstand a relatively significant reduction in yield or price from the assumed levels before all financial profits would be lost. The data show that dry season rice tends to be both more expensive and more profitable compared with wet season rice grown due to the extra costs of irrigation and other generally improved yield and price conditions.

105. Regarding crop profitability, the CASER/USAID research team reaches similar conclusions and notes that rice is currently very profitable, but then warns that this depends critically on either protection from current low prices in the world rice market or on a heavily depreciated rupiah. As the CASER/USAID team explain, “if world prices remain depressed (instead of returning to their anticipated long-run trend value of USD 200/mt) or the rupiah returns to, say IDR 8,000 to the US dollar, and the import tariff is of only limited effectiveness, then rice farmers in Klaten will feel intense competitive

pressures." Under such circumstances, conclude the CASER/USAID researchers, "small farmers are likely to exit rice production in a significant way."[13]

106. To the extent small landowners in Klaten may be exposed to this risk at the same time as they are under increased pressure from shrinking tobacco markets (say by only having the opportunity lease their land to PTPN-X for tobacco production once every 5-6 years instead of 3-4 years as at present), this combination of events could have many serious implications for smallholder income in lowland areas. Indeed, as the CASER/USAID researchers also conclude, "even with rice being profitable on a per hectare basis, the very small operational units of most Klaten rice farmers means these households would be quite poor without additional sources of income."[14] This specific view was also expressed by tobacco/rice farmers met in the Klaten area who said that the opportunity of growing tobacco for PTPN-X every few seasons is important source of income that helps to sustain other agricultural activities throughout the year.

Groundnuts

107. Groundnuts are grown in both upland and lowland areas and are well suited to production as a rotation crop with tobacco because of their nitrogen fixing capacity. Groundnuts in both regions, however, are normally grown on very small plots of just 0.1 to 0.25 hectares. In 2002, some 650,000 hectares in were planted to groundnuts in all parts of Indonesia from which a total harvest of one million tons unshelled nuts was collected.[15]

Table 6: Financial Indicators for Lowland Groundnuts

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
YIELD (Kg dry shelled per ha)	750	900	1,025	750	900	1,025
PRODUCTION COSTS (per ha)						
Cash before sale	608	1,250	1,674	68	140	188
Imputed costs before sale	900	945	990	101	106	111
Total variable costs	1,589	2,345	2,871	179	264	323
Total production costs	**1,709**	**2,465**	**2,991**	**192**	**277**	**336**
Total cost per ton	2,279	2,739	2,918	256.07	307.77	327.90
LABOUR						
Hired labour (days/ha)	39	68	80	39	68	80
Family labour (days/ha)	67	68	81	67	68	81
Total labour (days/ha)	**106**	**136**	**161**	**106**	**136**	**161**
Gr. return per day total labour	27.5	22.5	20.4	3.09	2.52	2.29
FARMER PROFIT (per ha)						
Gross profit	2,911	3,055	3,279	327	343	368
Net profit	**2,791**	**2,935**	**3,159**	**314**	**330**	**355**
RATES OF RETURN						
Return to variable costs	1.83	1.30	1.14	1.83	1.30	1.14
Return to total costs	1.63	1.19	1.06	1.63	1.19	1.06
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-62%	-54%	-51%	-62%	-54%	-51%
Chg in price to np = 0	-78%	-54%	-51%	-78%	-54%	-51%

108. In lowland regions, groundnuts are typically produced during the dry season when there is no irrigation and the field cannot be planted to rice. In upland areas, groundnuts may either be planted as a first relay crop immediately after tobacco or as a part of a second rotation during the wet season. Groundnuts may be sold either wet in the shell or as a dry seed out of shell. Village traders normally

[13] CASER/USAID (2002), p. 2.
[14] *Ibid.*
[15] Weight for groundnuts in shell. FAO Stat, 2003.

come to the farm to buy groundnuts after which the crop is delivered into the formal market for use as an oilseed, basic food ingredient, or confectionery product. Many households also aim to save a share of total groundnut production for home consumption. The financial indicators for groundnuts based on lowland production are summarized in Table 6.

109. Taken together, these data confirm the widely held perception that groundnuts are relatively inexpensive to produce, but also provide only a small income compared with most other enterprises. In terms of specific production costs, it is perhaps most interesting to note that about 30% to 50% of total costs for groundnuts are made up by the imputed value of self-saved seed so that the total cash requirement is relatively modest. In the lowlands farmers say groundnuts are mainly grown in favour of rice only when irrigation is not available, but (as shown in the table above) the fact that groundnuts are also relatively inexpensive to produce is surly another significant part of the attraction.

110. Because of the relatively low overall production costs, the rates of return to total expenditure for groundnuts are exceptional at a range of 1.06 to 1.83 in net and gross terms respectively and rank among the very best compared with every other enterprises. The sensitivity indicators are also very good and show that groundnuts could withstand a relatively large decrease in yield or price from the assumed levels before returning a financial loss.

Corn

111. Corn is one of Indonesia's most important staple foods after rice. It offers similar nutritional value to rice and can be grown in both upland and lowland areas without irrigation on most soil types. In 2002, a total of 3.3 million hectares of maize was harvested for a total production of 9.3 million tons (FAO Stat). In upland tobacco areas, corn is typically planted immediately after tobacco as a relay crop before the start of the heavy rains. In the lowland areas, corn may be grown in rotation with rice, groundnuts, and/or soybeans in the seasons between tobacco. Farmers typically use recycled seed rather than improved hybrid varieties and there may be good potential to increase yield and profitability through the use of new planting material. Of course, hybrid maize also requires an additional expenditure on chemical fertilizer and this option would probably not be appropriate for all smallholder growers. The financial indicators for corn are summarized in Table 7.

Table 7: Financial Indicators for Lowland Corn

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
YIELD (Kg dry per ha)	2,250	2,800	3,100	2,250	2,800	3,100
PRODUCTION COSTS (per ha)						
Cash before sale	1,095	1,712	2,023	123	192	227
Imputed costs before sale	47	53	58	5	6	7
Total variable costs	1,295	2,012	2,366	146	226	266
Total production costs	**1,415**	**2,132**	**2,486**	**159**	**240**	**279**
Total cost per ton	629	761	802	70.67	85.55	90.11
LABOUR						
Hired labour (days/ha)	46	55	65	46	55	65
Family labour (days/ha)	40	40	45	40	40	45
Total labour (days/ha)	**86**	**95**	**110**	**86**	**95**	**110**
Gr. return per day total labour	25.5	24.5	22.2	2.86	2.75	2.49
FARMER PROFIT (per ha)						
Gross profit	2,192	2,328	2,439	246	262	274
Net profit	**2,072**	**2,208**	**2,319**	**233**	**248**	**261**
RATES OF RETURN						
Return to variable costs	1.69	1.16	1.03	1.69	1.16	1.03
Return to total costs	1.46	1.04	0.93	1.46	1.04	0.93
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-59%	-51%	-48%	-59%	-51%	-48%
Chg in price to np = 0	-60%	-51%	-49%	-60%	-51%	-49%

112. In many respects, the financial indicators for corn are quite similar to those for groundnuts and show that this is a relatively inexpensive crop to grow, but also provides little income compared with most other enterprises. Compared with groundnuts, it is interesting to note that corn requires a much larger cash expenditure on fertilizer and other purchased inputs and so may be more difficult for an individual grower to afford despite lower total production costs overall. Indeed, the imputed value of self-saved seed only accounts for about 2% to 3% of total production costs with corn compared with 33% to 53% of the total costs for groundnuts. On the other hand, the data also show that an important advantage of corn is this is one of the least labour intensive crops analysed. While employment maximisation is an important social objective for Indonesia as a whole, individual farmers will likely see the estimated requirement of just 86 to 110 days per hectare as a distinct advantage of corn compared with other enterprises.

C. HORTICULTURE

113. Four annual horticultural crops were selected for detailed analysis as shown in Table 1. As a group, these commodities include some of the highest and lowest value farm products selected for analysis. At specific management levels, for example, chilli and potatoes far surpass tobacco in terms of the potential for total farmer income and attractive returns to total production costs and labour. On the other hand, the financial indicators for carrots and garlic are some of the worst results compared with all other enterprises and show that these specific crops yield very little profit and poor rates of return at most management levels.

114. Of the crops covered here, all four commodities grow well in the upland tobacco areas, but only chilli is well suited to lowland production. Other leading horticultural crops not covered here include cabbage, cucumber, onion, green beans, *sawi* (a type of leafy Chinese cabbage with medicinal properties), and watermelon. Most of these commodities are also best suited to upland production because of the milder climate compared with the lowlands.

Chilli

115. Hot red chilli peppers are an extremely high value horticultural crop well suited to the same climate as lowland and upland tobacco. While chilli peppers require good, fertile soil with adequate drainage, the crop can be grown on much of the same land as tobacco. Because chilli suffers from problems with fungus and disease if grown during the heavy rains, however, the crop is normally planted at the start of the dry season in March or April when Virginia-kretek is also planted. Chilli takes about 8-10 weeks to mature after planting and is harvested about twice a week until a maximum age of 4-5 months. Because of very intensive skill, cash, and management requirements, chilli is normally grown on very small plots of no more than about 0.25ha per household. When more than this area is planted, yield and profitability tend to suffer because of the difficulty tending to this crop as required.

116. Chilli prices are extremely variable throughout the year and may range from just IDR 2,500 (USD 0.28) to IDR 25,000 (2.80) per kilo at the farmgate depending on quality, moisture content, and time of sale. Chilli peppers are perishable and must normally be sold fresh soon after harvest. There is a good demand for fresh chillies in the rural and urban markets and potential also exists to sell sun-dried chillies for a premium. This later possibility is especially well suited to lowland areas where the hot sun makes the drying of fresh chilli very efficient. In upland areas, on the other hand, cooler and more overcast conditions mean that chilli peppers sometimes have to transported to a special location for drying (in the same way that must sometimes be done for tobacco). The financial indicators for chilli based on lowland production and the sale of a fresh product for a typical average price of IDR 3,500 (USD 0.39) are summarized in Table 8.

Table 8: Financial Indicators for Chilli

	IDR '000			USD		
	Low	Medium	High	Low	Medium	High
YIELD (Kg per ha)	6,800	8,000	9,000	6,800	8,000	9,000
PRODUCTION COSTS (per ha)						
Cash before sale	9,274	12,516	14,630	1,042	1,406	1,644
Total variable costs	10,409	14,121	16,500	1,170	1,587	1,854
Total production costs	**10,560**	**14,272**	**16,651**	**1,187**	**1,604**	**1,871**
Total cost per ton	1,553	1,784	1,850	174.49	200.45	207.88
LABOUR						
Hired labour (days/ha)	365	433	507	365	433	507
Family labour (days/ha)	122	149	173	122	149	173
Total labour (days/ha)	**487**	**582**	**680**	**487**	**582**	**680**
Gr. return per day total labour	27.5	23.8	22.1	3.09	2.68	2.48
FARMER PROFIT (per ha)						
Gross profit	13,391	13,879	15,000	1,505	1,559	1,685
Net profit	**13,240**	**13,728**	**14,849**	**1,488**	**1,542**	**1,668**
RATES OF RETURN						
Return to variable costs	1.29	0.98	0.91	1.29	0.98	0.91
Return to total costs	1.25	0.96	0.89	1.25	0.96	0.89
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-54%	-47%	-45%	-54%	-47%	-45%
Chg in price to np = 0	-52%	-45%	-44%	-52%	-45%	-44%

117. In terms of the potential for any one crop to provide high income from just a small area of land, the financial results for chilli are outstanding and suggest that further steps to promote this enterprise could be a good way of (partly) reducing farmer dependence on tobacco. At a range of IDR 13.2 to 14.8 million (USD 1,488 – 1,688) per hectare the estimated net profits for chilli rank among the very best and far exceed the potential earnings from tobacco of just IDR 4.1 to 10.0 (USD 460 – 1,132) with low and high intensity management respectively.

118. Because of these very good financial results, it is perhaps surprising that more area is not given to chilli instead of tobacco. While it must again be stressed that the analysis cannot identify optimal farm strategies for individual growers, the very high production costs and skill requirements for chilli almost certainly explain part of the reason why this crop is not more widely grown. In particular, despite outstanding rates of return to variable and total production costs (including a daily return to total labour about three times greater than the daily minimum wage in Central Java), the data above show that chilli is one of the most expensive crops to produce. Especially for farmers in lowland areas where TBN/Na oogst is grown on a land-lease agreement, the costs of chilli (and every other crop) are, in effect, infinitely grater compared with tobacco.

Potatoes

119. Potatoes are an emerging commodity for Indonesia and are well suited to production on the same volcanic soils found in upland tobacco areas. In 2002 only about 65,000 hectares of potatoes were harvested and yields remain low by world standards at no more than 13mt on a typical plot. By comparison, farmers in Japan regularly achieve yields in excess of 29mt/ha and the average in New Zealand is about 27mt/ha. An important reason for this poor performance is that most Indonesian potatoes are grown from recycled seed stock that is planted year after year without ever being rejuvenated. Potatoes have potential both as a basic food commodity and raw material to supply the growing snack-food industry. Total production has increased by about 30% since 1990 to around 850,000mt in 2002 and there appear to be good opportunities in both the domestic and export market to absorb any further additional production. The financial indicators for upland potatoes are summarized in Table 9.

Table 9: Financial Indicators for Upland Potatoes

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
YIELD (Kg per ha)	6,000	9,000	13,000	6,000	9,000	13,000
PRODUCTION COSTS (per ha)						
Cash before sale	1,832	3,576	5,458	206	402	613
Imputed costs before sale	6,300	6,720	7,560	708	755	849
Total variable costs	8,375	10,808	13,813	941	1,214	1,552
Total production costs	**8,495**	**10,928**	**13,933**	**954**	**1,228**	**1,565**
Total cost per ton	1,416	1,214	1,072	159.08	136.43	120.42
LABOUR						
Hired labour (days/ha)	75	99	129	75	99	129
Family labour (days/ha)	67	73	84	67	73	84
Total labour (days/ha)	**142**	**172**	**213**	**142**	**172**	**213**
Gr. return per day total labour	59.3	83.7	106.0	6.67	9.40	11.91
FARMER PROFIT (per ha)						
Gross profit	8,425	14,392	22,587	947	1,617	2,538
Net profit	**8,305**	**14,272**	**22,467**	**933**	**1,604**	**2,524**
RATES OF RETURN						
Return to variable costs	1.01	1.33	1.64	1.01	1.33	1.64
Return to total costs	0.98	1.31	1.61	0.98	1.31	1.61
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-50%	-57%	-62%	-50%	-57%	-62%
Chg in price to np = 0	-72%	-51%	-51%	-72%	-51%	-51%

120. The financial indicators above are among the very best compared with tobacco and all other farm enterprises. In the first place, the data suggest that potatoes offer a potential for significantly greater profits than Virginia-kretek tobacco.[16] Even when only a small area is given to potatoes, therefore, this crop is still likely to make an important contribution to household income and could perhaps even be a better choice than tobacco on the basis of any direct substitution. Any major effort to promote potatoes on a large scale will, however, likely depend on new investments in domestic processing capacity and, ultimately, the competitiveness of Indonesian growers with other regional producers. Further analysis of the underlying comparative advantage of Indonesian potatoes based on import and export parity prices and economic costs of crop inputs would be needed to build a more comprehensive understanding of this crop and its potential contribution as a diversification activity.

121. In terms of simple financial costs, however, the data show that a further important advantage of potatoes is that the crop demands relatively little cash expenditure at each management level due to the use of recycled seed. Although it is possible that an investment in new planting material could pay high returns in the long run, one of the greatest advantages of potatoes is that the crop appears to cost only about the same (and sometimes even less!) than garlic, corn, and groundnuts, which all provide significantly less total income. On this basis, the rates of return to variable and total input costs for potatoes are outstanding at a range of 0.98 to 1.64.

122. Because of relatively modest labour requirements, the financial returns from potatoes are also outstanding on a daily basis and suggest the crop could be an especially good choice for households with a shortage of active labour. By comparison, the next best daily return to labour is only IDR 27,500 (USD 3.09) for low input chilli, which is less than about 50% of the estimated minimum daily return of IDR 59,300 (USD 6.65) for potatoes. With high input management, the daily estimated return of IDR 106,000 (USD 11.91) is almost four times greater than the next best alternative.

[16] Specifically, the estimated net profits for potatoes are 77%, 51%, and 107% greater than for Virginia-kretek tobacco with low, medium and high-input management respectively.

Carrots

123. Carrots are grown in upland areas as a vegetable crop for sale in local markets. The crop can be planted at any time of the year, but requires soils with good drainage if grown during the heavy rains. An important advantage of carrots is that they are relatively quick to mature only 60 to 90 days from planting thus making it possible to grow several rotations of carrots and other similar vegetables throughout the year. A common practice in some areas, therefore, is to stagger the planting of carrots (and other vegetables) to produce a steady income. Financial indicators for carrots are summarized in Table 10.

Table 10: **Financial Indicators for Upland Carrots**

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
YIELD (Kg per ha)	3,750	5,000	6,000	3,750	5,000	6,000
PRODUCTION COSTS (per ha)						
Cash before sale	1,050	1,556	1,906	118	175	214
Total variable costs	1,133	1,688	2,073	127	190	233
Total production costs	**1,253**	**1,808**	**2,193**	**141**	**203**	**246**
Total cost per ton	334	362	365	37.55	40.63	41.07
LABOUR						
Hired labour (days/ha)	92	119	137	92	119	137
Family labour (days/ha)	51	47	52	51	47	52
Total labour (days/ha)	**143**	**166**	**189**	**143**	**166**	**189**
Gr. return per day total labour	7.8	7.9	8.1	0.88	0.89	0.91
FARMER PROFIT (per ha)						
Gross profit	1,117	1,312	1,527	125	147	172
Net profit	**997**	**1,192**	**1,407**	**112**	**134**	**158**
RATES OF RETURN						
Return to variable costs	0.99	0.78	0.74	0.99	0.78	0.74
Return to total costs	0.80	0.66	0.64	0.80	0.66	0.64
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-44%	-41%	-41%	-44%	-41%	-41%
Chg in price to np = 0	-44%	-40%	-39%	-44%	-40%	-39%

124. Despite the potential of carrots to provide a more steady income than many other enterprises (except perhaps chilli in which a single crop is harvested for several weeks), the data above show that the estimated profits are extremely low at a range of just IDR 997,000 to IDR 1.4 million (USD 112 – 158) per hectare. Only garlic was found to provide less total income on a per hectare basis and it clear that carrots are unlikely to be a good choice for profit maximization. In terms of total cash and labour requirements, on the other, the actual demands of carrot production are relatively modest (both in cash and labour terms) and the data also suggest that the inclusion of carrots, or some other similar vegetable crop, could still be a good choice to ensure small amounts of supplemental income throughout the year.

125. Regarding the different management levels, it is interesting to note that the estimated profits from carrots increase by almost 50% at the high-input level compared with more basic low-input management. Despite a slight deterioration in the rates of return to variable and total production costs with high input management, this result may suggest that smallholder vegetable farmers could do well by targeting some kind of high-input management system. Further increases may also be possible depending on local market conditions (supply and demand, barriers to access, trading conditions, etc), and it would be interesting to look in more detail at the role of vegetable crops and their specific earning potential in particular.

Garlic

126. Garlic is mostly planted in upland areas with a cool dry climate from 600 to 1,800 metres above sea level. The crop is not fastidious, but requires reasonably good soils with a neutral pH balance and adequate drainage. Most garlic is planted towards the end of the wet season or at the start of the dry season before tobacco. In some locations, garlic and tobacco may even be planted together with a circle of

garlic established first to make an eventual planting cover for tobacco. Only about 10,000 hectares of garlic were harvested in 2002 compared with 18,000ha in 1990 and more than 22,000ha for most of the last decade. Total production has also decreased from more than 110,000mt in 1990 to just 60,000mt in 2002. Indonesia is a large net importer of garlic with more than 205,000mt total imports in 2001 with a total value of USD 51.2 million (IDR 455.8 billion). The financial indicators for this crop are shown in Table 11.

Table 11: Financial Indicators for Upland Garlic

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
YIELD (Kg dry per ha)	1,050	1,950	2,550	1,050	1,950	2,550
PRODUCTION COSTS (per ha)						
Cash before sale	2,753	5,679	7,885	309	638	886
Imputed costs before sale	1,513	1,595	1,650	170	179	185
Total variable costs	4,501	7,865	10,448	506	884	1,174
Total production costs	**4,621**	**7,985**	**10,568**	**519**	**897**	**1,187**
Total cost per ton	4,401	4,095	4,144	494.45	460.12	465.65
LABOUR						
Hired labour (days/ha)	195	305	348	195	305	348
Family labour (days/ha)	81	55	62	81	55	62
Total labour (days/ha)	**276**	**360**	**410**	**276**	**360**	**410**
Gr. return per day total labour	0.8	2.5	5.6	0.09	0.28	0.63
FARMER PROFIT (per ha)						
Gross profit	224	910	2,302	25	102	259
Net profit	**104**	**790**	**2,182**	**12**	**89**	**245**
RATES OF RETURN						
Return to variable costs	0.05	0.12	0.22	0.05	0.12	0.22
Return to total costs	0.02	0.10	0.21	0.02	0.10	0.21
SENSITIVITY INDICATORS						
Chg in yield to np = 0	-2%	-9%	-17%	-2%	-9%	-17%
Chg in price to np = 0	-2%	-9%	-17%	-2%	-9%	-17%

High input management produces better quality garlic sold for higher price.

127. From almost every perspective, these results for garlic are extremely poor and suggest there is good reason for the long-term decline in total production described above. In terms of gross and net profits, the results for garlic are extremely disappointing and rank among the very lowest compared with all other activities analysed. With high-input management, the estimated profits improve significantly (due to the production of a better quality product from additional chemical use), but even at this level, the income from garlic is only roughly equivalent to what can be earned from corn and rice on an equivalent per hectare basis. With low and medium management garlic is nearly a loss making activity and the sensitivity indicators show that only a 2% or 9% decrease in yield or price from the assumed levels would result in a financial loss.

128. From the cost perspective, the data for garlic are similarly unattractive. Indeed, at every management level, garlic costs significantly more to produce than other enterprises that provide as much (and often far greater) total income. With low input management, for example, even though the imputed value of self-saved seed accounts for about 33% of total production costs, the cash requirement (mainly for hired labour) still makes this a more expensive enterprise than corn, carrots, potatoes and groundnuts. At the most profitable level of high-input garlic production, the estimated cash costs are actually greater than for low-input Virginia-kretek tobacco making garlic one of the most expensive enterprises analysed after only chilli and other higher-input tobacco variations. A main reason for these very high costs with garlic is the demand for hired labour to carry out such tasks as seed preparation (separation and cleaning of individual cloves) and planting which are very labour intensive and must be done in only a limited number of days.

D. PERENNIAL CROPS

129. In addition to the annual rotation crops discussed so far, a wide range of tree crops and other perennials also grow well in upland and lowland tobacco areas. Because these crops are cultivated over more than a single season, any area devoted to a perennial enterprise must (by definition) take away from the area that can be sown to tobacco. So far, perennial crops are not widespread in the major tobacco areas of Central Java and only small areas have been given over to these crops. Moreover, when perennials are grown, a typical practice is to maintain the production of tobacco as an intercrop for as long as possible before any shade canopy is established or there is simply no more room for tobacco to be included.

130. Presently, the most common perennials include nilam and oranges (or other citrus products), which can be grown in both lowland and upland areas, and coffee, which is mainly suited to upland production. Many other very high value perennials including pepper and vanilla can also be grown in tobacco areas and it would be useful to take a closer look at the costs and returns for these enterprises, including cash flow requirements during the establishment period since it sometimes several years before these crops produce the first harvest.

131. For this study data were prepared covering two indicative perennial crops including nilam and oranges. The results for these enterprises are encouraging and suggest that perennial crops may offer good potential to surpass tobacco in terms of total farmer income and rates of return to labour and other variable and total production costs. Success with a perennial enterprise, however, depends on being able to afford the total establishment costs when the perennial produces no income. Intercropping with tobacco, rice, and/or other seasonal commodities can help smooth this cash flow requirement, but farmers must still weigh the benefit of future returns from a long-term investment in a tree crop enterprise compared with the more immediate need for a regular agricultural income from seasonal activities. Success also depends on farmers having secure and remunerative access to the marketsw for tree crop products. Because many possible enterprises such as vanilla, pepper, and even citrus are relatively new in tobacco growing areas, any widespread growth of these enterprises is likely to require significant public and private sector investment to develop the support services and market infrastructure smallholders need for success.

Nilam

132. Nilam is an herbaceous plant that produces an essential oil highly sought after by the cosmetic, perfume, skin care, and homeopathic medicine industries. With an equivalent total annual production of around 450mt of refined *patchouly* oil made from the nilam plant, Indonesia currently accounts for about 80% of total nilam production worldwide. The effective annual demand for *patchouly* oil, however, is estimated at some 1,000mt and there would seem to be excellent potential to expand production to fill this market niche.

133. Central Java is one of the leading regions for nilam production, but the crop is relatively new in most major tobacco areas and is only now being promoted on a cooperative basis as a potential replacement to tobacco. Through a business partnership arrangement, nilam traders and processors have recently begun to work with smallholder farmers to promote the crop on a plasma basis in which the buyer provides seed and working capital in exchange for an agreement to sell the nilam leaf when harvested only to that agent. This type of system not only helps to link the farmer with the market (thereby minimising some of the risk associated with a new crop), but is also important to ease the cash flow requirements during establishment.

134. Nilam is typically grown over a three-year cycle and takes six months from planting before the time of first harvest. Once the crop comes into production, it may then be harvested every three months and so has the added advantage of providing a regular income throughout the year. Compared with other perennial crops, this relatively short establishment period for nilam is a significant advantage and may

help attract tobacco farmers to this enterprise. Nilam grows well in both lowland and upland areas with about 12,600 hectares planted to this crop in 2001. Even if total production doubled to meet world demand, however, the total area taken up by nilam would still only account for about 5-6% of the land area now given to tobacco and it would be a mistake to suggest that this crop could ever *substitute* for tobacco, except perhaps on an individual scale.

135. The financial indicators for nilam are summarized in Table 12 for low, medium, and high input management systems. These data include a summary of total establishment costs and revenues in Year 1 and full financial indicators for Year 2 when the nilam has come into full production. The estimation of annual capital recovery costs (depreciation) includes total establishment costs and revenues in Year 1 as described in the methodology section. More detailed cash flow analysis would be needed to look at the financing requirements and other financial aspects of a multi-year investment in greater detail.

Table 12: **Financial Indicators for Lowland Nilam**

	IDR '000			USD		
	Low	**Medium**	**High**	**Low**	**Medium**	**High**
ESTABLISHMENT - Yr. 1 (per ha)						
Total costs before income	6,065	8,577	10,792	681	964	1,213
Total revenue (start harvest at 6mos)	3,250	4,375	5,400	365	492	607
Gross profit (end of year 1)	2,815	4,202	5,392	316	472	606
YIELD - Yr. 2 (Kg fresh per ha)	19,000	26,000	31,000	19,000	26,000	31,000
PRODUCTION COSTS - Yr. 2 (per ha)						
Cash before sale	3,365	5,399	7,103	378	607	798
Total variable costs	3,574	5,728	7,538	402	644	847
Depreciation (plantation and equip)	180	269	451	20	30	51
Total production costs	**3,754**	**5,997**	**7,989**	**422**	**674**	**898**
Total cost per ton	198	231	258	22.20	25.92	28.96
LABOUR - Yr. 2						
Hired labour (days/ha)	271	372	452	271	372	452
Family labour (days/ha)	51	68	81	51	68	81
Total labour (days/ha)	**322**	**440**	**533**	**322**	**440**	**533**
Gr. return per day total labour	18.4	16.5	14.9	2.07	1.86	1.68
FARMER PROFIT Yr. 2 (per ha)						
Gross profit	5,926	7,272	7,962	666	817	895
Net profit	**5,746**	**7,003**	**7,511**	**646**	**787**	**844**
RATES OF RETURN - Yr. 2						
Return to variable costs	1.66	1.27	1.06	1.66	1.27	1.06
Return to total costs	1.53	1.17	0.94	1.53	1.17	0.94
SENSITIVITY INDICATORS - Yr. 2						
Chg in yield to np = 0	-72%	-64%	-58%	-72%	-64%	-58%
Chg in price to np = 0	-60%	-54%	-48%	-60%	-54%	-48%

Year 2 data include capital recovery on costs and income during establishment.

136. Taken together, these data are encouraging and suggest that nilam may have especially good potential as a diversification crop. While the comparatively small market demand means that nilam could never replace tobacco per se, the financial indicators show the earnings from this crop easily rival and sometimes even surpass the potential income from tobacco. Moreover, at each corresponding management level, nilam costs less to produce than tobacco and so yields much better rates of return to the expenditure on variable and cash inputs, including hired labour where the daily returns to labour are sometimes more than double those for tobacco.

137. In terms of labour requirements, the data show that hired labour accounts for about 85% the total daily input. This is due to the specific harvest requirements of nilam in that the plucking of leaves must be done in only a few days so that a large number of workers are brought in for this task. On smaller plots

where family labour is sufficient to carry out the harvest on their own, significant savings on hired labour would be possible, thereby dramatically improving the overall picture of crop profitability. In terms of sensitivity to variation in yield or price, the results for nilam are among the most robust compared with every other enterprise analysed and show that the crop could withstand a large change in either variable before returning a financial loss.

Oranges

138. Presently, oranges and other citrus crops are mainly grown in lowland areas of Central Java, but could easily be produced in the same upland areas where tobacco is also grown. Historically, in fact, upland areas were previously very important citrus producing areas, but this production largely came to an end due to the spread of tree crop disease some years ago. Government programmes are now underway to reintroduce oranges and other citrus crops to the upland areas, especially in Temanggung Regency where selected farmers are now being provided with young seedlings and assistance for input costs until the trees are ready for the first harvest (usually juice-quality oranges are harvested beginning in Year 3 and table-quality fruit is harvested beginning in Year 4). Industry estimates suggest that the domestic market for fresh oranges and oranges for squeezing may grow by about 10% per year and it is likely the market could easily absorb any additional production, at least in the near future.

139. As a true perennial with 10-year lifespan, a different methodology was used for the analysis of oranges as shown in Table 12. Specifically, these data are based on an INSTIPER analysis of lowland oranges intercropped with rice in the first two years before the oranges start to produce. Importantly, there are many technical differences between how seasonal inputs and total depreciation costs were valued by this INSTIPER study compared with the other commodities for which original (multi-level) production budgets were prepared. The INSTIPER data cover only one management level and are best interpreted as a "snapshot" picture of possible costs and returns. Despite these limitations, the data were adapted (as nearly as possible) to produce the same type of financial indicators used for the rest of this study, and the results below still provide a useful basis for comparison with tobacco.

Table 13: Financial Indicators for Oranges (INSTIPER analysis)

	Yr. 1	Yr. 2	Yr. 3	Yr. 4	Yr. 5	Yr. 6	Yr. 7	Yr. 8	Yr. 9	Yr. 10
Yield										
Rice (kg GKG/ha) - IDR 1,400/kg	6,207	5,172	-	-	-	-	-	-	-	-
Oranges (kg/ha) - IDR 3,500/kg	-	-	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
Production Costs (IDR '000/ha)										
Cash costs	5,123	3,502	12,053	16,001	20,622	22,334	22,334	22,334	22,334	22,334
Depreciation	772	772	636	636	636	636	636	636	636	636
Total costs (excl. famly labour)	5,895	4,274	12,690	16,638	21,259	22,970	22,970	22,970	22,970	22,970
Labour										
Total labour (days/ha)	188	171	414	425	503	528	528	528	528	528
Farmer Profit (IDR/ha)										
Gross profit (revenue - cash costs)	3,567	3,740	17,636	27,181	44,647	41,511	37,407	21,114	11,459	6,632
Net profit (revenue - total costs)	2,795	2,968	17,000	26,545	44,010	40,875	36,771	20,478	10,823	5,995
Rates of Return										
Return to cash costs	0.70	1.07	1.46	1.70	2.16	1.86	1.67	0.95	0.51	0.30
Return to total costs	0.47	0.69	1.34	1.60	2.07	1.78	1.60	0.89	0.47	0.26
Return to total labour (IDR '000/day)	14.90	17.35	41.03	62.50	87.58	77.36	69.60	38.76	20.48	11.35

140. Bearing in mind specific data limitations, the results in Table 13 clearly suggest that orange production can be extremely lucrative and may even provide significantly more income than tobacco grown in rotation with other typical crops such as corn and vegetables in the uplands or rice and groundnuts in the lowlands. Because oranges in the model above are grown as a pure-stand with no room for intercropping after Year 2, the estimated cost and profits are annual totals, but even on this basis, the

data still compare very favourably with the estimates for all other enterprises usually grown as part of a mixed rotation. Indeed, the estimated daily returns to labour are well above typical minimum wages for Central Java and show an investment in citrus production could be a very good choice for smallholder growers – even on a limited basis using just small parcels of land. Further analysis may do well, therefore, to look at citrus production in more detail including specific cash flow requirements throughout the crop cycle and potential contribution of intercrops other than rice to offset specific costs during establishment.[17]

IV. CONCLUSIONS AND FOLLOW-UP

141. This paper set out to provide an improved understanding of how the financial costs and returns for tobacco compare with a selected range of smallholder commodities that either complement tobacco or offer long-term diversification potential in Central Java. Towards this end, a set of 24 production budgets covering tobacco and seven other important crops grown by smallholder farmers were developed and used to compare the likely costs and returns from different enterprises and management decisions. In cases where data limitations meant that it was not possible to develop original production budgets, a variety of other data sources and approaches were used to derive similar financial indicators that can be compared as directly as possible with the results for each other crop. Although this analysis cannot be used to identify optimal production strategies for individual farmers, it is important to understand the trade-offs smallholder producers face in deciding which crops to grow. From the national perspective, the analysis also helps to understand some of the implications for rural welfare and employment opportunities that may result from a gradual shift away from tobacco. Several points stand out from this analysis with important policy implications.

142. In the first place, the analysis clearly shows that tobacco is of major importance to the rural economy as the most widely grown high-value crop in specific locations with a suitable climate and must not be neglected in the formulation of effective development strategies. Despite mounting public health concerns, local and international demand for tobacco is still strong and the analysis clearly demonstrates that this crop offers some of the best potential for high producer profits, attractive rates of return, and protection from variations in price and yield. Furthermore, as one of the most labour intensive crops analysed, tobacco employment accounts for a significant number of rural jobs and has benefits that extend far beyond national trade revenue and individual producer profits.

143. While there can be no doubt over the benefit to smallholder farmers of continuing with tobacco production for the time being, it is also clear that the long-term future of this crop is under considerable threat such that long-term steps to promote crop diversification may need to receive increased priority in new development policies for tobacco areas. In this respect, while it is unlikely that any single enterprise could ever substitute for tobacco and play the same type of anchor role in a mixed farm system, the analysis is encouraging and suggests that there are many other enterprises likely to offer a potential for similar (or better) net profits and rates of return than tobacco. Success with these other enterprises,

[17] Such an analysis of long-term cash flow requirements was carried out for the FAO/ADB during a 2002 study on the "Profitability of Smallholder Tree Crop Production" using a more detailed spreadsheet template for the coverage o f multi-year enterprises. While this analysis looks at the costs and profitability of rubber and oil palm, the paper defines a clear methodology for looking at tree crop production from a variety of short and long-term perspectives including the incremental benefit of planting intercrops during tree crop establishment and major trade-offs with using subsidized credit to support smallholder tree farmers. The templates developed for this study could easily be adapted for a new exercise that builds on the enterprise models created here to look in more detail at citrus, nilam and other potentially lucrative perennial crops in tobacco areas.

however, is far from automatic and considerable investment will be needed to develop the type of support services and market outlets small farmers need for a shift away from tobacco.

144. Based on the analysis here, for example, chilli and potatoes seem to offer good potential for exceptionally high producer profits and it is not unrealistic to imagine a future in which these enterprises begin to substitute for some of the earnings farmers now receive from tobacco. Perennial crops like nilam and oranges may also offer good potential for high profits and it would be useful to look at the issues around tree crop establishment in tobacco areas in more detail. On the other hand, the analysis also shows that traditional rotation crops like rice, groundnuts, corn, and horticultural vegetables (carrots and garlic) only offer very little income compared with tobacco and other high-value enterprises mentioned above. To the extent these crops are important for food security, cultural, and soil fertility reasons, however, it would be irresponsible to recommend that farmers should give up on these rotation crops and only focus on high-value enterprises. Because of the very intensive system of rotation farming practiced in all areas of Central Java, lower-cost/lower-value crops also have many important roles to play in terms of maximizing the efficiency of land use and helping to ensure a steady income throughout the year.

145. In interpreting these conclusions, it must also be remembered that there is a strong imperative to verify the production budgets to ensure each model covers a realistic spectrum of management possibilities. While every effort has been made to ensure the crop models provide the most accurate picture of current farm conditions possible, the analysis should be seen as a starting point for further investigation. It would be extremely helpful, for example, to take a closer look at such factors as the yield responsiveness to fertilizer, the amount of labour required for specific tasks, and the relative use of hired vs. family labour by different categories of farmers as some of the most important factors with a major bearing on overall costs and profitability, both in Central Java and in other parts of Indonesia where different cost structures and market conditions will apply.

146. It should also be stressed that the theoretical potential for attractive profits from the diversification crops analysed here is not the same as realising this potential in practice. Considerable investments in new support services (technical, financial, market logistics, etc.) will be needed to minimise the risk of crop diversification and attract farmers away from tobacco. This will likely be a slow process and require much further investigation to develop effective sector development strategies that address the need for long-term crop finance and other barriers to entry. Further consideration of the indicative costs and returns for smallholder crops (including a detailed analysis of agricultural costs and profitability in other parts of Indonesia than Central Java) would be a useful first step in this process, both to identify specific opportunities for market development and strategic areas where targeted support might have the greatest impact on farmer income.

147. Many other conclusions besides those noted above can be drawn from the detailed information presented in the narrative text and quantitative data section. Agricultural administrators, farmers, policy makers, agribusiness firms and others are all likely to interpret the data differently with an increased emphasis on their particular area of concern. Once a basic set of enterprise models have been prepared, however, it is very easy to use computer software to test the effects of alternative yield and price assumptions. At the very least, it is hoped this discussion has helped to illustrate the benefits of this approach to agriculture sector analysis. In the absence of a well-defined methodology for assessing individual crop attributes, sector planning can easily become an exercise in guesswork based on presuppositions about which crops and policy initiatives are best. The approach adopted here cannot point to optimal farm strategies, but can help to interpret some of the trade-offs and decisions farmers must make.

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APPENDIX 1: YIELD AND COST ASSUMPTIONS

INPUT PRICE ASSUMPTIONS

USD 1 = IDR **8,900**

Description	USD	IDR	Unit	Notes
Seed				
Carrots	0.45	4,000	sachet	Price from INSTIPER survey.
Chilli	2.25	20,000	sachet	Price from FAO study
Garlic	0.62	5,500	kg dry	Clean dry garlic (selling price from Rp 4,000 to 5,000 per kg plus premium for storage)
Nilam	0.01	100	kg	
Fertilizer				
Folar fertilizer (liquid fert)	5.62	50,000	litre	Use for chilli
KCl	0.22	1,920	kg	Excludes transport
Leaf fertilizer	2.81	25,000	kg	Special product used for nilam (price from crop brochure)
Manure/dung (organic fertilizer)	50.56	450,000	5mt load	Incl transport to field. Prices from Rp400,000-Rp500,000
NPK	0.36	3,180	kg	Excludes transport
TSP/SP-36	0.17	1,550	kg	Excludes transport
Urea	0.15	1,350	kg	Excludes transport
ZA	0.12	1,100	kg	Excludes transport
Chemicals				
Amino acid	1.69	15,000	800ml	
Antracol	6.18	55,000	kg	Prices from Rp50,000/kg - Rp60,000/kg
Bactericide	3.60	32,000	lt	Price from INSTIPER data
Dursban	2.92	26,000	500ml	
Furidan	0.90	8,000	kg	
Herbicide (general use)	5.17	46,000	litre	Price from FAO study
Insecticide (Profil)	12.36	110,000	litre	
Insecticide (for chilli)	20.79	185,000	lt	Price from INSTIPER data
Fungicide (for chilli)	16.85	150,000	litre	Price from INSTIPER data
Madator	8.99	80,000	500ml	Prices range from Rp90,000/500ml - Rp35,000/300ml
Orthene	5.62	50,000	kg	
Sanfrit	1.01	9,000	litre	
Washing detergent	1.07	9,500	kg	Spray for aphids if no other chemical
Other bought inputs (tobacco nursery and lands)				
Tobacco seedling (purchased)	0.0028	25.00	plant	Buy from nursery (typically IDR 15-35 each @ 17,500-18,000 plants per ha)
Tobacco seedlings (own nursery)	0.0020	17.36	plant	Gross cost per plant from own budget analysis of individual nursery.
Nursery soil	14.04	125,000	lump sum	Used for 1million plant breeding unit (est 35-40 seedbeds @ 30m x 80cm each).
Tobacco seed	2.25	20,000	gram	Seeds domain (variety:) Kemlako Ageng & seeds from Kopeng
Mulch	1.69	15,000	load	Pine needles and leaves collected locally and delivered to nursery.
Plastic sheeting (bulk)	3.37	30,000	25m roll	Bulk price for large tobacco nursery.
Plastic sheeting (individual)	5.06	45,000	25m roll	Individual price for small nursery and other crops with plastic.
Bamboo for tobacco nursery (bulk)	67.42	600,000	truck load	Bulk price for large tobacco nursery.
Bamboo for tobacco nursery (indiv)	2.25	20,000	small load	Small load for individual nursery delivered to nursery.
Bamboo poles for chilli trellis	0.11	1,000	each	Use +/- 75 poles per ha to make trellis for chilli.
String (chilli)	1.12	10,000	roll	For chilli
Wire	1.12	10,000	roll	For tobacco nursery
Packing basket	3.37	30,000	basket	About 40kg capacity (dry chop)
	-			
Land tax	-			
Upland (single crop share)	2.25	20,000	per crop	Based on Temanggung area - fertile soil (assume 60,000 pa / 3 rotations)
Lowland (single crop share)	3.37	30,000	per crop	Based on Klaten area (aprox. Rp 25,000 land tax + 66,667 premium / 3 rotations)
	-			
Transport	-			
50kg bag fertilizer to field	0.39	3,500	50kg bag	Transport from nearby market
40kg basket to market	0.56	5,000	40kg basket	Transport to drying point or other spot further than fertilizer market.
	-			
Hired labour	-			
Typical day	0.90	8,000	day	Basic wage (most tasks). Range from 5,000-15,000 depending on task and total hrs.
Nilam harvest (pay by kg)	0.01	100	kg fresh	Pay workers by kg harvested.

YIELD ASSUMPTIONS (Per Hectare)

	Unit	Low	Medium	High	Notes
TOBACCO - Virginia/Kretek					Analysis of upland areas only. Can grow in lowlands, but much lower yield and quality.
Total Production	kg dry chop	**600**	**950**	**1,200**	
of which Grade A	% total yield	10%	11%	12%	Quality depends on altitude; base model based on middle altidude (upland region)
of which Grade B	% total yield	15%	18%	21%	For high elevations assume + 50kg total yield of which - 3% A; - 5% B; + 3% C-D; + 5% E-F
of which Gardes C-D	% total yield	60%	57%	54%	For low elevations assume - 50kg total yield of which + 3% A; + 5% B; - 3% C-D; - 5% E-F
of which Grades E-F	% total yield	15%	14%	13%	
Kg/ha Grade A	kg dry chop	60	105	144	Kg/ha dry chop tobacco based on standard assumptions for different grades.
Kg/ha Grade B	kg dry chop	90	171	252	" "
Kg/ha Grades C-D	kg dry chop	360	542	648	" "
Kg/ha Grades E-F	kg dry chop	90	133	156	" "
ANNUAL AND ROTATION CROPS					
Carrots	kg fresh	3,750	5,000	6,000	Yield assumptions based on INSTIPER data.
Chilli	kg fresh	6,800	8,000	9,000	Suitable for upland and lowland areas (assume mid-elev). Data on yield, input differences by elev not available.
Corn	kg dry	2,250	2,800	3,100	Yield assumptions based on INSTIPER data.
Garlic	kg dry	1,750	3,250	4,250	Dry garlic converts from wet with leaves @ 60% (100kg wet = 60kg dry).
Groundnuts	kg dry	750	900	1,025	Yield assumptions based on INSTIPER data.
Potatoes	kg fresh	6,000	9,000	13,000	Yield assumptions based on INSTIPER data.
HIGH-VALUE PERENNAIALS					
Nilam ('000kg wet/ha)					Data for lowland areas. Can also grow in upland, but not clear on any yield difference.
6 months	mt wet	2.00	2.50	3.30	
9 months	mt wet	3.50	5.25	6.20	
12 months	mt wet	4.50	6.25	7.50	
Total Year 1	mt wet	**10.00**	**14.00**	**17.00**	Sales in Year 1 capitalized as part of establishment (negative cost).
15 months	mt wet	4.50	6.25	7.50	
18 months	mt wet	4.50	6.25	7.50	
21 months	mt wet	5.00	6.75	8.00	
24 months	mt wet	5.00	6.75	8.00	
Total Year 2	mt wet	**19.00**	**26.00**	**31.00**	Analysis based on Year 2 with full production.
27 months	mt wet	5.00	7.00	8.00	
30 months	mt wet	4.50	6.50	7.50	
33 months	mt wet	4.25	6.00	7.25	
36 months	mt wet	3.75	4.50	5.25	
Total Year 3	mt wet	**17.50**	**24.00**	**28.00**	Declining production in last year (replace after 36 months).
Total Nilam Yield (full life)	mt wet	**46.50**	**64.00**	**76.00**	Total production Yrs. 1-3 (full cycle).

OUTPUT PRICE ASSUMPTIONS (Farmgate price for crop sales).

USD 1 = IDR **8,900**

Description	USD	IDR	Unit	Notes
Virginia-Kretek Tobacco (normal prices)				
Grade A	0.73	6,500	kg dry chop	Based on INSTIPER survey (see price analysis for details) and own interviews.
Grade B	1.57	14,000	kg dry chop	" "
Grade C-D	2.58	23,000	kg dry chop	" "
Grade E-F	4.04	36,000	kg dry chop	" "
Virginia-Kretek Tobacco (2002 prices)				
Grade A	0.73	6,500	kg dry chop	Low prices due to cap on tar and nicotine. See Tobacco Price Analysis for details.
Grade B	1.57	14,000	kg dry chop	" "
Grade C-D	0.93	8,250	kg dry chop	" "
Grade E-F	0.62	5,500	kg dry chop	" "
Carrots	0.07	600	kg fresh	Assumption based on INSTIPER survey and analysis.
Chilli	0.39	3,500	kg	Typical price for most of crop, can range from Rp 2,500 to Rp 20,000 per kg.
Corn	0.17	1,550	kg shelled	Cash price for product sold; would have higher opportunity cost for home consumption.
Garlic				
Average quality (low & medium)	0.51	4,500	kg dry	Dry w/o leaf. Typical prices from Rp 4,000 - 5,000kg paid by trader who comes to village.
Superior quality (high input)	0.56	5,000	kg dry	Dry w/o leaf. Typical prices from Rp 4,500 - 5,500kg paid by trader who comes to village.
Groundnuts	0.67	6,000	kg dry	
Potatoes	0.31	2,800	kg dry	
Rice				
Wet season	0.10	850	kg GKP	Unmilled wet rice (*gabah kiring panen*); price used by CASER/USAID (2002).
Dry season	0.11	950	kg GKP	Unmilled wet rice (*gabah kiring panen*); price used by CASER/USAID (2002).
Nilam	0.06	500	kg wet	Various sources say 400-600/kg (Avg of INSTIPER survey = 494; rounds to 500)

DERIVATION OF ANNUAL INVESTMENT COSTS

Capital Recovery Factor (CRF): CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = real interest on savings; n = number of years in the implement's useful life.
Annual depreciation cost per ha = replacement cost (value new) * CRF * per ha share of total use.

Main Assumptions: USD 1 = IDR **8,900**

Real interest on savings (op cost of capital) = **4.0%** = Bank interest on savings (about 15% annual) - annual inflation (about 11% currently)

BASIC FARM EQUIPMENT (Shared for most crops)

Total equipment would serve 1-2ha farm. Per hectare share of use based on 1.5 ha total farm size (optimal for equipment list?) with 3 crop rotations per year less 15% allowance for use onother productive work.

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	IDR	CRF	Share of total annual use	Annual Depreciation Cost (per hectare) USD	IDR
Hoe (4 @ 40,000 each)	4	17.98	160,000	0.2755	0.1889	0.94	8,326
Shovel/fork (2 @ 55,000 each)	5	12.36	110,000	0.2246	0.1889	0.52	4,667
Sikle (4 @ 18,500 each)	3	8.31	74,000	0.3603	0.1889	0.57	5,037
Hand spryer (2 @ 230,000 each)	5	51.69	460,000	0.2246	0.1889	2.19	19,518
Watering can (3 @ 35,000 each)	3	11.80	105,000	0.3603	0.1889	0.80	7,147
Ax (1)	5	6.74	60,000	0.2246	0.1889	0.29	2,546
Wheelbarrow (1)	3	25.28	225,000	0.3603	0.1889	1.72	15,315
Buckets and other small tools	2	10.11	90,000	0.5302	0.1889	1.01	9,013
Tool shed/store (lump sum)	15	280.90	2,500,000	0.0899	0.1889	4.77	42,472
Allowance for spare parts, other bits	2	6.74	60,000	0.5302	0.1889	0.68	6,009
TOTAL Basic Equipment (all crops)						**13.49**	**120,050**

INCREMENTAL TOBACCO EQUIPMENT (Virginia-Kretek)

Low Input (300 racks/ha)

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	IDR	CRF	Share of total annual use	Annual Depreciation Cost (per hectare) USD	IDR
Drying racks (300) - low input	8	202.25	1,800,000	0.1485	1.0000	30.04	267,350
Chopping Knife (3)	3	74.16	660,000	0.3603	1.0000	26.72	237,830
TOTAL Dedicated Tobacco Equipment (low input)						**56.76**	**505,180**

Medium Input (325 racks/ha)

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	IDR	CRF	Share of total annual use	Annual Depreciation Cost (per hectare) USD	IDR
Drying racks (325) - medium input	8	219.10	1,950,000	0.1485	1.0000	32.54	289,629
Chopping Knife (4)	3	98.88	880,000	0.3603	1.0000	35.63	317,107
TOTAL Dedicated Tobacco Equipment (medium input)						**68.17**	**606,736**

High Input (350 racks/ha)

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	IDR	CRF	Share of total annual use	Annual Depreciation Cost (per hectare) USD	IDR
Drying racks (350) - high input	8	235.96	2,100,000	0.1485	1.0000	35.05	311,908
Chopping Knife (4)	3	98.88	880,000	0.3603	1.0000	35.63	317,107
TOTAL Dedicated Tobacco Equipment (high input)						**70.68**	**629,015**

TOBACCO NURSERY

Use basic equipment plus following items if plant own nursery. Assume 60% share of use on nursery (find other uses for equipment)

Individual Unit (+/- 30,000 plants; 1.7ha lands)

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	IDR	CRF	Share of total annual use	Annual Depreciation Cost (per hectare) USD	IDR
Watering cans (2 extra)	3	8.99	80,000	0.3603	0.6000	1.94	17,297
Hoe (1 extra)	4	9.55	85,000	0.2755	0.6000	1.58	14,050
Shovel/fork (1 extra)	5	8.43	75,000	0.2246	0.6000	1.14	10,108
Parts allowance for sprayer, other bits	2	3.37	30,000	0.5302	0.6000	1.07	9,544
TOTAL Tobacco Nursery (small unit)						**5.73**	**50,998**

Large Unit (+/- 1,000,000 plants; 55-57ha lands)

Description and Quantity	Useful Life (yrs)	Total Replacement Cost (value new) USD	IDR	CRF	Share of total annual use	Annual Depreciation Cost (per hectare) USD	IDR
Watering cans (10 extra)	3	44.94	400,000	0.3603	0.6000	9.72	86,484
Hoe (6 extra)	4	57.30	510,000	0.2755	0.6000	9.47	84,300
Shovel/fork (4 extra)	5	33.71	300,000	0.2246	0.6000	4.54	40,433
Parts allowance for sprayer, other bits	2	16.85	150,000	0.5302	0.6000	5.36	47,718
TOTAL Tobacco Nursery (large unit)						**29.09**	**258,934**

INCREMENTAL CHILLI EQUIPMENT

Use basic equipment for chilli plus following additional items.

Description and Quantity	Useful Life (yrs)	Total Replacement Cost USD	IDR	CRF	Share of total annual	Annual Depreciation Cost USD	IDR
Hoe (2 extra @ 40,000 each)	4	8.99	80,000	0.2755	0.1889	0.47	4,163
Sikle (2 extra @ 18,500 each)	3	4.16	37,000	0.3603	0.1889	0.28	2,518
Watering can (2 extra @ 35,000 each)	3	7.87	70,000	0.3603	0.1889	0.54	4,765
Hand spryer (2 extra @ 230,000 each)	5	51.69	460,000	0.2246	0.1889	2.19	19,518
TOTAL Basic Equipment (all crops)						**3.48**	**30,964**

DERIVATION OF ANNUAL INVESTMENT COSTS FOR NILAM

Capital Recovery Factor (CRF):

CRF = (((1+i)^n)*i)/((1+i)^n-1) where i = real interest on savings; n = number of years in the implement's useful life.

Annual depreciation cost per ha = replacement cost (value new) * CRF * per ha share of total use.

Main Assumptions:

USD 1 = IDR	8,900	
Real interest on savings (op cost of capital) =	4.0%	= Bank interest on savings (about 15% annual) - annual inflation (about 11% currently)

NILAM ESTABLISHMENT (first full year)

Establishment costs for first 12 months from planting. First harvest after 6 months, build to full production in months 12-30 then finish in month 36.
Production model based on 1 year full production (months 12-24). Therefore, new plants have life of 3 yrs; for replanting assume 2.8 years;
for maintenance in first year assume average 2.4 years remaining in life of investment.

Nilam Low Input (Yr. 1 costs and revenue)

Description	Qty/Ha	Unit Cost	Unit	Useful Life	Total Replacement Cost USD	Total Replacement Cost IDR	CRF	Share of total annual	Annual Depreciation Cost (per ha) USD	Annual Depreciation Cost (per ha) IDR
First Planting										
Seed	10,000	100	kg	3.0	112.36	1,000,000	0.3603	1.0000	40.49	360,349
Manure	4	450,000	truck load	3.0	202.25	1,800,000	0.3603	1.0000	72.88	648,627
Land tillage (hired labour)	180	8,000	day	3.0	161.80	1,440,000	0.3603	1.0000	58.30	518,902
Planting (hired labour)	15	8,000	day	3.0	13.48	120,000	0.3603	1.0000	4.86	43,242
Manure ap (hired labour)	8	8,000	day	3.0	7.19	64,000	0.3603	1.0000	2.59	23,062
Subtotal first planting						**4,424,000**			**179.12**	**1,594,182**
Replanting										
Seed (9% replacement)	900	100	kg	2.8	10.11	90,000	0.3846	1.0000	3.89	34,614
Replanting (hired labour)	3	8,000	day	2.8	2.70	24,000	0.3846	1.0000	1.04	9,231
Subtotal replanting						**114,000**			**4.93**	**43,845**
Maintenance (yr. 1)										
Urea	100	1,350	kg	2.4	15.17	135,000	0.4453	1.0000	6.75	60,110
Insecticide (profil)		110,000	lt	2.4	-	-	0.4453	1.0000	-	-
Weeding	45	8,000	day	2.4	40.45	360,000	0.4453	1.0000	18.01	160,293
Fertilizer ap (hired labour)	4	8,000	day	2.4	3.60	32,000	0.4453	1.0000	1.60	14,248
Chemical ap (hired labour)		8,000	day	2.4	-	-	0.4453	1.0000	-	-
Harvest - 6mos (hired labour)	2,000	100	kg	2.5	22.47	200,000	0.4283	1.0000	9.62	85,655
Harvest - 9 mos (hired labour	3,500	100	kg	2.5	39.33	350,000	0.4283	1.0000	16.84	149,896
Harvest - 12 mos (hired labour)	4,500	100	kg	2.2	50.56	450,000	0.4839	1.0000	24.47	217,739
Subtotal maintenance (yr. 1)						**1,527,000**			**77.30**	**687,942**
TOTAL ANNUAL DEPRECIATION (BEFORE SALES)						**6,065,000**	total yr 1 establishment		**261.34**	**2,325,969**
CROP SALES IN YEAR 1 (revenue = negative cost)										
First harvest (6 mos)	2,000	(500)	kg fresh	2.5	(112.36)	(1,000,000)	0.4283	1.0000	(48.12)	(428,274)
Second harvest (9 mos)	3,500	(500)	kg fresh	2.5	(196.63)	(1,750,000)	0.4283	1.0000	(84.21)	(749,480)
Third harvest (12 mos)	4,500	(500)	kg fresh	2.2	(252.81)	(2,250,000)	0.4839	1.0000	(122.33)	(1,088,695)
Total Yr. 1 Sales (revenue = negative cost)						**(3,250,000)**			**(170)**	**(2,266,450)**
TOTAL Nilam Establishment (0-12 months)						**2,815,000**	total yr 1 profit/loss		**529.38**	**59,519**

Nilam Medium Input (Yr. 1 costs and revenue)

Description	Qty/Ha	Unit Cost	Unit	Useful Life	Total Replacement Cost USD	Total Replacement Cost IDR	CRF	Share of total annual	Annual Depreciation Cost (per ha) USD	Annual Depreciation Cost (per ha) IDR
First Planting										
Seed	15,000	100	kg	3.0	168.54	1,500,000	0.3603	1.0000	60.73	540,523
Manure	6	450,000	truck load	3.0	303.37	2,700,000	0.3603	1.0000	109.32	972,941
Land tillage (hired labour)	180	8,000	day	3.0	161.80	1,440,000	0.3603	1.0000	58.30	518,902
Planting (hired labour)	20	8,000	day	3.0	17.98	160,000	0.3603	1.0000	6.48	57,656
Manure ap (hired labour)	12	8,000	day	3.0	10.79	96,000	0.3603	1.0000	3.89	34,593
Subtotal first planting						**5,896,000**			**238.72**	**2,124,615**
Replanting										
Seed (7% replacement)	1,050	100	kg	2.8	11.80	105,000	0.3846	1.0000	4.54	40,384
Replanting (hired labour)	5	8,000	day	2.8	4.49	40,000	0.3846	1.0000	1.73	15,384
Subtotal replanting						**145,000**			**6.27**	**55,768**
Maintenance (yr. 1)										
Urea	200	1,350	kg	2.4	30.34	270,000	0.4453	1.0000	13.51	120,220
Insecticide (profil)	3	110,000	lt	2.4	37.08	330,000	0.4453	1.0000	16.51	146,936
Weeding	55	8,000	day	2.4	49.44	440,000	0.4453	1.0000	22.01	195,914
Fertilizer ap (hired labour)	8	8,000	day	2.4	7.19	64,000	0.4453	1.0000	3.20	28,497
Chemical ap (hired labour)	4	8,000	day	2.4	3.60	32,000	0.4453	1.0000	1.60	14,248
Harvest - 6mos (hired labour)	2,500	100	kg	2.5	28.09	250,000	0.4283	1.0000	12.03	107,069
Harvest - 9 mos (hired labour	5,250	100	kg	2.5	58.99	525,000	0.4283	1.0000	25.26	224,844
Harvest - 12 mos (hired labour)	6,250	100	kg	2.2	70.22	625,000	0.4839	1.0000	33.98	302,415
Subtotal maintenance (yr. 1)						**2,536,000**			**128.11**	**1,140,143**
TOTAL ANNUAL DEPRECIATION (BEFORE SALES)						**8,577,000**	total yr 1 establishment		**373.09**	**3,320,525**
CROP SALES IN YEAR 1 (revenue = negative cost)										
First harvest (6 mos)	2,500	(500)	kg fresh	2.5	(140.45)	(1,250,000)	0.4283	1.0000	(60.15)	(535,343)
Second harvest (9 mos)	5,250	(500)	kg fresh	2.5	(294.94)	(2,625,000)	0.4283	1.0000	(126.32)	(1,124,221)
Third harvest (12 mos)	6,250	(500)	kg fresh	2.2	(351.12)	(3,125,000)	0.4839	1.0000	(169.90)	(1,512,077)
Total Yr. 1 Sales (revenue = negative cost)						**(4,375,000)**			**(230)**	**(3,171,640)**
TOTAL Nilam Establishment (0-12 months)						**4,202,000**	total yr 1 profit/loss		**762.91**	**148,885**

Nilam High Input (Yr. 1 costs and revenue)

Description	Qty/Ha	Unit Cost	Unit	Useful Life	Total Replacement Cost USD	Total Replacement Cost IDR	CRF	Share of total annual	Annual Depreciation Cost (per ha) USD	Annual Depreciation Cost (per ha) IDR
First Planting										
Seed	20,000	100	kg	3.0	224.72	2,000,000	0.3603	1.0000	80.98	720,697
Manure	8	450,000	truck load	3.0	404.49	3,600,000	0.3603	1.0000	145.76	1,297,255
Land tillage (hired labour)	180	8,000	day	3.0	161.80	1,440,000	0.3603	1.0000	58.30	518,902
Planting (hired labour)	30	8,000	day	3.0	26.97	240,000	0.3603	1.0000	9.72	86,484
Manure ap (hired labour)	15	8,000	day	3.0	13.48	120,000	0.3603	1.0000	4.86	43,242
Subtotal first planting						**7,400,000**			**299.62**	**2,666,579**
Replanting										
Seed (5% replacement)	1,000	100	kg	2.8	11.24	100,000	0.3846	1.0000	4.32	38,461
Replanting (hired labour)	8	8,000	day	2.8	7.19	64,000	0.3846	1.0000	2.77	24,615
Subtotal replanting						**164,000**			**7.09**	**63,075**
Maintenance (yr. 1)										
Urea	250	1,350	kg	2.4	37.92	337,500	0.4453	1.0000	16.88	150,275
Insecticide (profil)	5	110,000	lt	2.4	61.80	550,000	0.4453	1.0000	27.52	244,893
Weeding	65	8,000	day	2.4	58.43	520,000	0.4453	1.0000	26.02	231,535
Fertilizer ap (hired labour)	10	8,000	day	2.4	8.99	80,000	0.4453	1.0000	4.00	35,621
Chemical ap (hired labour)	5	8,000	day	2.4	4.49	40,000	0.4453	1.0000	2.00	17,810
Harvest - 6mos (hired labour)	3,300	100	kg	2.5	37.08	330,000	0.4283	1.0000	15.88	141,331
Harvest - 9 mos (hired labour	6,200	100	kg	2.5	69.66	620,000	0.4283	1.0000	29.83	265,530
Harvest - 12 mos (hired labour)	7,500	100	kg	2.2	84.27	750,000	0.4839	1.0000	40.78	362,898
Subtotal maintenance (yr. 1)						**3,227,500**			**162.91**	**1,449,893**
TOTAL ANNUAL DEPRECIATION (BEFORE SALES)						**10,791,500**	total yr 1 establishment		**469.61**	**4,179,547**
CROP SALES IN YEAR 1 (revenue = negative cost)										
First harvest (6 mos)	3,300	(500)	kg fresh	2.5	(185.39)	(1,650,000)	0.4283	1.0000	(79.40)	(706,653)
Second harvest (9 mos)	6,200	(500)	kg fresh	2.5	(348.31)	(3,100,000)	0.4283	1.0000	(149.17)	(1,327,651)
Third harvest (12 mos)	7,500	(500)	kg fresh	2.2	(421.35)	(3,750,000)	0.4839	1.0000	(203.88)	(1,814,492)
Total Yr. 1 Sales (revenue = negative cost)						**(5,400,000)**			**(283)**	**(3,848,796)**
TOTAL Nilam Establishment (0-12 months)						**5,391,500**	total yr 1 profit/loss		**976.39**	**330,751**

VIRGINIA-KRETEK PRICE ANALYSIS
(Background data only used to help derive price assumptions)

1) Survey Results (IDR/kg)

Grade	Low	High	Median	Mode	Average
A	5,000	8,000	6,750	7,000	6,438
B	10,000	17,500	14,000	15,000	13,650
C	17,000	22,500	20,000	20,000	19,450
D	22,000	30,000	25,000	25,000	25,400
E	26,500	37,000	30,000	30,000	31,363
F	35,000	40,000	37,500	40,000	38,269

40 respondents except Grade F where only 26 farmers sold this quality.
Median shows the number in the middle of the interview results.
Mode shows the most frequently occurring number from interview results.
Average is the arithmetic mean of the interview results.

2) Informant Interviews (IDR/kg)

Grade	Normal year	2002	Notes
A	6,000	6,000	Harvested from July to early-August
A+	8,500	8,500	" "
B	12,500	12,500	Harvested from July to mid-August
B+	17,500	17,500	" "
C	20,000	10,000	Harvested from late-August to November
C+	22,500	8,500	" "
D	25,000	7,500	" "
D+	35,000	7,000	" "
E	40,000	6,000	" "
E+ to F	45,000	5,000	" "

Prices in 2002 for grades above B were very low because of government policy to cap tar and nicotine content in future at a certain level (with severe penalties for factories that produced kretek cigarettes that exceded these limits). At end of year, the policy was changed to allow factores still sell high tar and nicotine cigarettes, but with clear labeling of content. Analysts expect prices to return to "normal" in foreseable future, but may still be a long-term decrease in demand for high tar and nicotine products in the long-run. Factories save tobacco for 3-4 years before manufacturing it to a cigarette, so even though the caps imposed in 2002 were not to be in effect until 2006, this still had a dramatic impact on price.

3) Assumptions for Budget Analysis

Based on the above, the following prices have been assumed for different grades under "normal" conditions and in 2002 when prices were severely affected by new tobacco restrictions. Assumptionson total output of different grades based on analysis of Instiper survey data.

	Price (IDR/kg)		Total Production (% total yield)		
Grade	Normal year	2002	Low	Medium	High
A	6,500	6,500	10%	11%	12%
B	14,000	14,000	15%	18%	21%
C-D	23,000	8,250	60%	57%	54%
E-F	36,000	5,500	15%	14%	13%

VIRGINIA-Kretek YIELD ANALYSIS
(Background data only used to help derive yield assumptions)

Results Sorted by Yield/ha		Area Cultivated (Ha)	Actual Production (Kg/total area cultivated)						ACTUAL YIELD (total kg)	YIELD PER HA (kg/ha)	Quality Designation As Percent of Total Yield					
			Grd. A	Grd. B	Grd. C	Grd. D	Grd. E	Grd. F			Grd. A	Grd. B	Grd. C	Grd. D	Grd. E	Grd. F
Bottom third	1	2.25	92	184	230	230	92	92	920	409	10%	20%	25%	25%	10%	10%
	2	0.75	36	72	90	80	26	36	340	453	11%	21%	26%	24%	8%	11%
	3	0.75	35	70	88	87	35	35	350	467	10%	20%	25%	25%	10%	10%
	4	2.00	112	224	280	280	112	112	1,120	560	10%	20%	25%	25%	10%	10%
	5	0.75	44	88	110	110	44	44	440	587	10%	20%	25%	25%	10%	10%
	6	1.00	63	126	158	157	63	63	630	630	10%	20%	25%	25%	10%	10%
	7	0.50	32	64	80	80	32	32	320	640	10%	20%	25%	25%	10%	10%
	8	0.25	23	46	58	5	23	23	178	712	13%	26%	33%	3%	13%	13%
	9	0.75	60	120	150	150	60	60	600	800	10%	20%	25%	25%	10%	10%
AVERAGE		**1.00**								**584**	**10%**	**21%**	**26%**	**22%**	**10%**	**10%**
MEDIAN		**0.75**								**587**	**10%**	**20%**	**25%**	**25%**	**10%**	**10%**
Middle third	10	1.50	123	245	307	306	123	123	1,225	817	10%	20%	25%	25%	10%	10%
	11	0.25	21	42	52	53	21	21	210	840	10%	20%	25%	25%	10%	10%
	12	1.00	92	184	230	230	92	92	920	920	10%	20%	25%	25%	10%	10%
	13	1.00	93	186	233	232	93	93	930	930	10%	20%	25%	25%	10%	10%
	14	1.25	118	236	295	295	118	118	1,180	944	10%	20%	25%	25%	10%	10%
	15	1.00	95	190	238	237	95	95	950	950	10%	20%	25%	25%	10%	10%
	16	1.00	96	192	240	240	96	96	960	960	10%	20%	25%	25%	10%	10%
	17	0.25	25	49	62	61	25	25	245	980	10%	20%	25%	25%	10%	10%
	18	0.75	110	180	200	230	90	-	810	1,080	14%	22%	25%	28%	11%	0%
	19	4.00	480	960	1,200	1,250	490	-	4,380	1,095	11%	22%	27%	29%	11%	0%
AVERAGE		**1.20**								**952**	**10%**	**20%**	**25%**	**26%**	**10%**	**8%**
MEDIAN		**1.00**								**947**	**10%**	**20%**	**25%**	**25%**	**10%**	**10%**
Top third	20	2.50	300	650	760	750	300	-	2,760	1,104	11%	24%	28%	27%	11%	0%
	21	4.00	500	985	1,250	1,200	500	-	4,435	1,109	11%	22%	28%	27%	11%	0%
	22	2.00	240	500	610	620	250	-	2,220	1,110	11%	23%	27%	28%	11%	0%
	23	0.25	28	56	70	70	28	28	280	1,120	10%	20%	25%	25%	10%	10%
	24	1.00	150	270	350	350	120	-	1,240	1,240	12%	22%	28%	28%	10%	0%
	25	1.00	160	260	340	365	130	-	1,255	1,255	13%	21%	27%	29%	10%	0%
	26	0.50	80	140	175	160	80	-	635	1,270	13%	22%	28%	25%	13%	0%
	27	0.50	90	135	170	170	75	-	640	1,280	14%	21%	27%	27%	12%	0%
	28	0.50	75	140	170	180	80	-	645	1,290	12%	22%	26%	28%	12%	0%
AVERAGE		**1.36**								**1,198**	**12%**	**22%**	**27%**	**27%**	**11%**	**1%**
MEDIAN		**1.00**								**1,240**	**12%**	**22%**	**27%**	**27%**	**11%**	**0%**

Source: INSTIPER survey data.

APPENDIX 2: CROP MODELS

A. GENERAL DESCRIPTION									
Crop:	VA-Kretek Tobacco	**Regency:**	Temanggung	**Cultivation:**	Hoe	**Typical plot:**	0.25-0.5ha	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Average	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km
Notes:	**Buy plants from local nursery. Cost of own plants about IDR 17 each so not much potential savings if grow own.** Yield and price analysis based on survey data, interview with tobacco trader and statistical information. Some farmers, however, said that yields often range from only 300-700kg/ha (probably using something like low and medium management) so the results here may be inflated???								

B. MAIN ASSUMPTIONS	USD 1.00 = IDR	8,900	LOW		MEDIUM		HIGH	
Yield (kg dry chopped tobacco per ha):		**Total kg/ha:**		**600**		**950**		**1,200**
		Grade A:	10%	60	11%	105	12%	144
		Grade B:	15%	90	18%	171	21%	252
		Grade C-D:	60%	360	57%	542	54%	648
		Grade E-F:	15%	90	14%	133	13%	156
Cash price for product sold (IDR/kg):		Grade A:		6,500		6,500		6,500
		Grade B:		14,000		14,000		14,000
		Grade C-D:		23,000		23,000		23,000
		Grade E-F:		36,000		36,000		36,000

C. VARIABLE COSTS	Price (IDR)	Unit	Qty/ha	IDR/Ha	Qty/ha	IDR/Ha	Qty/ha	IDR/Ha
Cash costs before sale				-		-		-
Tobacco seedlings (buy from nursery)	25	plant	17,750	443,750	17,750	443,750	17,750	443,750
Organic fertilizer (includes transport)	450,000	5mt load	8	3,600,000	9	4,050,000	10	4,500,000
Urea	1,350	kg	300	405,000	600	810,000	700	945,000
ZA	1,100	kg	-	-	-	-	700	770,000
Furidan	8,000	kg		-		-	8	64,000
Matador (300ml 1 day after plant)	80,000	500ml		-		-	0.6	48,000
Dursban (mix w/ Matador, Antracol)	26,000	500ml		-	1.2	31,200	1.8	46,800
Matador (mix w/ Dursban, Antracol)	80,000	500ml		-	1.2	96,000	1.8	144,000
Antracol (mix w/ Dursban, Matador)	55,000	kg		-	-	-	1.5	82,500
Amino acid	15,000	800ml		-	0.50	7,500	0.75	11,250
Detergent	9,500	kg	0.25	2,375	0.10	950		-
Packing baskets (40kg capacity)	30,000	basket	15	450,000	24	712,500	30	900,000
Transport IN (fertilizer to field)	3,500	50kg bag	6	21,000	12	42,000	28	98,000
Transport OUT (r/t to drying point)	20,000	per trip	4	80,000	6	120,000	8	160,000
Transport OUT (tobacco to market)	5,000	per 40kg basket	15	75,000	24	118,750	30	150,000
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Crop finance (loan = 35% of seed, fert & chem)	50%	flat interest	1,557,063	778,531	1,903,458	951,729	2,469,355	1,234,678
Land tax (60,000pa / 3 rotations)	20,000	crop share	1	20,000	1	20,000	1	20,000
Hired Labour (assume all labour before sale)				-		-		-
Hoe and row	8,000	day	90	720,000	90	720,000	90	720,000
Make holes	8,000	day	10	80,000	10	80,000	10	80,000
Manure application	8,000	day	15	120,000	18	144,000	21	168,000
Plant/replant	8,000	day	12	96,000	18	144,000	21	168,000
1st fertilizer application	8,000	day	6	48,000	12	96,000	15	120,000
2nd fertilizer application	8,000	day		-		-	15	120,000
Spraying	8,000	day	1	8,000	2	16,000	4	32,000
1st weeding	8,000	day	35	280,000	55	440,000	55	440,000
2nd weeding	8,000	day		-		-	35	280,000
Topping/side cut	8,000	day	12	96,000	15	120,000	21	168,000
Harvest	8,000	day	45	360,000	72	576,000	96	768,000
Chopping	8,000	day	30	240,000	48	384,000	60	480,000
Arrange the chop	8,000	day	36	288,000	54	432,000	72	576,000
Drying	8,000	day	17	136,000	24	192,000	36	288,000
Pack dry chop	8,000	day	7	56,000	12	96,000	17	136,000
Family Labour (quantity only)								
Hoe and row	0.00	day	15	-	15	-	15	-
Make holes	0.00	day	10	-	10	-	10	-
Manure application	0.00	day	10	-	12	-	14	-
Plant/replant	0.00	day	15	-	12	-	14	-
1st fertilizer application	0.00	day	4	-	8	-	10	-
2nd fertilizer application	0.00	day		-		-	10	-
Spraying	0.00	day	4	-	10	-	16	-
1st weeding	0.00	day	29	-	21	-	15	-
2nd weeding	0.00	day		-		-	10	-
Topping/side cut	0.00	day	28	-	35	-	49	-
Harvest	0.00	day	30	-	48	-	64	-
Chopping	0.00	day	20	-	32	-	40	-
Arrange the chop	0.00	day	24	-	36	-	48	-
Drying	0.00	day	11	-	16	-	24	-
Pack dry chop	0.00	day	5	-	8	-	11	-

D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
Dedicated equipment (vary by mgt level)	1	year	505,180	505,180	606,736	606,736	629,015	629,015
Nursery (individual scale)	50,998	annual share		-		-		-

E. FINANCIAL INDICATORS (Sell All)			USD	IDR	USD	IDR	USD	IDR
1. Gross Revenue (yield * cash price)			**1,480**	**13,170,000**	**2,283**	**20,315,750**	**2,807**	**24,984,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			855	7,605,125	1,109	9,872,650	1,450	12,907,300
Imputed costs before sale (self-saved seed, hired labour, bartered inputs)			-	-	-	-	-	-
Total costs before sale			**855**	**7,605,125**	**1,109**	**9,872,650**	**1,450**	**12,907,300**
Cash deductions after sale (loan payment, land tax)			90	798,531	109	971,729	141	1,254,678
Total variable costs			**944**	**8,403,656**	**1,218**	**10,844,379**	**1,591**	**14,161,978**
Annual depreciation on fixed investments (capital recovery cost)			70	625,230	82	726,786	84	749,065
Total production costs (total variable costs + depreciation)			**1,014**	**9,028,886**	**1,300**	**11,571,164**	**1,675**	**14,911,042**
Gross cost per ton of product			1,574	14,006,094	1,283	11,415,136	1,326	11,801,648
Net cost per ton of product			1,691	15,048,143	1,369	12,180,173	1,396	12,425,869
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**536**	**4,766,344**	**1,064**	**9,471,371**	**1,216**	**10,822,023**
Net profit (gross profit - annual depreciation)			**465**	**4,141,114**	**983**	**8,744,586**	**1,132**	**10,072,958**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				0.57		0.87		0.76
Return to total costs (net profit/total production costs)				0.46		0.76		0.68
5. Labour								
Hired labour (days)				316		430		568
Family labour (days, small-scale only)				205		263		350
Total labour requirement (days)				**521**		**693**		**918**
Gross profit per day family labour			2.61	23,250	4.05	36,013	3.47	30,920
Gross profit per day total labour			1.03	9,148	1.54	13,667	1.32	11,789
Net profit per day total labour			0.89	7,948	1.42	12,618	1.23	10,973

F. SENSITIVITY INDICATORS (Sell All)			Result	% chg	Result	% chg	Result	% chg
Yield & percent change to gross profit = 0			374	-38%	512	-46%	677	-44%
Yield & percent change to net profit = 0			404	-33%	549	-42%	715	-40%
Average Price & percent change to net profit = 0		Current Average:	21,950		21,385		20,820	
		New Average to give NP = 0:	15,048	-46%	12,180	-76%	12,426	-68%

A. GENERAL DESCRIPTION	2002 PRICES									
Crop:	VA-Kretek Tobacco (2002 price)	**Regency:**	Temanggung	**Cultivation:**	Hoe	**Typical plot:**	0.25-0.5ha	**Sold to:**	Field agent	
Sector:	Smallholder	**Area:**	Average	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km	
Notes:	**Buy plants from local nursery. Cost of own plants about IDR 17 each so not much potential savings if grow own.**									
	Yield and price analysis based on survey data, interview with tobacco trader and statistical information. Some farmers, however, said that yields									
	often range from only 300-700kg/ha (probably using something like low and medium management) so the results here may be inflated???									

B. MAIN ASSUMPTIONS	USD 1.00 = IDR	8,900	LOW		MEDIUM		HIGH	
Yield (kg dry chopped tobacco per ha):		**Total kg/ha:**		**600**		**950**		**1,200**
		Grade A:	10%	60	11%	105	12%	144
		Grade B:	15%	90	18%	171	21%	252
		Grade C-D:	60%	360	57%	542	54%	648
		Grade E-F:	15%	90	14%	133	13%	156
Cash price for product sold (IDR/kg):		Grade A:		6,500		6,500		6,500
		Grade B:		14,000		14,000		14,000
		Grade C-D:		8,250		8,250		8,250
		Grade E-F:		5,500		5,500		5,500

C. VARIABLE COSTS	Price (IDR)	Unit	Qty/ha	IDR/Ha	Qty/ha	IDR/Ha	Qty/ha	IDR/Ha
Cash costs before sale				-		-		-
Tobacco seedlings (buy from nursery)	25	plant	17,750	443,750	17,750	443,750	17,750	443,750
Organic fertilizer (includes transport)	450,000	5mt load	8	3,600,000	9	4,050,000	10	4,500,000
Urea	1,350	kg	300	405,000	600	810,000	700	945,000
ZA	1,100	kg	-	-	-	-	700	770,000
Furidan	8,000	kg		-		-	8	64,000
Matador (300ml 1 day after plant)	80,000	500ml		-		-	0.6	48,000
Dursban (mix w/ Matador, Antracol)	26,000	500ml		-	1.2	31,200	1.8	46,800
Matador (mix w/ Dursban, Antracol)	80,000	500ml		-	1.2	96,000	1.8	144,000
Antracol (mix w/ Dursban, Matador)	55,000	kg		-	-	-	1.5	82,500
Amino acid	15,000	800ml		-	0.50	7,500	0.75	11,250
Detergent	9,500	kg	0.25	2,375	0.10	950		-
Packing baskets (40kg capacity)	30,000	basket	15	450,000	24	712,500	30	900,000
Transport IN (fertilizer to field)	3,500	50kg bag	6	21,000	12	42,000	28	98,000
Transport OUT (r/t to drying point)	20,000	per trip	4	80,000	6	120,000	8	160,000
Transport OUT (tobacco to market)	5,000	per 40kg basket	15	75,000	24	118,750	30	150,000
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Crop finance (loan = 35% of seed, fert & chem)	50%	flat interest	1,557,063	778,531	1,903,458	951,729	2,469,355	1,234,678
Land tax (60,000pa / 3 rotations)	20,000	crop share	1	20,000	1	20,000	1	20,000
Hired Labour (assume all labour before sale)				-		-		-
Hoe and row	8,000	day	90	720,000	90	720,000	90	720,000
Make holes	8,000	day	10	80,000	10	80,000	10	80,000
Manure application	8,000	day	15	120,000	18	144,000	21	168,000
Plant/replant	8,000	day	12	96,000	18	144,000	21	168,000
1st fertilizer application	8,000	day	6	48,000	12	96,000	15	120,000
2nd fertilizer application	8,000	day		-		-	15	120,000
Spraying	8,000	day	1	8,000	2	16,000	4	32,000
1st weeding	8,000	day	35	280,000	55	440,000	55	440,000
2nd weeding	8,000	day		-		-	35	280,000
Topping/side cut	8,000	day	12	96,000	15	120,000	21	168,000
Harvest	8,000	day	45	360,000	72	576,000	96	768,000
Chopping	8,000	day	30	240,000	48	384,000	60	480,000
Arrange the chop	8,000	day	36	288,000	54	432,000	72	576,000
Drying	8,000	day	17	136,000	24	192,000	36	288,000
Pack dry chop	8,000	day	7	56,000	12	96,000	17	136,000
Family Labour (quantity only)								
Hoe and row	0.00	day	15	-	15	-	15	-
Make holes	0.00	day	10	-	10	-	10	-
Manure application	0.00	day	10	-	12	-	14	-
Plant/replant	0.00	day	15	-	12	-	14	-
1st fertilizer application	0.00	day	4	-	8	-	10	-
2nd fertilizer application	0.00	day		-		-	10	-
Spraying	0.00	day	4	-	10	-	16	-
1st weeding	0.00	day	29	-	21	-	15	-
2nd weeding	0.00	day		-		-	10	-
Topping/side cut	0.00	day	28	-	35	-	49	-
Harvest	0.00	day	30	-	48	-	64	-
Chopping	0.00	day	20	-	32	-	40	-
Arrange the chop	0.00	day	24	-	36	-	48	-
Drying	0.00	day	11	-	16	-	24	-
Pack dry chop	0.00	day	5	-	8	-	11	-

D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
Dedicated equipment (vary by mgt level)	1	year	505,180	505,180	606,736	606,736	629,015	629,015
Nursery (individual scale)	50,998	annual share		-		-		-

E. FINANCIAL INDICATORS (Sell All)	USD	IDR	USD	IDR	USD	IDR
1. Gross Revenue (yield * cash price)	**575**	**5,115,000**	**929**	**8,272,125**	**1,199**	**10,668,000**
2. Production Costs						
Cash costs before sale (excl. loan paynent and land tax)	855	7,605,125	1,109	9,872,650	1,450	12,907,300
Imputed costs before sale (self-saved seed, hired labour, bartered inputs)	-	-	-	-	-	-
Total costs before sale	**855**	**7,605,125**	**1,109**	**9,872,650**	**1,450**	**12,907,300**
Cash deductions after sale (loan payment, land tax)	90	798,531	109	971,729	141	1,254,678
Total variable costs	**944**	**8,403,656**	**1,218**	**10,844,379**	**1,591**	**14,161,978**
Annual depreciation on fixed investments (capital recovery cost)	70	625,230	82	726,786	84	749,065
Total production costs (total variable costs + depreciation)	**1,014**	**9,028,886**	**1,300**	**11,571,164**	**1,675**	**14,911,042**
Gross cost per ton of product	1,574	14,006,094	1,283	11,415,136	1,326	11,801,648
Net cost per ton of product	1,691	15,048,143	1,369	12,180,173	1,396	12,425,869
3. Farmer Profits (sell all)						
Gross profit (gross revenue - total variable costs)	**(370)**	**(3,288,656)**	**(289)**	**(2,572,254)**	**(393)**	**(3,493,978)**
Net profit (gross profit - annual depreciation)	**(440)**	**(3,913,886)**	**(371)**	**(3,299,039)**	**(477)**	**(4,243,042)**
4. Rates of Return (sell all)						
Return to variable costs (gross profit/total variable costs)		(0.39)		(0.24)		(0.25)
Return to total costs (net profit/total production costs)		(0.43)		(0.29)		(0.28)
5. Labour						
Hired labour (days)		316		430		568
Family labour (days, small-scale only)		205		263		350
Total labour requirement (days)		**521**		**693**		**918**
Gross profit per day family labour	(1.80)	(16,042)	(1.10)	(9,780)	(1.12)	(9,983)
Gross profit per day total labour	(0.71)	(6,312)	(0.42)	(3,712)	(0.43)	(3,806)
Net profit per day total labour	(0.84)	(7,512)	(0.53)	(4,761)	(0.52)	(4,622)

F. SENSITIVITY INDICATORS (Sell All)		Result	% chg	Result	% chg	Result	% chg
Yield & percent change to gross profit = 0		374	-38%	512	-46%	677	-44%
Yield & percent change to net profit = 0		404	-33%	549	-42%	715	-40%
Average Price & percent change to net profit = 0	Current Average:	21,950		21,385		20,820	
	New Average to give NP = 0:	15,048	-46%	12,180	-76%	12,426	-68%

A. GENERAL DESCRIPTION

Crop:	Virginia kretek nursery	**Regency:**	Temanggung	**Cultivation:**	Hoe	**Typical plot:**	Various	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Upland - avg	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km

Notes: Large model from INSTIPER; Medium model from JCK farmer interview; Small model based on area reduction compared with medium
Data appear to show that individual nursery may nob make financial sense - profits seem to rely on use of own labour (minimum hired).
Individual costs IDR 16.00 to 23.00/plant (can sometimes buy for Rp 15-20). Large-scale costs much less per plant. Use 17,500 - 18,000 plants per ha on lands.

B. MAIN ASSUMPTIONS	**USD 1.00 = IDR**	8,900			**INDIVIDUAL (max 1.7 ha lands)**		**LARGE (55-57ha lands)**	
					Typical 30m x 80cm seebed		Est 35-40 standard beds	
		Yield (seedlings/unit)			**30,000**			**1,000,000**
		Cash price to farmer (IDR/plant)			25.00			25.00
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
				-		-		-
				-		-		-
Cash costs before sale				-		-		-
Soil (large operation only)	125,000	lump sum		-		-	1	125,000
Manure (mix with own or bought soil)	450,000	5mt load		-		-	1.50	675,000
Manure (small qty price est > Rp/kg 5mt laod)	200	kg		-	325	65,000		-
Seed	20,000	g		-	0.5	10,000	20	400,000
Mulch	15,000	load		-	2	30,000	75	1,125,000
Plastic (bulk price)	30,000	25m roll		-		-	20	600,000
Plastic (individual price)	45,000	25m roll		-	1.20	54,000		-
Bamboo (bulk)	600,000	truck load		-		-	1	600,000
Bamboo (individual)	20,000	small load		-	1	20,000		-
Wire	10,000	roll		-	0.50	5,000	10.0	100,000
KCl	1,920	kg		-		-	5	9,600
Matador	80,000	500ml		-		-	2	160,000
Antracol	55,000	kg		-	0.05	2,750	0.5	27,500
Orthene	50,000	kg		-	0.25	12,500		-
Transport & other bits	10,000	lump sum		-	1	10,000	15	150,000
Cash deductions after sale (including finance)				-	loan amt		loan amt	
Crop finance (35% of cost) - full-season	50%	flat rate		-	73,238	36,619		-
Crop finance (35% of cost) - short-term	15%	flat rate		-		-	1,390,235	208,535
				-		-		-
Hired Labour (assume all labour before sale)				-		-		-
1. Large Operation				-		-		-
Prepare (1 month)				-		-		-
10 workers x 20 days each (male)	15,000	day		-		-	200	3,000,000
Maintenance (45 day period, some tasks part time)				-		-		-
4 workers x 35 days each (male)	15,000	day		-		-	140	2,100,000
8 workers x 15 days each (female)	8,000	day		-		-	120	960,000
2. Individual Operation				-		-		-
Prepare & plant	15,000	day		-	10	150,000		-
Irrigation (every 5 days, 2 workers)	5,000	day		-	18	90,000		-
Spray and other maintenance	5,000	day		-	7	35,000		-
				-		-		-
Family Labour (quantity only)								
Supervision and management	0.00	day			60	days	100	days
	0.00	day						
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic equipment	#REF!	year		#REF!	1.00	#REF!	1.00	#REF!
Special items - individual nursery	258,934	year		-	1.00	258,934		-
Special items - large nursery	#REF!	year		#REF!		#REF!	1.00	#REF!
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**-**	**-**	**84**	**750,000**	**2,809**	**25,000,000**
2. Production Costs								
Cash costs before sale (excl. outgrower support, other deductions)			-	-	54	484,250	1,127	10,032,100
Cash deductions after sale			-	-	4	36,619	23	208,535
Total variable costs			**-**	**-**	**59**	**520,869**	**1,151**	**10,240,635**
Annual depreciation on fixed investments (capital recovery cost)			#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Total production costs (total variable costs + depreciation)			**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
Gross cost per plant						17.36		10.24
Net cost per plant				#REF!	#REF!	#REF!	#REF!	#REF!
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**-**	**-**	**26**	**229,131**	**1,658**	**14,759,365**
Net profit (gross profit - annual depreciation)			**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**	**#REF!**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				#DIV/0!		0.44		1.44
Return to total costs (net profit/total production costs)				#REF!		#REF!		#REF!
5. Labour								
Hired labour (days)				-		35		460
Family labour (days, small-scale only)				-		60		100
Total labour requirement (days)				**-**		**95**		**560**
Gross profit per day family labour			#DIV/0!	#DIV/0!	0.43	3,818.85	16.58	147,593.65
Net profit per day family labour			#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
Net profit per day total labour			#REF!	#REF!	#REF!	#REF!	#REF!	#REF!
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0				#DIV/0!	20,835	-31%	409,625	-59%
Yield & percent change to net profit = 0				#DIV/0!	28,507	-5%	425,615	-57%
Cash price & percent change to net profit = 0				#DIV/0!	23.76	-5%	10.64	-57%

	Rainfed		Simple Irrigation		Semi-Technical Irrigation		Technical Irrigation	
	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season	Wet Season	Dry Season
Production								
Yield (Kg GKP/ha)	3,780	3,970	4,810	4,900	5,370	5,880	5,900	6,360
Price (IDR/kg GKP)	850	950	850	950	850	950	850	950
Value (IDR/ha)	**3,213,000**	**3,771,500**	**4,088,500**	**4,655,000**	**4,564,500**	**5,586,000**	**5,015,000**	**6,042,000**
Variable Costs (IDR/ha)								
Fertilizers	391,986	422,408	417,027	460,845	415,370	497,154	506,515	489,402
Other agro-inputs	260,253	120,688	273,930	260,680	187,145	262,542	260,780	187,302
Hired labour	726,138	716,585	879,028	931,000	848,997	1,173,060	862,580	1,462,164
Capital	189,567	147,089	134,921	148,960	255,612	262,542	235,705	175,218
Total	**1,567,944**	**1,406,770**	**1,704,905**	**1,801,485**	**1,707,123**	**2,195,298**	**1,865,580**	**2,314,086**
Gross Profit (IDR/ha)	**1,645,056**	**2,364,731**	**2,383,596**	**2,853,515**	**2,857,377**	**3,390,702**	**3,149,420**	**3,727,914**
USD/ha	184.84	265.70	267.82	320.62	321.05	380.98	353.87	418.87
Labour (days/ha)								
Hired labour	91	90	110	116	106	147	108	183
Family labour	14	54	36	48	36	22	36	24
Total	**105**	**144**	**146**	**165**	**142**	**169**	**144**	**207**
Rates of Rerurn								
Return to var costs (gr. profit/vc)	1.05	1.68	1.40	1.58	1.67	1.54	1.69	1.61
Return per day total labour (IDR)	15,693	16,446	16,365	17,329	20,112	20,066	21,939	18,015
Sensitivity Indicators								
Yield to give gross profit = 0	1,845	1,481	2,006	1,896	2,008	2,311	2,195	2,436
% Chg in yield or price to GP = 0	-51%	-63%	-58%	-61%	-63%	-61%	-63%	-62%

Source: CASER/USAID (2002).

Note: INSTIPER data similar for gross value, but costs are much less than CASER/USAID (no land rent in INSTIPER model and 50-60%r less labour).

A. GENERAL DESCRIPTION

Crop:	Groundnuts	**Regency:**	Sleman/Jogja	**Cultivation:**	Hoe	**Typical plot:**	0.1- 0.25ha	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Lowland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km
Notes:	Dry groundnuts sold to trader who comes to village								

B. MAIN ASSUMPTIONS	**USD 1.00 = IDR**	8,900	**LOW**		**MEDIUM**		**HIGH**	
		Total yield (kg dry/ha)		**750**		**900**		**1,025**
		Cash price for product sold (IDR/kg dry):		**6,000**		**6,000**		**6,000**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
Recycled seed (selling price + 50% storage cost)	9,000	kg	100	900,000	105	945,000	110	990,000
				-		-		-
Cash costs before sale				-		-		-
				-		-		-
Manure	450,000	5mt load	0.50	225,000	0.75	337,500	1.00	450,000
KCl	1,920	kg		-	50	96,000	75	144,000
TSP/SP-36	1,550	kg		-	100	155,000	150	232,500
Urea	1,350	kg	50	67,500	75	101,250	100	135,000
				-		-		-
Orthene	50,000	lt		-		-	1.0	50,000
				-		-		-
				-		-		-
				-		-		-
Transport IN (fert to farm)	3,500	bag	1	3,500	5	15,750	7	22,750
				-		-		-
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Loan (borrow 35% of seed, fert, chem, plastic)	50%	flat interest	102,375	51,188	241,413	120,706	354,025	177,013
Land tax (60,000pa / 3 rotations)	30,000	annual rate	1	30,000	1	30,000	1	30,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage	8,000	day	20	160,000	25	200,000	25	200,000
Manure application	8,000	day	2	16,000	4	32,000	4	32,000
Planting	8,000	day	2	16,000	3	24,000	3	24,000
Fertilizer application	8,000	day		-	4	32,000	4	32,000
Weeding	8,000	day	15	120,000	30	240,000	40	320,000
Harvest	8,000	day		-	2	16,000	4	32,000
				-		-		-
				-		-		-
Family Labour (quantity only)								
Tillage	0.00	day	10	-	5	-	5	-
Manure application	0.00	day	4	-	2	-	2	-
Planting	0.00	day	4	-	3	-	3	-
Fertilizing	0.00	day	2	-	6	-	8	-
Spraying	0.00	day		-		-	2	-
Weeding	0.00	day	10	-	8	-	5	-
Harvest/post-harvest	0.00	day	15	-	18	-	25	-
Drying and paring	0.00	day	22	-	26	-	31	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
				-		-		-
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**506**	**4,500,000**	**607**	**5,400,000**	**691**	**6,150,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			68	608,000	140	1,249,500	188	1,674,250
Imputed costs before sale (self-saved seed, bartered inputs)			101	900,000	106	945,000	111	990,000
Total costs before sale			**169**	**1,508,000**	**247**	**2,194,500**	**299**	**2,664,250**
Cash deductions after sale (loan payment, land tax)			9	81,188	17	150,706	23	207,013
Total variable costs			**179**	**1,589,188**	**264**	**2,345,206**	**323**	**2,871,263**
Annual depreciation on fixed investments (capital recovery cost)			13	120,050	13	120,050	13	120,050
Total production costs (total variable costs + depreciation)			**192**	**1,709,237**	**277**	**2,465,256**	**336**	**2,991,312**
Gross cost per ton of product			238	2,118,917	293	2,605,785	315	2,801,232
Net cost per ton of product			256	2,278,983	308	2,739,173	328	2,918,353
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**327**	**2,910,813**	**343**	**3,054,794**	**368**	**3,278,738**
Net profit (gross profit - annual depreciation)			**314**	**2,790,763**	**330**	**2,934,744**	**355**	**3,158,688**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				1.83		1.30		1.14
Return to total costs (net profit/total production costs)				1.63		1.19		1.06
5. Labour								
Hired labour (days)				39		68		80
Family labour (days, small-scale only)				67		68		81
Total labour requirement (days)				**106**		**136**		**161**
Gross profit per day family labour			4.88	43,445	5.05	44,923	4.55	40,478
Gross profit per day total labour			#VALUE!	27,460	#VALUE!	22,462	#VALUE!	20,365
Net profit per day total labour			2.96	26,328	2.42	21,579	2.20	19,619
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			265	-65%	391	-57%	479	-53%
Yield & percent change to net profit = 0			285	-62%	411	-54%	499	-51%
Price & percent change to net profit = 0			1,349	-78%	2,739	-54%	2,918	-51%

A. GENERAL DESCRIPTION

Crop:	Corn	**Regency:**	Bantul/Jogja	**Cultivation:**	Hoe	**Typical plot:**	0.1 - 0.75ha	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Lowland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km

Notes: Survey data from Bantul/Jogja in lowland areas. Corn also grown in upland regions, but data not available on yield, price or inpu use differences.
Would likley get higher yield in upland areas due to mildergrowing climate?
Model for dry corn sold to trader who comes to village.
Tillage based on part labour (assume garlic included in rotation). In practice, may do quick tillage after harvest tobacco (save on labour)
Use fertilizer with recycled seed unlikely to be an efficient use of expensive fertilizer - likely to be big improvement if use hybrid or other improved seed (+4mt/ha?).

B. MAIN ASSUMPTIONS	**USD 1.00 = IDR**	8,900	**LOW**		**MEDIUM**		**HIGH**	
	Total yield (kg shelled/ha)			**2,250**		**2,800**		**3,100**
	Cash price for product sold (IDR/kg fresh):			**1,550**		**1,550**		**1,550**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
Recycled seed (selling price + 50% storage cost)	2,325	kg	20	46,500	23	53,475	25	58,125
				-		-		-
Cash costs before sale				-		-		-
				-		-		-
Manure	450,000	5mt load	0.50	225,000	1.00	450,000	1.00	450,000
				-		-		-
TSP/SP-36	1,550	kg	100	155,000	200	310,000	250	387,500
Urea	1,350	kg	200	270,000	300	405,000	400	540,000
				-		-		-
Pesticide	8,000	lt	7.0	56,000	9.0	72,000	10.0	80,000
				-		-		-
				-		-		-
				-		-		-
				-		-		-
Transport IN (fert to farm)	3,500	bag	6	21,000	10	35,000	13	45,500
				-		-		-
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Loan (borrow 35% of seed, fert, chem, plastic)	50%	flat interest	247,100	123,550	432,950	216,475	510,125	255,063
Land tax (60,000pa / 3 rotations)	30,000	annual rate	1	30,000	1	30,000	1	30,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage	8,000	day	12	96,000	12	96,000	12	96,000
Manure application	8,000	day	2	16,000	4	32,000	4	32,000
Planting	8,000	day	2	16,000	3	24,000	3	24,000
Fertilizer application	8,000	day	6	48,000	8	64,000	12	96,000
Weeding	8,000	day	18	144,000	22	176,000	28	224,000
Harvest/post-harvest	8,000	day	6	48,000	6	48,000	6	48,000
				-		-		-
				-		-		-
Family Labour (quantity only)								
Tillage	0.00	day	5	-	5	-	5	-
Manure application	0.00	day	4	-	2	-	2	-
Planting	0.00	day	4	-	3	-	3	-
Fertilizing	0.00	day	8	-	6	-	8	-
Spraying	0.00	day	2	-	4	-	4	-
Weeding	0.00	day	10	-	12	-	15	-
Harvest/post-harvest	0.00	day	5	-	5	-	5	-
Marketing	0.00	day	2	-	3	-	3	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
				-		-		-
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**392**	**3,487,500**	**488**	**4,340,000**	**540**	**4,805,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			123	1,095,000	192	1,712,000	227	2,023,000
Imputed costs before sale (self-saved seed, bartered inputs)			5	46,500	6	53,475	7	58,125
Total costs before sale			**128**	**1,141,500**	**198**	**1,765,475**	**234**	**2,081,125**
Cash deductions after sale (loan payment, land tax)			17	153,550	28	246,475	32	285,063
Total variable costs			**146**	**1,295,050**	**226**	**2,011,950**	**266**	**2,366,188**
Annual depreciation on fixed investments (capital recovery cost)			13	120,050	13	120,050	13	120,050
Total production costs (total variable costs + depreciation)			**159**	**1,415,100**	**240**	**2,132,000**	**279**	**2,486,237**
Gross cost per ton of product			65	575,578	81	718,554	86	763,286
Net cost per ton of product			71	628,933	86	761,428	90	802,012
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**246**	**2,192,450**	**262**	**2,328,050**	**274**	**2,438,813**
Net profit (gross profit - annual depreciation)			**233**	**2,072,400**	**248**	**2,208,000**	**261**	**2,318,763**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				1.69		1.16		1.03
Return to total costs (net profit/total production costs)				1.46		1.04		0.93
5. Labour								
Hired labour (days)				46		55		65
Family labour (days, small-scale only)				40		40		45
Total labour requirement (days)				**86**		**95**		**110**
Gross profit per day family labour			6.16	54,811	6.54	58,201	6.09	54,196
Gross profit per day total labour			2.86	25,494	2.75	24,506	2.49	22,171
Net profit per day total labour			2.71	24,098	2.61	23,242	2.37	21,080
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			836	-63%	1,294	-54%	1,519	-51%
Yield & percent change to net profit = 0			913	-59%	1,371	-51%	1,597	-48%
Price & percent change to net profit = 0			616	-60%	759	-51%	798	-49%

A. GENERAL DESCRIPTION									
Crop:	Chilli	**Regency:**	Magelang	**Cultivation:**	Hoe	**Typical plot:**	0.1 - 0.25ha	**Sold to:**	village trader
Sector:	Smallholder	**Area:**	Midland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km
Notes:	Use data from FAO study and cross-check with INSTIPER data.				Numbers for Chilli appear better than tobacco, so why not grow more Chill?				
	Survey data from Magelang (midland area). Can grow chlli in upland and lowland tobacco areas.				- market size, variable price, input support, skill, tradition.				
	Could make sensitivity test based on alternative prices (very variable for chilli from IDR 2,500 - 25,000 or 30,000 per kg). 3,500 used here is typical for most sales.								
	Tillage based on part labour (as if chilli grown in rotation) would require more labour if did full till.								

B. MAIN ASSUMPTIONS	USD 1.00 = IDR	8,900	LOW		MEDIUM		HIGH	
		Total yield (kg/ha)		**6,800**		**8,000**		**9,000**
		Cash price for product sold (IDR/kg):		**3,500**		**3,500**		**3,500**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
				-		-		-
Cash costs before sale				-		-		-
Chilli seed	20,000	sachet	5	100,000	5	100,000	5	100,000
Urea	1,350	kg	200	270,000	250	337,500	300	405,000
TSP/SP-36	1,550	kg	150	232,500	200	310,000	250	387,500
KCl	1,920	kg	150	288,000	200	384,000	250	480,000
NPK	3,180	kg		-	50	159,000	50	159,000
Foliar fertlizer (liquid fert)	50,000	lt	1.0	50,000	1.5	75,000	2.0	100,000
Manure	450,000	5mt load	5.0	2,250,000	8.0	3,600,000	10.0	4,500,000
Herbicide	46,000	lt	2.0	92,000	3.0	138,000	4.0	184,000
Insecticide (furidan)	8,000	kg	45.0	360,000	45.0	360,000	45.0	360,000
Insecticide (special for chilli)	185,000	lt	2.0	370,000	5.0	925,000	5.0	925,000
Fungicide	150,000	lt	10.0	1,500,000	12.0	1,800,000	14.0	2,100,000
Bactericide	32,000	lt	0.5	16,000	0.75	24,000	0.75	24,000
String	10,000	roll	4.0	40,000	4.0	40,000	4.0	40,000
Bamboo poles (trellis for chilli)	1,000	each	75.0	75,000	75.0	75,000	75.0	75,000
Plastic sheeting	45,000	roll	15	675,000	15.0	675,000	15.0	675,000
Transport IN (fert to farm)	3,500	bag	10	35,000	14	49,000	17	59,500
Transport OUT (chilli to market)		40kg basket	170	-	200	-	225	-
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Loan (borrow 35% of seed, fert, chem, plastic)	50%	flat interest	2,211,475	1,105,738	3,150,875	1,575,438	3,680,075	1,840,038
Land tax (60,000pa / 3 rotations)	30,000	annual rate	1	30,000	1	30,000	1	30,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage	8,000	day	25	200,000	25	200,000	25	200,000
Seedbed establishment and maintenance	8,000	day	15	120,000	20	160,000	25	200,000
Seeding/transplanting	8,000	day	5	40,000	8	64,000	10	80,000
Manuring and bed maintenance	8,000	day	50	400,000	65	520,000	75	600,000
Fertilizer application	8,000	day	15	120,000	18	144,000	22	176,000
Weeding	8,000	day	50	400,000	58	464,000	75	600,000
Spraying	8,000	day	3	24,000	5	40,000	7	56,000
Harvest	8,000	day	190	1,520,000	220	1,760,000	250	2,000,000
Pack and market	8,000	day	12	96,000	14	112,000	18	144,000
				-		-		-
Family Labour (quantity only)								
Tillage	0.00	day	5	-	5	-	5	-
Seedbed establishment and maintenance	0.00	day	5	-	6	-	7	-
Seeding/transplanting	0.00	day	2	-	4	-	5	-
Replanting	0.00	day	5	-	4	-	4	-
Manuring and bed maintenance	0.00	day	10	-	12	-	14	-
Fertilizer application	0.00	day	4	-	7	-	9	-
Soil recovery	0.00	day	20	-	22	-	24	-
Weeding	0.00	day	23	-	24	-	23	-
Spraying	0.00	day	20	-	25	-	30	-
Harvest	0.00	day	18	-	25	-	32	-
Pack and market	0.00	day	10	-	15	-	20	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
Incremental chilli equipment	30,964	annual share	1	30,964	1	30,964	1	30,964
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**2,674**	**23,800,000**	**3,146**	**28,000,000**	**3,539**	**31,500,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			1,042	9,273,500	1,406	12,515,500	1,644	14,630,000
Imputed costs before sale (self-saved seed, bartered inputs)			-	-	-	-	-	-
Total costs before sale			**1,042**	**9,273,500**	**1,406**	**12,515,500**	**1,644**	**14,630,000**
Cash deductions after sale (loan payment, land tax)			128	1,135,738	180	1,605,438	210	1,870,038
Total variable costs			**1,170**	**10,409,238**	**1,587**	**14,120,938**	**1,854**	**16,500,038**
Annual depreciation on fixed investments (capital recovery cost)			17	151,013	17	151,013	17	151,013
Total production costs (total variable costs + depreciation)			**1,187**	**10,560,251**	**1,604**	**14,271,951**	**1,871**	**16,651,051**
Gross cost per ton of product			172	1,530,770	198	1,765,117	206	1,833,338
Net cost per ton of product			174	1,552,978	200	1,783,994	208	1,850,117
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**1,505**	**13,390,763**	**1,559**	**13,879,063**	**1,685**	**14,999,963**
Net profit (gross profit - annual depreciation)			**1,488**	**13,239,749**	**1,542**	**13,728,049**	**1,668**	**14,848,949**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				1.29		0.98		0.91
Return to total costs (net profit/total production costs)				1.25		0.96		0.89
5. Labour								
Hired labour (days)				365		433		507
Family labour (days, small-scale only)				122		149		173
Total labour requirement (days)				**487**		**582**		**680**
Gross profit per day family labour			12.33	109,760	10.47	93,148	9.74	86,705
Gross profit per day total labour			3.09	27,496	2.68	23,847	2.48	22,059
Net profit per day total labour			3.05	27,186	2.65	23,588	2.45	21,837
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			3,084	-55%	4,184	-48%	4,889	-46%
Yield & percent change to net profit = 0			3,129	-54%	4,229	-47%	4,934	-45%
Price & percent change to net profit = 0			1,678	-52%	1,909	-45%	1,975	-44%

A. GENERAL DESCRIPTION									
Crop:	Potato	**Regency:**	Probolinggo	**Cultivation:**	Hoe	**Typical plot:**	0.25 - 1ha	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Upland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km
Notes:									

B. MAIN ASSUMPTIONS	USD 1.00 = IDR	8,900	LOW		MEDIUM		HIGH	
		Total yield (kg/ha)		**6,000**		**9,000**		**13,000**
		Cash price for product sold (IDR/kg):		**2,800**		**2,800**		**2,800**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
Recycled seed (selling price + 50% storage cost)	4,200	kg	1,500	6,300,000	1,600	6,720,000	1,800	7,560,000
				-		-		-
Cash costs before sale				-		-		-
				-		-		-
Manure	450,000	5mt load	2.00	900,000	4.00	1,800,000	6.00	2,700,000
ZA	1,100	kg	50	55,000	100	110,000	200	220,000
TSP/SP-36	1,550	kg	50	77,500	100	155,000	200	310,000
Urea	1,350	kg	100	135,000	250	337,500	400	540,000
Insecticide	50,000	lt	1	50,000	4	200,000	6	300,000
Fungicide	150,000	lt		-	1.0	150,000	2.0	300,000
				-		-		-
				-		-		-
				-		-		-
				-		-		-
				-		-		-
Transport IN (fert to farm)	3,500	bag	4	14,000	9	31,500	16	56,000
				-		-		-
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Loan (borrow 35% of seed, fert, chem, plastic)	50%	flat interest	426,125	213,063	963,375	481,688	1,529,500	764,750
Land tax (60,000pa / 3 rotations)	30,000	annual rate	1	30,000	1	30,000	1	30,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage	8,000	day	25	200,000	20	160,000	20	160,000
Manure application	8,000	day	6	48,000	8	64,000	12	96,000
Planting	8,000	day	2	16,000	3	24,000	3	24,000
Fertilizer application	8,000	day	4	32,000	6	48,000	10	80,000
Weeding	8,000	day	20	160,000	35	280,000	45	360,000
Harvest/post-harvest (200kg day @ 60% hired)	8,000	day	18.00	144,000	27.00	216,000	39.00	312,000
				-		-		-
				-		-		-
Family Labour (quantity only)								
Tillage	0.00	day	15	-	10	-	10	-
Manure application	0.00	day	8	-	6	-	6	-
Planting	0.00	day	4	-	3	-	3	-
Fertilizing	0.00	day	6	-	12	-	16	-
Spraying	0.00	day	4	-	6	-	8	-
Weeding	0.00	day	15	-	14	-	10	-
Harvest/post-harvest (200kg day @ 40% family)	0.00	day	12.00	-	18.00	-	26.00	-
Marketing	0.00	day	3	-	4	-	5	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
				-		-		-
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**1,888**	**16,800,000**	**2,831**	**25,200,000**	**4,090**	**36,400,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			206	1,831,500	402	3,576,000	613	5,458,000
Imputed costs before sale (self-saved seed, bartered inputs)			708	6,300,000	755	6,720,000	849	7,560,000
Total costs before sale			**914**	**8,131,500**	**1,157**	**10,296,000**	**1,463**	**13,018,000**
Cash deductions after sale (loan payment, land tax)			27	243,063	57	511,688	89	794,750
Total variable costs			**941**	**8,374,563**	**1,214**	**10,807,688**	**1,552**	**13,812,750**
Annual depreciation on fixed investments (capital recovery cost)			13	120,050	13	120,050	13	120,050
Total production costs (total variable costs + depreciation)			**954**	**8,494,612**	**1,228**	**10,927,737**	**1,565**	**13,932,800**
Gross cost per ton of product			157	1,395,760	135	1,200,854	119	1,062,519
Net cost per ton of product			159	1,415,769	136	1,214,193	120	1,071,754
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**947**	**8,425,438**	**1,617**	**14,392,313**	**2,538**	**22,587,250**
Net profit (gross profit - annual depreciation)			**933**	**8,305,388**	**1,604**	**14,272,263**	**2,524**	**22,467,200**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				1.01		1.33		1.64
Return to total costs (net profit/total production costs)				0.98		1.31		1.61
5. Labour								
Hired labour (days)				75		99		129
Family labour (days, small-scale only)				67		73		84
Total labour requirement (days)				**142**		**172**		**213**
Gross profit per day family labour			14.13	125,753	22.15	197,155	30.21	268,896
Gross profit per day total labour			6.67	59,334	9.40	83,676	11.91	106,043
Net profit per day total labour			6.57	58,489	9.32	82,978	11.85	105,480
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			2,965	-51%	3,815	-58%	4,863	-63%
Yield & percent change to net profit = 0			3,008	-50%	3,859	-57%	4,907	-62%
Price & percent change to net profit = 0			585	-79%	1,214	-57%	1,072	-62%

A. GENERAL DESCRIPTION									
Crop:	Carrots	**Regency:**	Magelang	**Cultivation:**	Hoe	**Typical plot:**	0.25 - 0.5ha	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Midland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km
Notes:	Mainly appropriate in upland areas (too hot/dry in lowlands for good yield). Survey data from Magelang in midlands.								
	Yield data from INSTIPER -- but look extremely low for carrots (CEN analysis +12mt/ha w/o irrigation)								

B. MAIN ASSUMPTIONS	USD 1.00 = IDR	8,900	LOW		MEDIUM		HIGH	
	Total yield (kg fresh/ha)			**3,750**		**5,000**		**6,000**
	Cash price for product sold (IDR/kg fresh):			**600**		**600**		**600**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
				-		-		-
				-		-		-
Cash costs before sale				-		-		-
Seed	4,000	sachet	8	32,000	8	32,000	8	32,000
Manure	450,000	5mt load	0.20	90,000	0.25	112,500	0.30	135,000
KCl	1,920	kg	50	96,000	100	192,000	150	288,000
TSP/SP-36	1,550	kg	25	38,750	75	116,250	100	155,000
Urea	1,350	kg	25	33,750	75	101,250	100	135,000
Firadan	8,000	kg	2	16,000	4	32,000	5	40,000
				-		-		-
				-		-		-
				-		-		-
				-		-		-
Transport IN (fert to farm)	3,500	bag	2	7,000	5	17,500	7	24,500
				-		-		-
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Loan (borrow 35% of seed, fert, chem, plastic)	50%	flat interest	107,275	53,638	205,100	102,550	274,750	137,375
Land tax (60,000pa / 3 rotations)	30,000	annual rate	1	30,000	1	30,000	1	30,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage	8,000	day	20	160,000	25	200,000	25	200,000
Manuring and bed establishment	8,000	day	15	120,000	18	144,000	22	176,000
Planting	8,000	day	16	128,000	16	128,000	16	128,000
Fertilizer application	8,000	day	5	40,000	7	56,000	9	72,000
Weeding	8,000	day	25	200,000	38	304,000	47	376,000
Harvest/post-harvest (200kg/day @ 60% hired)	8,000	day	11.00	88,000	15.00	120,000	18.00	144,000
				-		-		-
				-		-		-
Family Labour (quantity only)								
Tillage	0.00	day	10	-	5	-	5	-
Manuring and bed establishment	0.00	day	6	-	5	-	4	-
Planting	0.00	day	2	-	2	-	2	-
Fertilizing	0.00	day	5	-	5	-	6	-
Spraying	0.00	day	2	-	4	-	6	-
Weeding	0.00	day	15	-	11	-	10	-
Harvest/post-harvest (200kg/day @ 40% family)	0.00	day	8.00	-	10.00	-	12.00	-
Marketing	0.00	day	3	-	5	-	7	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
				-		-		-
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**253**	**2,250,000**	**337**	**3,000,000**	**404**	**3,600,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			118	1,049,500	175	1,555,500	214	1,905,500
Imputed costs before sale (self-saved seed, bartered inputs)			-	-	-	-	-	-
Total costs before sale			**118**	**1,049,500**	**175**	**1,555,500**	**214**	**1,905,500**
Cash deductions after sale (loan payment, land tax)			9	83,638	15	132,550	19	167,375
Total variable costs			**127**	**1,133,138**	**190**	**1,688,050**	**233**	**2,072,875**
Annual depreciation on fixed investments (capital recovery cost)			13	120,050	13	120,050	13	120,050
Total production costs (total variable costs + depreciation)			**141**	**1,253,187**	**203**	**1,808,100**	**246**	**2,192,925**
Gross cost per ton of product			34	302,170	38	337,610	39	345,479
Net cost per ton of product			38	334,183	41	361,620	41	365,487
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**125**	**1,116,863**	**147**	**1,311,950**	**172**	**1,527,125**
Net profit (gross profit - annual depreciation)			**112**	**996,813**	**134**	**1,191,900**	**158**	**1,407,075**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				0.99		0.78		0.74
Return to total costs (net profit/total production costs)				0.80		0.66		0.64
5. Labour								
Hired labour (days)				92		119		137
Family labour (days, small-scale only)				51		47		52
Total labour requirement (days)				**143**		**166**		**189**
Gross profit per day family labour			2.46	21,899	3.14	27,914	3.30	29,368
Gross profit per day total labour			0.88	7,810	0.89	7,903	0.91	8,080
Net profit per day total labour			0.78	6,971	0.81	7,180	0.84	7,445
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			1,889	-50%	2,722	-46%	3,349	-44%
Yield & percent change to net profit = 0			2,089	-44%	2,931	-41%	3,557	-41%
Price & percent change to net profit = 0			334	-44%	362	-40%	365	-39%

A. GENERAL DESCRIPTION

Crop:	Garlic	**Regency:**	Wonosobo	**Cultivation:**	Hoe	**Typical plot:**	0.1 - 0.25ha	**Sold to:**	village trader
Sector:	Smallholder	**Area:**	Upland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km

Notes: Dry garlic sold to trader who comes to village; high input farmer gets higher quality product (better price).
Yields based on INSTIPER survey and JCK interview. Some farmers report upto 7mt yield (wet) in a good season with top management. Max yield here (4mt) from survey.
Includes imputed cost of seed garlic.
Tillage based on part labour (assume garlic included in rotation). In practice, may do quick tillage after harvest tobacco (save on labour)

B. MAIN ASSUMPTIONS	**USD 1.00 = IDR**	8,900	**LOW**		**MEDIUM**		**HIGH**	
		Total yield (kg wet/ha):		1,750		3,250		4,250
		Total yield (kg dry w/o leaves per ha) - convert @ 60% from wet:		**1,050**		**1,950**		**2,550**
		Cash price for product sold (IDR/kg dry w/o leaves):		**4,500**		**4,500**		**5,000**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Imputed costs before sale (excl. labour)				-		-		-
Clean dry garlic (saved input)	5,500	kg clean dry	275	1,512,500	290	1,595,000	300	1,650,000
				-		-		-
Cash costs before sale				-		-		-
				-		-		-
Manure	450,000	5mt load	2	900,000	5	2,250,000	7	3,150,000
ZA	1,100	kg	250	275,000	300	330,000	300	330,000
TSP/SP-36	1,550	kg		-	150	232,500	500	775,000
Urea	1,350	kg		-		-		-
Matador	80,000	500ml bottle		-	1	80,000	2	160,000
Antracol	55,000	kg		-	4.5	247,500	9.0	495,000
Sanfrit	9,000	litre		-	7.5	67,500	15.0	135,000
				-		-		-
				-		-		-
				-		-		-
Transport IN (fert to farm)	3,500	bag	5	17,500	9	31,500	16	56,000
				-		-		-
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Loan (borrow 35% of seed, fert, chem, plastic)	50%	flat interest	411,250	205,625	1,122,625	561,313	1,765,750	882,875
Land tax (60,000pa / 3 rotations)	30,000	annual rate	1	30,000	1	30,000	1	30,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage	8,000	day	18	144,000	25	200,000	25	200,000
Manuring and bed establishment	8,000	day	34	272,000	58	464,000	65	520,000
Cleaning garlic for planting (9kg per day)	8,000	day	33	264,000	33	264,000	33	264,000
Planting (6kg per day)	8,000	day	50	400,000	50	400,000	50	400,000
Fertilizer application	8,000	day		-	15	120,000	20	160,000
Weeding	8,000	day	20	160,000	50	400,000	60	480,000
Harvest (45kg per day @ 80% hired)	8,000	day	31	248,000	58	464,000	75	600,000
Post-harvest (100kg per day @ 80% hired)	8,000	day	9	72,000	16	128,000	20	160,000
	8,000	day		-		-		-
				-		-		-
Family Labour (quantity only)								
Tillage	0.00	day	13	-	5	-	5	-
Manuring and bed establishment	0.00	day	14	-	10	-	9	-
Planting	0.00	day	4	-	4	-	4	-
Fertilizing	0.00	day	10	-	5	-	6	-
Spraying	0.00	day		-	2	-	4	-
Weeding	0.00	day	30	-	11	-	10	-
Harvest (45kg per day @ 20% family)	0.00	day	8	-	14	-	19	-
Post-harvest (100kg per day @ 20% hired)	0.00	day	2	-	4	-	5	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
				-		-		-
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**531**	**4,725,000**	**986**	**8,775,000**	**1,433**	**12,750,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			309	2,752,500	638	5,679,000	886	7,885,000
Imputed costs before sale (self-saved seed, bartered inputs)			170	1,512,500	179	1,595,000	185	1,650,000
Total costs before sale			**479**	**4,265,000**	**817**	**7,274,000**	**1,071**	**9,535,000**
Cash deductions after sale (loan payment, land tax)			26	235,625	66	591,313	103	912,875
Total variable costs			**506**	**4,500,625**	**884**	**7,865,313**	**1,174**	**10,447,875**
Annual depreciation on fixed investments (capital recovery cost)			13	120,050	13	120,050	13	120,050
Total production costs (total variable costs + depreciation)			**519**	**4,620,675**	**897**	**7,985,362**	**1,187**	**10,567,925**
Gross cost per ton of product			482	4,286,310	453	4,033,494	460	4,097,206
Net cost per ton of product			494	4,400,642	460	4,095,057	466	4,144,284
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**25**	**224,375**	**102**	**909,688**	**259**	**2,302,125**
Net profit (gross profit - annual depreciation)			**12**	**104,325**	**89**	**789,638**	**245**	**2,182,075**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				0.05		0.12		0.22
Return to total costs (net profit/total production costs)				0.02		0.10		0.21
5. Labour								
Hired labour (days)				195		305		348
Family labour (days, small-scale only)				81		55		62
Total labour requirement (days)				**276**		**360**		**410**
Gross profit per day family labour			0.31	2,767	1.86	16,570	4.17	37,071
Gross profit per day total labour			0.09	813	0.28	2,528	0.63	5,614
Net profit per day total labour			0.04	378	0.25	2,194	0.60	5,321
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			1,000	-5%	1,748	-10%	2,090	-18%
Yield & percent change to net profit = 0			1,027	-2%	1,775	-9%	2,114	-17%
Price & percent change to net profit = 0			4,401	-2%	4,096	-9%	4,144	-17%

A. GENERAL DESCRIPTION

Crop:	Nilam (yr 2)	**Regency:**	Kulonprogo	**Cultivation:**	Hoe	**Typical plot:**	various	**Sold to:**	Field agent
Sector:	Smallholder	**Area:**	Lowland	**Irrigation:**	None	**Rent/lease:**	Own land	**Dist to mkt:**	0km

Notes: Price from IDR 400-600 per kg - average from INSTIPER survey = IDR 494 (rounded to 500).

Model for Java nilam ("dilem"). Possible varieties available with higher oil content (Nilam Ache or Pogostemon Cablin Benth) could give higher price?

Assume 1ha pure stand. 3 year life; first harvest at 6mos then havest every 3mos. Analysis for Yr. 2 w/ full production (4 harvests)

Investment costs include plantation establishment (first full year includes 2 harvests in months 6 and 9).

For loan, assume only 20% of costs financed by credit (35% of costs for tobacco) due to steady cash flow from Nilam (credit not included in Yr. 1 establishment costs)

B. MAIN ASSUMPTIONS	**USD 1.00 = IDR**	8,900	**LOW**		**MEDIUM**		**HIGH**	
	Total yield, 12 mos, yr. 2 (kg wet/ha):			**19,000**		**26,000**		**31,000**
	Cash price for product sold (IDR/kg):			**500**		**500**		**500**
C. VARIABLE COSTS	**Price (IDR)**	**Unit**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**	**Qty/ha**	**IDR/Ha**
Cash costs before sale (Year 2)				-		-		-
				-		-		-
Organic fertilizer (50% of year 1)	450,000	5mt load	2	900,000	3	1,350,000	4	1,800,000
Urea (same as year 1)	1,350	kg	100	135,000	200	270,000	250	337,500
TSP (optional year 2)	1,550	kg		-	100	155,000	150	232,500
KCl (optional year 2)	1,920	kg		-	50.0	96,000	100	192,000
Insecticide (Profil)	110,000	lt	1.0	110,000	3.0	330,000	5.0	550,000
Sanfit	9,000	lt	5.0	45,000	8.0	72,000	10.0	90,000
Leaf fertilizer	25,000	kg		-	5.0	125,000	10.0	250,000
Transport IN (fert to farm)	3,500	bag	2	7,000	7	24,500	10	35,000
				-		-		-
Cash deductions after sale (including finance)			loan amt		loan amt		loan amt	
Crop finance (loan = 20% of seed, fert & chem)	50%	flat interest	238,000	119,000	479,600	239,800	690,400	345,200
Land tax (90,000pa, monocrop, lowland)	90,000	annual rate	1	90,000	1	90,000	1	90,000
Hired Labour (assume all labour before sale)				-		-		-
Tillage and planting capitalized as investment cost.								
Manure application	8,000	day	6	48,000	9	72,000	12	96,000
Fertilizer application	8,000	day	6	48,000	12	96,000	15	120,000
Spraying	8,000	day	4	32,000	6	48,000	10	80,000
Weeding	8,000	day	50	400,000	65	520,000	80	640,000
Harvest (100kg per day)	8,000	day	190	1,520,000	260	2,080,000	310	2,480,000
Pack and market	8,000	day	15	120,000	20	160,000	25	200,000
				-		-		-
Family Labour (quantity only)								
Manure application	0.00	day	2	-	4	-	4	-
Fertilizer application	0.00	day	2	-	3	-	3	-
Spraying	0.00	day	2	-	4	-	5	-
Weeding	0.00	day	10	-	15	-	20	-
Harvest (supervision)	0.00	day	25	-	30	-	35	-
Pack and market	0.00	day	10	-	12	-	14	-
D. FIXED INVESTMENTS AND OCCASIONAL REVENUE								
Annual Depreciation (capital recovery cost)								
Basic farm equipment	120,050	annual share	1.00	120,050	1.00	120,050	1.00	120,050
Nilam costs Yr 1 (capital recovery)	1	ha	2,325,969	2,325,969	3,320,525	3,320,525	4,179,547	4,179,547
Nilam sales Yr. 1 (negative cap recovery cost)	1	ha	(2,266,450)	(2,266,450)	(3,171,640)	(3,171,640)	(3,848,796)	(3,848,796)
E. FINANCIAL INDICATORS (Sell All)			**USD**	**IDR**	**USD**	**IDR**	**USD**	**IDR**
1. Gross Revenue (yield * cash price)			**1,067**	**9,500,000**	**1,461**	**13,000,000**	**1,742**	**15,500,000**
2. Production Costs								
Cash costs before sale (excl. loan paynent and land tax)			378	3,365,000	607	5,398,500	798	7,103,000
Imputed costs before sale (self-saved seed, bartered inputs)			-	-	-	-	-	-
Total costs before sale			**378**	**3,365,000**	**607**	**5,398,500**	**798**	**7,103,000**
Cash deductions after sale (loan payment, land tax)			23	209,000	37	329,800	49	435,200
Total variable costs			**402**	**3,574,000**	**644**	**5,728,300**	**847**	**7,538,200**
Annual depreciation on fixed investments (capital recovery cost)			20	179,568	30	268,935	51	450,801
Total production costs (total variable costs + depreciation)			**422**	**3,753,568**	**674**	**5,997,235**	**898**	**7,989,001**
Gross cost per ton of product			21	188,105	25	220,319	27	243,168
Net cost per ton of product			22	197,556	26	230,663	29	257,710
3. Farmer Profits (sell all)								
Gross profit (gross revenue - total variable costs)			**666**	**5,926,000**	**817**	**7,271,700**	**895**	**7,961,800**
Net profit (gross profit - annual depreciation)			**646**	**5,746,432**	**787**	**7,002,765**	**844**	**7,510,999**
4. Rates of Return (sell all)								
Return to variable costs (gross profit/total variable costs)				1.66		1.27		1.06
Return to total costs (net profit/total production costs)				1.53		1.17		0.94
5. Labour								
Hired labour (days)				271		372		452
Family labour (days, small-scale only)				51		68		81
Total labour requirement (days)				**322**		**440**		**533**
Gross profit per day family labour			13.06	116,196	12.02	106,937	11.04	98,294
Gross profit per day total labour			2.07	18,404	1.86	16,527	1.68	14,938
Net profit per day total labour			2.01	17,846	1.79	15,915	1.58	14,092
F. SENSITIVITY INDICATORS (Sell All)			**Result**	**% chg**	**Result**	**% chg**	**Result**	**% chg**
Yield & percent change to gross profit = 0			4,890	-74%	8,686	-67%	12,043	-61%
Yield & percent change to net profit = 0			5,318	-72%	9,327	-64%	13,117	-58%
Price & percent change to net profit = 0			198	-60%	231	-54%	258	-48%

ORANGES (w/ intercrop rice in Year 1-2) - 1ha

INSTIPER budget analysis of lowland oranges intercropped with rice in Year 1-2.
Data not cross-checked to ensure all standard price assumptions used for other crops apply to this analysis.
Depreciation cost estimates using INSTIPER method - different from capital recovery approach.

Explanation	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Land area (ha)	**1.00**									
Seed orange : (plant)	466									
Price (Rp/plant)	3,500									
Value (Rp)	1,629,310									
Seed rice : (kg)	34	30								
Price (Rp/kg)	4,800	4,800								
Value (Rp)	163,697	144,497								
Fertilizer :										
- Manure (kg)	13,255	15,359	69,559	94,441	117,100	123,679	123,679	123,679	123,679	123,679
Price (Rp/kg)	150	150	150	150	150	150	150	150	150	150
Value (Rp)	1,988,276	2,303,793	10,433,793	14,166,207	17,565,000	18,551,897	18,551,897	18,551,897	18,551,897	18,551,897
- Urea (kg)	-	-	418	481	811	1,086	1,086	1,086	1,086	1,086
Price (Rp/kg)	-	-	1,450	1,450	1,450	1,450	1,450	1,450	1,450	1,450
Value (Rp)	-	-	606,800	697,450	1,175,750	1,574,600	1,574,600	1,574,600	1,574,600	1,574,600
- SP 36 (kg)	103	27	84	115	200	252	252	252	252	252
Price (Rp/kg)	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750
Value (Rp)	180,371	48,038	146,440	201,250	350,000	441,000	441,000	441,000	441,000	441,000
- KCl (kg)	93	92	263	400	702	832	832	832	832	832
Price (Rp/kg)	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800
Value (Rp)	166,903	165,910	473,897	720,000	1,264,469	1,498,097	1,498,097	1,498,097	1,498,097	1,498,097
- ZA (kg)	160	163								
Price (Rp/kg)	1,500	1,500								
Value (Rp)	240,207	244,034								
Pestiside										
- Confidor (Btl)	5	3	8	-	2	3	3	3	3	3
Price (Rp/kg)	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000	33,000
Value (Rp)	151,345	103,552	270,828	-	69,414	111,517	111,517	111,517	111,517	111,517
- Fostag (kg)	1	0	1	3	3	2	2	2	2	2
Price (Rp/kg)	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000
Value (Rp)	33,517	20,483	61,448	156,414	137,793	96,828	96,828	96,828	96,828	96,828
- Total cost input	**4,553,626**	**3,030,306**	**11,993,206**	**15,941,321**	**20,562,426**	**22,273,938**	**22,273,938**	**22,273,938**	**22,273,938**	**22,273,938**
Labor										
- Land tillage										
family (mandays)	35	24	28	26	26	26	26	26	26	26
hired (mandays)	35	24	-	-	-	-	-	-	-	-
- irrigation										
family (mandays)	12	14	90	103	110	95	95	95	95	95
hired (mandays)										
- Weeding										
family (mandays)	12	14	50	55	64	68	68	68	68	68
hired (mandays)										
- Fertilizing										
family (mandays)	12	14	76	73	84	98	98	98	98	98
hired (mandays)										
- Cutting										
family (mandays)	12	14	69	79	81	83	83	83	83	83
hired (mandays)										
- Pest Contrrol										
family (mandays)	12	14	52	45	57	64	64	64	64	64
hired (mandays)										
- Harvest										
family (mandays)	29	28	49	44	82	94	94	94	94	94
hired (mandays)	28	27								
- Total										
family (mandays)	124	120	414	425	503	528	528	528	528	528
hired (mandays)	64	51	-	-	-	-	-	-	-	-
total (mandays)	**188**	**171**	**414**	**425**	**503**	**528**	**528**	**528**	**528**	**528**
wage (Rp/mandays)	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000
- Total Cost of labor : hired (Rp)	508,966	411,310	-	-	-	-	-	-	-	-
implicit family (Rp)	991,724	956,966	3,314,759	3,397,517	4,020,138	4,226,759	4,226,759	4,226,759	4,226,759	4,226,759
Depreciation										
- hoe (qty)	19	19	19	19	19	19	19	19	19	19
price : Rp/unit	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500	14,500
usefull life (year)	5	5	5	5	5	5	5	5	5	5
depreciation (Rp)	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000
- sickle (qty)	19	19	19	19	19	19	19	19	19	19
price : Rp/unit	7,590	7,590	7,590	7,590	7,590	7,590	7,590	7,590	7,590	7,590
usefull life (year)	4	4	4	4	4	4	4	4	4	4
depreciation (Rp)	35,987	35,987	35,987	35,987	35,987	35,987	35,987	35,987	35,987	35,987
- Sprayer (qty)	15	15	15	15	15	15	15	15	15	15
price : Rp/unit	134,500	134,500	134,500	134,500	134,500	134,500	134,500	134,500	134,500	134,500
usefull life (year)	5	5	5	5	5	5	5	5	5	5
depreciation (Rp)	368,946	368,946	368,946	368,946	368,946	368,946	368,946	368,946	368,946	368,946
- Sprinkle (qty)	18	18	18	18	18	18	18	18	18	18
price : Rp/unit	20,300	20,300	20,300	20,300	20,300	20,300	20,300	20,300	20,300	20,300
usefull life (year)	5	5	5	5	5	5	5	5	5	5
depreciation (Rp)	74,340	74,340	74,340	74,340	74,340	74,340	74,340	74,340	74,340	74,340
- Bamboo (qty)	1,810	1,810								
price : Rp/unit	150	150								
usefull life (year)	2	2								
depreciation (Rp)	135,776	135,776								
- Cutter (qty)	23	23	23	23	23	23	23	23	23	23
price : Rp/unit	21,700	21,700	21,700	21,700	21,700	21,700	21,700	21,700	21,700	21,700
usefull life (year)	5	5	5	5	5	5	5	5	5	5
depreciation (Rp)	102,108	102,108	102,108	102,108	102,108	102,108	102,108	102,108	102,108	102,108
Total Depreciation (Rp)	772,158	772,158	636,382	636,382	636,382	636,382	636,382	636,382	636,382	636,382
Other Cost : land tax (Rp)	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000	60,000
- Sack (qty)			240	240	240	240	240	240	240	240
price : Rp/unit			450	450	450	450	450	450	450	450
usefull life (year)			2	2	2	2	2	2	2	2
depreciation (Rp)			54,000	54,000	54,000	54,000	54,000	54,000	54,000	54,000
Basket (qty)			38	38	38	38	38	38	38	38
price : Rp/unit			4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
usefull life (year)			2	2	2	2	2	2	2	2
depreciation (Rp)			76,000	76,000	76,000	76,000	76,000	76,000	76,000	76,000
Production : orange (kg)			8,483	12,338	18,648	18,241	17,069	12,414	9,655	8,276
price : Rp/kg			3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500
rice (kg GKG)	6,207	5,172								
price : Rp/kg GKG	1,400	1,400								
Gross Revenue (Rp)	8,689,655	7,241,379	29,689,655	43,182,759	65,268,966	63,844,828	59,741,379	43,448,276	33,793,103	28,965,517
Total cost (Rp) cash & depreciation	**5,894,749**	**4,273,774**	**12,819,587**	**16,767,702**	**21,388,808**	**23,100,320**	**23,100,320**	**23,100,320**	**23,100,320**	**23,100,320**
Net Revenue (Rp)	2,794,906	2,967,605	16,870,068	26,415,056	43,880,158	40,744,508	36,641,060	20,347,956	10,692,784	5,865,198
Net Profit (Rp) - incl family labour	**1,803,182**	**2,010,639**	**13,555,309**	**23,017,539**	**39,860,020**	**36,517,749**	**32,414,301**	**16,121,198**	**6,466,025**	**1,638,439**

APPENDIX 3: RANKINGS OF FINANCIAL RESULTS

This appendix presents the complete data set from the quantitative analysis. There are separate data tables in which the various enterprises are sorted as follows.

- Alphabetical listing with results in IDR.
- Alphabetical listing with results in USD
- Enterprises Sorted by Cash Costs Before Sale
- Enterprises Sorted by Total Variable Costs
- Enterprises Sorted by Total Gross Profit
- Enterprises Sorted by Total Net Profit
- Enterprises Sorted by Return to Variable Costs
- Enterprises Sorted by Total Labour Requirement
- Enterprises Sorted by Return to Total Labour Requirement
- Enterprises Sorted by Sensitivity to Variation in Yield
- Enterprises Sorted by Sensitivity to Variation in Price
- Enterprises Sorted by Management Level and Variable Costs
- Enterprises Sorted by management Level and Gross Profit
- Enterprises Sorted by Management Level and Total Labour Requirement
- Enterprises Sorted by Management Level and Return to Total Labour Requirement

COMPLETE DATA SET, Alphabetical Listing with Results in IDR.

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).

Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour					Sensitivity Indicators		
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	9.1	-38%	-33%	-46%
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	13.7	-46%	-42%	-76%
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	11.8	-44%	-40%	-68%
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	83.6	1,133.1	1,133.1	120.0	1,253.2	334.2	1,116.9	996.8	0.99	0.80	92	51	143	21.9	7.8	-50%	-44%	-44%
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	7.9	-46%	-41%	-40%
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	8.1	-44%	-41%	-39%
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	27.5	-55%	-54%	-52%
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	23.8	-48%	-47%	-45%
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	22.1	-46%	-45%	-44%
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	25.5	-63%	-59%	-60%
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	24.5	-54%	-51%	-51%
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	22.2	-51%	-48%	-49%
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	0.8	-5%	-2%	-2%
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	2.5	-10%	-9%	-9%
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	5.6	-18%	-17%	-17%
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	27.5	-65%	-62%	-78%
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	22.5	-57%	-54%	-54%
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	20.4	-53%	-51%	-51%
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	18.4	-74%	-72%	-60%
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	16.5	-67%	-64%	-54%
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	14.9	-61%	-58%	-48%
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	59.3	-51%	-50%	-79%
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	83.7	-58%	-57%	-57%
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	106.0	-63%	-62%	-62%
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	16.4	-63%	-	-
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	17.3	-51%	-	-
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	20.1	-61%	-	-
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	18.0	-58%	-	-
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	15.7	-61%	-	-
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	16.4	-63%	-	-
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	20.1	-62%	-	-
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	21.9	-63%	-	-

* Because of different data source for rice, missing financial indicators could not be calculated.

COMPLETE DATA SET, Alphabetical Listing with Results in USD.

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).

Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

UNITED STATES DOLLARS (USD)

						Production Costs (USD/ha)									Farmer Income (USD/ha)				Labour					Sensitivity Indicators		
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (USD/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (USD/day)	Gr. profit per day total labour (USD day)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
VA-Kretek Tobacco	Upland	Upland	Low	600	1,480	855	-	854.5	90	944.2	944.2	70	1,014.5	1,690.8	535.5	465.3	0.57	0.46	316	205	521	2.6	1.0	-38%	-33%	-46%
VA-Kretek Tobacco	Upland	Upland	Medium	950	2,283	1,109	-	1,109.3	109	1,218.5	1,218.5	82	1,300.1	1,368.6	1,064.2	982.5	0.87	0.76	430	263	693	4.0	1.5	-46%	-42%	-76%
VA-Kretek Tobacco	Upland	Upland	High	1,200	2,807	1,450	-	1,450.3	141	1,591.2	1,591.2	84	1,675.4	1,396.2	1,216.0	1,131.8	0.76	0.68	568	350	918	3.5	1.3	-44%	-40%	-68%
Carrots	Upland	Midland	Low	3,750	253	118	-	117.9	9	127.3	127.3	13	140.8	37.5	125.5	112.0	0.99	0.80	92	51	143	2.5	0.9	-50%	-44%	-44%
Carrots	Upland	Midland	Medium	5,000	337	175	-	174.8	15	189.7	189.7	13	203.2	40.6	147.4	133.9	0.78	0.66	119	47	166	3.1	0.9	-46%	-41%	-40%
Carrots	Upland	Midland	High	6,000	404	214	-	214.1	19	232.9	232.9	13	246.4	41.1	171.6	158.1	0.74	0.64	137	52	189	3.3	0.9	-44%	-41%	-39%
Chilli	All	Midland	Low	6,800	2,674	1,042	-	1,042.0	128	1,169.6	1,169.6	17	1,186.5	174.5	1,504.6	1,487.6	1.29	1.25	365	122	487	12.3	3.1	-55%	-54%	-52%
Chilli	All	Midland	Medium	8,000	3,146	1,406	-	1,406.2	180	1,586.6	1,586.6	17	1,603.6	200.4	1,559.4	1,542.5	0.98	0.96	433	149	582	10.5	2.7	-48%	-47%	-45%
Chilli	All	Midland	High	9,000	3,539	1,644	-	1,643.8	210	1,853.9	1,853.9	17	1,870.9	207.9	1,685.4	1,668.4	0.91	0.89	507	173	680	9.7	2.5	-46%	-45%	-44%
Corn	All	Lowland	Low	2,250	392	123	5	128.3	17	140.3	145.5	13	159.0	70.7	246.3	232.9	1.69	1.46	46	40	86	6.2	2.9	-63%	-59%	-60%
Corn	All	Lowland	Medium	2,800	488	192	6	198.4	28	220.1	226.1	13	239.6	85.6	261.6	248.1	1.16	1.04	55	40	95	6.5	2.8	-54%	-51%	-51%
Corn	All	Lowland	High	3,100	540	227	7	233.8	32	259.3	265.9	13	279.4	90.1	274.0	260.5	1.03	0.93	65	45	110	6.1	2.5	-51%	-48%	-49%
Garlic	Upland	Upland	Low	1,050	531	309	170	479.2	26	335.7	505.7	13	519.2	494.5	25.2	11.7	0.05	0.02	195	81	276	0.3	0.1	-5%	-2%	-2%
Garlic	Upland	Upland	Medium	1,950	986	638	179	817.3	66	704.5	883.7	13	897.2	460.1	102.2	88.7	0.12	0.10	305	55	360	1.9	0.3	-10%	-9%	-9%
Garlic	Upland	Upland	High	2,550	1,433	886	185	1,071.3	103	988.5	1,173.9	13	1,187.4	465.6	258.7	245.2	0.22	0.21	348	62	410	4.2	0.6	-18%	-17%	-17%
Groundnuts	All	Lowland	Low	750	506	68	101	169.4	9	77.4	178.6	13	192.0	256.1	327.1	313.6	1.83	1.63	39	67	106	4.9	3.1	-65%	-62%	-78%
Groundnuts	All	Lowland	Medium	900	607	140	106	246.6	17	157.3	263.5	13	277.0	307.8	343.2	329.7	1.30	1.19	68	68	136	5.0	2.5	-57%	-54%	-54%
Groundnuts	All	Lowland	High	1,025	691	188	111	299.4	23	211.4	322.6	13	336.1	327.9	368.4	354.9	1.14	1.06	80	81	161	4.5	2.3	-53%	-51%	-51%
Nilam (yr 2)	All	Lowland	Low	19,000	1,067	378	-	378.1	23	401.6	401.6	20	421.7	22.2	665.8	645.7	1.66	1.53	271	51	322	13.1	2.1	-74%	-72%	-60%
Nilam (yr 2)	All	Lowland	Medium	26,000	1,461	607	-	606.6	37	643.6	643.6	30	673.8	25.9	817.0	786.8	1.27	1.17	372	68	440	12.0	1.9	-67%	-64%	-54%
Nilam (yr 2)	All	Lowland	High	31,000	1,742	798	-	798.1	49	847.0	847.0	51	897.6	29.0	894.6	843.9	1.06	0.94	452	81	533	11.0	1.7	-61%	-58%	-48%
Potato	Upland	Upland	Low	6,000	1,888	206	708	913.7	27	233.1	941.0	13	954.5	159.1	946.7	933.2	1.01	0.98	75	67	142	14.1	6.7	-51%	-50%	-79%
Potato	Upland	Upland	Medium	9,000	2,831	402	755	1,156.9	57	459.3	1,214.3	13	1,227.8	136.4	1,617.1	1,603.6	1.33	1.31	99	73	172	22.2	9.4	-58%	-57%	-57%
Potato	Upland	Upland	High	13,000	4,090	613	849	1,462.7	89	702.6	1,552.0	13	1,565.5	120.4	2,537.9	2,524.4	1.64	1.61	129	84	213	30.2	11.9	-63%	-62%	-62%
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	424	-	-	-	-	-	-	-	-	-	423.8	423.8	#DIV/0!	#DIV/0!	90	54	144	7.8	2.9	-63%	-	-
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	523	-	-	-	-	-	-	-	-	-	523.0	523.0	#DIV/0!	#DIV/0!	116	48	165	10.8	3.2	-51%	-	-
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	628	-	-	-	-	-	-	-	-	-	627.6	627.6	#DIV/0!	#DIV/0!	147	22	169	28.1	3.7	-61%	-	-
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	679	-	-	-	-	-	-	-	-	-	678.9	678.9	#DIV/0!	#DIV/0!	183	24	207	28.1	3.3	-58%	-	-
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	361	-	-	-	-	-	-	-	-	-	361.0	361.0	#DIV/0!	#DIV/0!	91	14	105	25.7	3.4	-61%	-	-
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	459	-	-	-	-	-	-	-	-	-	459.4	459.4	#DIV/0!	#DIV/0!	110	36	146	12.8	3.2	-63%	-	-
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	513	-	-	-	-	-	-	-	-	-	512.9	512.9	#DIV/0!	#DIV/0!	106	36	142	14.3	3.6	-62%	-	-
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	563	-	-	-	-	-	-	-	-	-	563.5	563.5	#DIV/0!	#DIV/0!	108	36	144	15.8	3.9	-63%	-	-

SELECTED INDICATORS, Results Sorted by Cash Costs Before Sale

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
Chilli	All	Midland	High	9,000	31,500.0	**14,630.0**	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	22.1
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	**12,907.3**	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	11.8
Chilli	All	Midland	Medium	8,000	28,000.0	**12,515.5**	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	23.8
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	**9,872.7**	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	13.7
Chilli	All	Midland	Low	6,800	23,800.0	**9,273.5**	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	27.5
Garlic	Upland	Upland	High	2,550	12,750.0	**7,885.0**	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	5.6
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	**7,605.1**	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	9.1
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	**7,103.0**	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	14.9
Garlic	Upland	Upland	Medium	1,950	8,775.0	**5,679.0**	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	2.5
Potato	Upland	Upland	High	13,000	36,400.0	**5,458.0**	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	106.0
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	**5,398.5**	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	16.5
Potato	Upland	Upland	Medium	9,000	25,200.0	**3,576.0**	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	83.7
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	**3,365.0**	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	18.4
Garlic	Upland	Upland	Low	1,050	4,725.0	**2,752.5**	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	0.8
Corn	All	Lowland	High	3,100	4,805.0	**2,023.0**	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	22.2
Carrots	Upland	Midland	High	6,000	3,600.0	**1,905.5**	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	8.1
Potato	Upland	Upland	Low	6,000	16,800.0	**1,831.5**	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	59.3
Corn	All	Lowland	Medium	2,800	4,340.0	**1,712.0**	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	24.5
Groundnuts	All	Lowland	High	1,025	6,150.0	**1,674.3**	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	20.4
Carrots	Upland	Midland	Medium	5,000	3,000.0	**1,555.5**	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	7.9
Groundnuts	All	Lowland	Medium	900	5,400.0	**1,249.5**	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	22.5
Corn	All	Lowland	Low	2,250	3,487.5	**1,095.0**	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	25.5
Carrots	Upland	Midland	Low	3,750	2,250.0	**1,049.5**	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	8.4
Groundnuts	All	Lowland	Low	750	4,500.0	**608.0**	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	27.5
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	**-**	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	18.0
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	**-**	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	20.1
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	**-**	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	21.9
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	**-**	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	20.1
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	**-**	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	17.3
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	**-**	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	16.4
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	**-**	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	15.7
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	**-**	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	16.4

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Total Variable Costs

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	**16,500.0**	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	22.1
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	**14,162.0**	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	11.8
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	**14,120.9**	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	23.8
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	**13,812.8**	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	106.0
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	**10,844.4**	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	13.7
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	**10,807.7**	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	83.7
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	**10,447.9**	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	5.6
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	**10,409.2**	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	27.5
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	**8,403.7**	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	9.1
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	**8,374.6**	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	59.3
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	**7,865.3**	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	2.5
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	**7,538.2**	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	14.9
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	**5,728.3**	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	16.5
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	**4,500.6**	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	0.8
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	**3,574.0**	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	18.4
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	**2,871.3**	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	20.4
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	**2,366.2**	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	22.2
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	**2,345.2**	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	22.5
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	**2,314.1**	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	18.0
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	**2,195.3**	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	20.1
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	**2,072.9**	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	8.1
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	**2,012.0**	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	24.5
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	**1,865.6**	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	21.9
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	**1,801.5**	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	17.3
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	**1,707.1**	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	20.1
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	**1,704.9**	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	16.4
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	**1,688.1**	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	7.9
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	**1,589.2**	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	27.5
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	**1,567.9**	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	15.7
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	**1,406.8**	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	16.4
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	**1,295.1**	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	25.5
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	**1,049.5**	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	8.4

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Total Gross Profit

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross rev - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	**22,587.3**	22,467.2	1.64	1.61	129	84	213	268.9	106.0
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	**15,000.0**	14,848.9	0.91	0.89	507	173	680	86.7	22.1
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	**14,392.3**	14,272.3	1.33	1.31	99	73	172	197.2	83.7
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	**13,879.1**	13,728.0	0.98	0.96	433	149	582	93.1	23.8
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	**13,390.8**	13,239.7	1.29	1.25	365	122	487	109.8	27.5
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	**10,822.0**	10,073.0	0.76	0.68	568	350	918	30.9	11.8
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	**9,471.4**	8,744.6	0.87	0.76	430	263	693	36.0	13.7
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	**8,425.4**	8,305.4	1.01	0.98	75	67	142	125.8	59.3
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	**7,961.8**	7,511.0	1.06	0.94	452	81	533	98.3	14.9
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	**7,271.7**	7,002.8	1.27	1.17	372	68	440	106.9	16.5
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	**5,926.0**	5,746.4	1.66	1.53	271	51	322	116.2	18.4
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	**4,766.3**	4,141.1	0.57	0.46	316	205	521	23.3	9.1
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	**3,727.9**	-	1.61	-	183	24	207	154.3	18.0
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	**3,390.7**	-	1.54	-	147	22	169	151.8	20.1
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	**3,278.7**	3,158.7	1.14	1.06	80	81	161	40.5	20.4
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	**3,149.4**	-	1.69	-	108	36	144	88.1	21.9
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	**3,054.8**	2,934.7	1.30	1.19	68	68	136	44.9	22.5
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	**2,910.8**	2,790.8	1.83	1.63	39	67	106	43.4	27.5
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	**2,857.4**	-	1.67	-	106	36	142	79.5	20.1
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	**2,853.5**	-	1.58	-	116	48	165	59.1	17.3
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	**2,438.8**	2,318.8	1.03	0.93	65	45	110	54.2	22.2
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	**2,383.6**	-	1.40	-	110	36	146	66.6	16.4
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	**2,364.7**	-	1.68	-	90	54	144	43.6	16.4
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	**2,328.1**	2,208.0	1.16	1.04	55	40	95	58.2	24.5
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	**2,302.1**	2,182.1	0.22	0.21	348	62	410	37.1	5.6
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	**2,192.5**	2,072.4	1.69	1.46	46	40	86	54.8	25.5
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	**1,645.1**	-	1.05	-	91	14	105	117.0	15.7
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	**1,527.1**	1,407.1	0.74	0.64	137	52	189	29.4	8.1
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	**1,312.0**	1,191.9	0.78	0.66	119	47	166	27.9	7.9
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	**1,200.5**	1,080.5	1.14	0.92	92	51	143	23.5	8.4
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	**909.7**	789.6	0.12	0.10	305	55	360	16.6	2.5
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	**224.4**	104.3	0.05	0.02	195	81	276	2.8	0.8

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Net Profit

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	**Net profit (goss revenue - total cost)**	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	**22,467.2**	1.64	1.61	129	84	213	268.9	106.0
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	**14,848.9**	0.91	0.89	507	173	680	86.7	22.1
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	**14,272.3**	1.33	1.31	99	73	172	197.2	83.7
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	**13,728.0**	0.98	0.96	433	149	582	93.1	23.8
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	**13,239.7**	1.29	1.25	365	122	487	109.8	27.5
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	**10,073.0**	0.76	0.68	568	350	918	30.9	11.8
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	**8,744.6**	0.87	0.76	430	263	693	36.0	13.7
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	**8,305.4**	1.01	0.98	75	67	142	125.8	59.3
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	**7,511.0**	1.06	0.94	452	81	533	98.3	14.9
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	**7,002.8**	1.27	1.17	372	68	440	106.9	16.5
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	**5,746.4**	1.66	1.53	271	51	322	116.2	18.4
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	**4,141.1**	0.57	0.46	316	205	521	23.3	9.1
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	**3,158.7**	1.14	1.06	80	81	161	40.5	20.4
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	**2,934.7**	1.30	1.19	68	68	136	44.9	22.5
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	**2,790.8**	1.83	1.63	39	67	106	43.4	27.5
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	**2,318.8**	1.03	0.93	65	45	110	54.2	22.2
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	**2,208.0**	1.16	1.04	55	40	95	58.2	24.5
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	**2,182.1**	0.22	0.21	348	62	410	37.1	5.6
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	**2,072.4**	1.69	1.46	46	40	86	54.8	25.5
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	**1,407.1**	0.74	0.64	137	52	189	29.4	8.1
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	**1,191.9**	0.78	0.66	119	47	166	27.9	7.9
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	**1,080.5**	1.14	0.92	92	51	143	23.5	8.4
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	**789.6**	0.12	0.10	305	55	360	16.6	2.5
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	**104.3**	0.05	0.02	195	81	276	2.8	0.8
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	**-**	1.61	-	183	24	207	154.3	18.0
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	**-**	1.54	-	147	22	169	151.8	20.1
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	**-**	1.69	-	108	36	144	88.1	21.9
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	**-**	1.67	-	106	36	142	79.5	20.1
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	**-**	1.58	-	116	48	165	59.1	17.3
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	**-**	1.40	-	110	36	146	66.6	16.4
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	**-**	1.05	-	91	14	105	117.0	15.7
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	**-**	1.68	-	90	54	144	43.6	16.4

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Return to Variable Costs

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	**1.83**	1.63	39	67	106	43.4	27.5
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	**1.69**	1.46	46	40	86	54.8	25.5
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	**1.69**	-	108	36	144	88.1	21.9
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	**1.68**	-	90	54	144	43.6	16.4
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	**1.67**	-	106	36	142	79.5	20.1
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	**1.66**	1.53	271	51	322	116.2	18.4
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	**1.64**	1.61	129	84	213	268.9	106.0
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	**1.61**	-	183	24	207	154.3	18.0
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	**1.58**	-	116	48	165	59.1	17.3
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	**1.54**	-	147	22	169	151.8	20.1
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	**1.40**	-	110	36	146	66.6	16.4
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	**1.33**	1.31	99	73	172	197.2	83.7
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	**1.30**	1.19	68	68	136	44.9	22.5
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	**1.29**	1.25	365	122	487	109.8	27.5
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	**1.27**	1.17	372	68	440	106.9	16.5
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	**1.16**	1.04	55	40	95	58.2	24.5
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	**1.14**	0.92	92	51	143	23.5	8.4
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	**1.14**	1.06	80	81	161	40.5	20.4
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	**1.06**	0.94	452	81	533	98.3	14.9
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	**1.05**	-	91	14	105	117.0	15.7
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	**1.03**	0.93	65	45	110	54.2	22.2
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	**1.01**	0.98	75	67	142	125.8	59.3
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	**0.98**	0.96	433	149	582	93.1	23.8
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	**0.91**	0.89	507	173	680	86.7	22.1
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	**0.87**	0.76	430	263	693	36.0	13.7
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	**0.78**	0.66	119	47	166	27.9	7.9
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	**0.76**	0.68	568	350	918	30.9	11.8
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	**0.74**	0.64	137	52	189	29.4	8.1
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	**0.57**	0.46	316	205	521	23.3	9.1
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	**0.22**	0.21	348	62	410	37.1	5.6
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	**0.12**	0.10	305	55	360	16.6	2.5
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	**0.05**	0.02	195	81	276	2.8	0.8

* Because of different data source for rice, missing financial indicators could not be calculated.

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	**Total labour (days)**	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	**918**	30.9	11.8
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	**693**	36.0	13.7
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	**680**	86.7	22.1
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	**582**	93.1	23.8
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	**533**	98.3	14.9
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	**521**	23.3	9.1
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	**487**	109.8	27.5
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	**440**	106.9	16.5
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	**410**	37.1	5.6
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	**360**	16.6	2.5
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	**322**	116.2	18.4
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	**276**	2.8	0.8
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	**213**	268.9	106.0
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	**207**	154.3	18.0
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	**189**	29.4	8.1
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	**172**	197.2	83.7
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	**169**	151.8	20.1
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	**166**	27.9	7.9
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	**165**	59.1	17.3
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	**161**	40.5	20.4
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	**146**	66.6	16.4
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	**144**	43.6	16.4
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	**144**	88.1	21.9
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	**143**	23.5	8.4
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	**142**	79.5	20.1
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	**142**	125.8	59.3
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	**136**	44.9	22.5
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	**110**	54.2	22.2
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	**106**	43.4	27.5
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	**105**	117.0	15.7
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	**95**	58.2	24.5
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	**86**	54.8	25.5

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Daily Return to Total Labour.

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	**Gr. profit per day total labour (IDR '000/day)**
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	**106.0**
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	**83.7**
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	**59.3**
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	**27.5**
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	**27.5**
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	**25.5**
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	**24.5**
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	**23.8**
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	**22.5**
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	**22.2**
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	**22.1**
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	**21.9**
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	**20.4**
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	**20.1**
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	**20.1**
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	**18.4**
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	**18.0**
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	**17.3**
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	**16.5**
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	**16.4**
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	**16.4**
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	**15.7**
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	**14.9**
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	**13.7**
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	**11.8**
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	**9.1**
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	**8.4**
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	**8.1**
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	**7.9**
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	**5.6**
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	**2.5**
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	**0.8**

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Sensitivity to Variation in Yield

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)					Farmer Income (IDR '000/ha)				Labour					Sensitivity	Sensitivity Indicators	
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	18.4	**-74%**	-72%	-60%
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	16.5	**-67%**	-64%	-54%
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	27.5	**-65%**	-62%	-78%
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	25.5	**-63%**	-59%	-60%
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	21.9	**-63%**	-	-
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	16.4	**-63%**	-	-
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	16.4	**-63%**	-	-
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	106.0	**-63%**	-62%	-62%
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	20.1	**-62%**	-	-
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	20.1	**-61%**	-	-
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	14.9	**-61%**	-58%	-48%
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	15.7	**-61%**	-	-
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	18.0	**-58%**	-	-
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	83.7	**-58%**	-57%	-57%
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	22.5	**-57%**	-54%	-54%
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	27.5	**-55%**	-54%	-52%
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	24.5	**-54%**	-51%	-51%
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	20.4	**-53%**	-51%	-51%
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	17.3	**-51%**	-	-
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	22.2	**-51%**	-48%	-49%
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	59.3	**-51%**	-50%	-79%
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	8.4	**-50%**	-44%	-44%
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	23.8	**-48%**	-47%	-45%
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	13.7	**-46%**	-42%	-76%
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	22.1	**-46%**	-45%	-44%
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	7.9	**-46%**	-41%	-40%
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	8.1	**-44%**	-41%	-39%
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	11.8	**-44%**	-40%	-68%
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	9.1	**-38%**	-33%	-46%
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	5.6	**-18%**	-17%	-17%
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	2.5	**-10%**	-9%	-9%
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	0.8	**-5%**	-2%	-2%

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Sensitivity to Variation in Price

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)					Farmer Income (IDR '000/ha)				Labour					Sensitivity	Sensitivity Indicators	
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)	% change in yield to gross profit = 0	% change in yield to net profit = 0	% change in price to net profit = 0
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	59.3	-51%	-50%	**-79%**
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	27.5	-65%	-62%	**-78%**
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	13.7	-46%	-42%	**-76%**
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	11.8	-44%	-40%	**-68%**
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	106.0	-63%	-62%	**-62%**
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	18.4	-74%	-72%	**-60%**
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	25.5	-63%	-59%	**-60%**
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	83.7	-58%	-57%	**-57%**
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	22.5	-57%	-54%	**-54%**
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	16.5	-67%	-64%	**-54%**
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	27.5	-55%	-54%	**-52%**
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	20.4	-53%	-51%	**-51%**
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	24.5	-54%	-51%	**-51%**
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	22.2	-51%	-48%	**-49%**
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	14.9	-61%	-58%	**-48%**
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	9.1	-38%	-33%	**-46%**
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	23.8	-48%	-47%	**-45%**
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	8.4	-50%	-44%	**-44%**
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	22.1	-46%	-45%	**-44%**
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	7.9	-46%	-41%	**-40%**
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	8.1	-44%	-41%	**-39%**
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	5.6	-18%	-17%	**-17%**
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	2.5	-10%	-9%	**-9%**
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	0.8	-5%	-2%	**-2%**
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	20.1	-61%	-	**-**
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	16.4	-63%	-	**-**
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	17.3	-51%	-	**-**
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	20.1	-62%	-	**-**
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	21.9	-63%	-	**-**
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	18.0	-58%	-	**-**
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	16.4	-63%	-	**-**
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	15.7	-61%	-	**-**

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Management Level and Variable Costs

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gross revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
LOW INPUT MANAGEMENT																							
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	**10,409.2**	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	27.5
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	**8,403.7**	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	9.1
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	**8,374.6**	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	59.3
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	**4,500.6**	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	0.8
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	**3,574.0**	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	18.4
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	**1,801.5**	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	17.3
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	**1,704.9**	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	16.4
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	**1,589.2**	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	27.5
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	**1,567.9**	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	15.7
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	**1,406.8**	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	16.4
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	**1,295.1**	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	25.5
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	**1,049.5**	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	8.4
MEDIUM INPUT MANAGEMENT																							
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	**14,120.9**	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	23.8
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	**10,844.4**	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	13.7
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	**10,807.7**	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	83.7
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	**7,865.3**	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	2.5
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	**5,728.3**	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	16.5
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	**2,345.2**	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	22.5
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	**2,195.3**	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	20.1
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	**2,012.0**	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	24.5
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	**1,707.1**	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	20.1
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	**1,688.1**	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	7.9
HIGH INPUT MANAGEMENT																							
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	**16,500.0**	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	22.1
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	**14,162.0**	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	11.8
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	**13,812.8**	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	106.0
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	**10,447.9**	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	5.6
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	**7,538.2**	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	14.9
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	**2,871.3**	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	20.4
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	**2,366.2**	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	22.2
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	**2,314.1**	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	18.0
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	**2,072.9**	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	8.1
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	**1,865.6**	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	21.9

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Management Level and Gross Profit

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gr revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
LOW INPUT MANAGEMENT																							
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	**13,390.8**	13,239.7	1.29	1.25	365	122	487	109.8	27.5
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	**8,425.4**	8,305.4	1.01	0.98	75	67	142	125.8	59.3
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	**5,926.0**	5,746.4	1.66	1.53	271	51	322	116.2	18.4
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	**4,766.3**	4,141.1	0.57	0.46	316	205	521	23.3	9.1
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	**2,910.8**	2,790.8	1.83	1.63	39	67	106	43.4	27.5
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	**2,853.5**	-	1.58	-	116	48	165	59.1	17.3
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	**2,383.6**	-	1.40	-	110	36	146	66.6	16.4
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	**2,364.7**	-	1.68	-	90	54	144	43.6	16.4
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	**2,192.5**	2,072.4	1.69	1.46	46	40	86	54.8	25.5
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	**1,645.1**	-	1.05	-	91	14	105	117.0	15.7
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	**1,200.5**	1,080.5	1.14	0.92	92	51	143	23.5	8.4
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	**224.4**	104.3	0.05	0.02	195	81	276	2.8	0.8
MEDIUM INPUT MANAGEMENT																							
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	**14,392.3**	14,272.3	1.33	1.31	99	73	172	197.2	83.7
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	**13,879.1**	13,728.0	0.98	0.96	433	149	582	93.1	23.8
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	**9,471.4**	8,744.6	0.87	0.76	430	263	693	36.0	13.7
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	**7,271.7**	7,002.8	1.27	1.17	372	68	440	106.9	16.5
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	**3,390.7**	-	1.54	-	147	22	169	151.8	20.1
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	**3,054.8**	2,934.7	1.30	1.19	68	68	136	44.9	22.5
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	**2,857.4**	-	1.67	-	106	36	142	79.5	20.1
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	**2,328.1**	2,208.0	1.16	1.04	55	40	95	58.2	24.5
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	**1,312.0**	1,191.9	0.78	0.66	119	47	166	27.9	7.9
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	**909.7**	789.6	0.12	0.10	305	55	360	16.6	2.5
HIGH INPUT MANAGEMENT																							
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	**22,587.3**	22,467.2	1.64	1.61	129	84	213	268.9	106.0
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	**15,000.0**	14,848.9	0.91	0.89	507	173	680	86.7	22.1
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	**10,822.0**	10,073.0	0.76	0.68	568	350	918	30.9	11.8
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	**7,961.8**	7,511.0	1.06	0.94	452	81	533	98.3	14.9
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	**3,727.9**	-	1.61	-	183	24	207	154.3	18.0
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	**3,278.7**	3,158.7	1.14	1.06	80	81	161	40.5	20.4
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	**3,149.4**	-	1.69	-	108	36	144	88.1	21.9
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	**2,438.8**	2,318.8	1.03	0.93	65	45	110	54.2	22.2
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	**2,302.1**	2,182.1	0.22	0.21	348	62	410	37.1	5.6
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	**1,527.1**	1,407.1	0.74	0.64	137	52	189	29.4	8.1

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Management Level and Total Labour Requirement

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gr revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	Gr. profit per day total labour (IDR '000/day)
LOW INPUT MANAGEMENT																							
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	**521**	23.3	9.1
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	**487**	109.8	27.5
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	**322**	116.2	18.4
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	**276**	2.8	0.8
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	**165**	59.1	17.3
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	**146**	66.6	16.4
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	**144**	43.6	16.4
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	**143**	23.5	8.4
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	**142**	125.8	59.3
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	**106**	43.4	27.5
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	**105**	117.0	15.7
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	**86**	54.8	25.5
MEDIUM INPUT MANAGEMENT																							
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	**693**	36.0	13.7
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	**582**	93.1	23.8
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	**440**	106.9	16.5
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	**360**	16.6	2.5
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	**172**	197.2	83.7
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	**169**	151.8	20.1
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	**166**	27.9	7.9
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	**142**	79.5	20.1
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	**136**	44.9	22.5
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	**95**	58.2	24.5
HIGH INPUT MANAGEMENT																							
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	**918**	30.9	11.8
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	**680**	86.7	22.1
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	**533**	98.3	14.9
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	**410**	37.1	5.6
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	**213**	268.9	106.0
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	**207**	154.3	18.0
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	**189**	29.4	8.1
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	**161**	40.5	20.4
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	**144**	88.1	21.9
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	**110**	54.2	22.2

* Because of different data source for rice, missing financial indicators could not be calculated.

SELECTED INDICATORS, Results Sorted by Management Level and Gross Return per day Total Labour.

USD 1.00 = IDR 8,900

TBN/NO tobacco not included since farmed on contract arrangement (different terms apply).
Analysis of rice based on CASER/USAID study where distinction between management levels is based on irrigation technology (low = rainfed and simple irrigation; medium = semi-technical irrigation; high = technical irrigation)

INDONESIAN RUPIAHS (IDR)

						Production Costs (IDR '000/ha)									Farmer Income (IDR '000/ha)				Labour				
Crop	Primary Region	Region Covered by Model	Mgt. Level	Yield (kg/ha)	Gross Revenue (IDR '000/ha)	Cash costs before sale	Imputed costs before sale	Total costs before sale	Cash costs after sale	Total cash costs	Total variable costs	Annual Capital Recovery Cost	Total production costs	Total cost per ton	Gross profit (gr revenue - var costs)	Net profit (goss revenue - total cost)	Return to var costs	Return to total costs	Hired labour (days)	Family labour (days)	Total labour (days)	Gr. profit per day family labour (IDR '000/day)	**Gr. profit per day total labour (IDR '000/day)**
LOW INPUT MANAGEMENT																							
Potato	Upland	Upland	Low	6,000	16,800.0	1,831.5	6,300.0	8,131.5	243.1	2,074.6	8,374.6	120.0	8,494.6	1,415.8	8,425.4	8,305.4	1.01	0.98	75	67	142	125.8	**59.3**
Chilli	All	Midland	Low	6,800	23,800.0	9,273.5	-	9,273.5	1,135.7	10,409.2	10,409.2	151.0	10,560.3	1,553.0	13,390.8	13,239.7	1.29	1.25	365	122	487	109.8	**27.5**
Groundnuts	All	Lowland	Low	750	4,500.0	608.0	900.0	1,508.0	81.2	689.2	1,589.2	120.0	1,709.2	2,279.0	2,910.8	2,790.8	1.83	1.63	39	67	106	43.4	**27.5**
Corn	All	Lowland	Low	2,250	3,487.5	1,095.0	46.5	1,141.5	153.6	1,248.6	1,295.1	120.0	1,415.1	628.9	2,192.5	2,072.4	1.69	1.46	46	40	86	54.8	**25.5**
Nilam (yr 2)	All	Lowland	Low	19,000	9,500.0	3,365.0	-	3,365.0	209.0	3,574.0	3,574.0	179.6	3,753.6	197.6	5,926.0	5,746.4	1.66	1.53	271	51	322	116.2	**18.4**
Rice (dry season)*	Lowland	Lowland	Simple Irrg	4,900	4,655.0	-	-	-	-	-	1,801.5	-	-	367.7	2,853.5	-	1.58	-	116	48	165	59.1	**17.3**
Rice (dry season)*	Lowland	Lowland	Rainfed	3,970	3,771.5	-	-	-	-	-	1,406.8	-	-	354.4	2,364.7	-	1.68	-	90	54	144	43.6	**16.4**
Rice (wet season)*	Lowland	Lowland	Simple Irrg	4,810	4,088.5	-	-	-	-	-	1,704.9	-	-	354.5	2,383.6	-	1.40	-	110	36	146	66.6	**16.4**
Rice (wet season)*	Lowland	Lowland	Rainfed	3,780	3,213.0	-	-	-	-	-	1,567.9	-	-	414.8	1,645.1	-	1.05	-	91	14	105	117.0	**15.7**
VA-Kretek Tobacco	Upland	Upland	Low	600	13,170.0	7,605.1	-	7,605.1	798.5	8,403.7	8,403.7	625.2	9,028.9	15,048.1	4,766.3	4,141.1	0.57	0.46	316	205	521	23.3	**9.1**
Carrots	Upland	Midland	Low	3,750	2,250.0	1,049.5	-	1,049.5	-	1,049.5	1,049.5	120.0	1,169.5	311.9	1,200.5	1,080.5	1.14	0.92	92	51	143	23.5	**8.4**
Garlic	Upland	Upland	Low	1,050	4,725.0	2,752.5	1,512.5	4,265.0	235.6	2,988.1	4,500.6	120.0	4,620.7	4,400.6	224.4	104.3	0.05	0.02	195	81	276	2.8	**0.8**
MEDIUM INPUT MANAGEMENT																							
Potato	Upland	Upland	Medium	9,000	25,200.0	3,576.0	6,720.0	10,296.0	511.7	4,087.7	10,807.7	120.0	10,927.7	1,214.2	14,392.3	14,272.3	1.33	1.31	99	73	172	197.2	**83.7**
Corn	All	Lowland	Medium	2,800	4,340.0	1,712.0	53.5	1,765.5	246.5	1,958.5	2,012.0	120.0	2,132.0	761.4	2,328.1	2,208.0	1.16	1.04	55	40	95	58.2	**24.5**
Chilli	All	Midland	Medium	8,000	28,000.0	12,515.5	-	12,515.5	1,605.4	14,120.9	14,120.9	151.0	14,272.0	1,784.0	13,879.1	13,728.0	0.98	0.96	433	149	582	93.1	**23.8**
Groundnuts	All	Lowland	Medium	900	5,400.0	1,249.5	945.0	2,194.5	150.7	1,400.2	2,345.2	120.0	2,465.3	2,739.2	3,054.8	2,934.7	1.30	1.19	68	68	136	44.9	**22.5**
Rice (wet season)*	Lowland	Lowland	Semi-Tech	5,370	4,564.5	-	-	-	-	-	1,707.1	-	-	317.9	2,857.4	-	1.67	-	106	36	142	79.5	**20.1**
Rice (dry season)*	Lowland	Lowland	Semi-Tech	5,880	5,586.0	-	-	-	-	-	2,195.3	-	-	373.4	3,390.7	-	1.54	-	147	22	169	151.8	**20.1**
Nilam (yr 2)	All	Lowland	Medium	26,000	13,000.0	5,398.5	-	5,398.5	329.8	5,728.3	5,728.3	268.9	5,997.2	230.7	7,271.7	7,002.8	1.27	1.17	372	68	440	106.9	**16.5**
VA-Kretek Tobacco	Upland	Upland	Medium	950	20,315.8	9,872.7	-	9,872.7	971.7	10,844.4	10,844.4	726.8	11,571.2	12,180.2	9,471.4	8,744.6	0.87	0.76	430	263	693	36.0	**13.7**
Carrots	Upland	Midland	Medium	5,000	3,000.0	1,555.5	-	1,555.5	132.6	1,688.1	1,688.1	120.0	1,808.1	361.6	1,312.0	1,191.9	0.78	0.66	119	47	166	27.9	**7.9**
Garlic	Upland	Upland	Medium	1,950	8,775.0	5,679.0	1,595.0	7,274.0	591.3	6,270.3	7,865.3	120.0	7,985.4	4,095.1	909.7	789.6	0.12	0.10	305	55	360	16.6	**2.5**
HIGH INPUT MANAGEMENT																							
Potato	Upland	Upland	High	13,000	36,400.0	5,458.0	7,560.0	13,018.0	794.8	6,252.8	13,812.8	120.0	13,932.8	1,071.8	22,587.3	22,467.2	1.64	1.61	129	84	213	268.9	**106.0**
Corn	All	Lowland	High	3,100	4,805.0	2,023.0	58.1	2,081.1	285.1	2,308.1	2,366.2	120.0	2,486.2	802.0	2,438.8	2,318.8	1.03	0.93	65	45	110	54.2	**22.2**
Chilli	All	Midland	High	9,000	31,500.0	14,630.0	-	14,630.0	1,870.0	16,500.0	16,500.0	151.0	16,651.1	1,850.1	15,000.0	14,848.9	0.91	0.89	507	173	680	86.7	**22.1**
Rice (wet season)*	Lowland	Lowland	Tech Irrig	5,900	5,015.0	-	-	-	-	-	1,865.6	-	-	316.2	3,149.4	-	1.69	-	108	36	144	88.1	**21.9**
Groundnuts	All	Lowland	High	1,025	6,150.0	1,674.3	990.0	2,664.3	207.0	1,881.3	2,871.3	120.0	2,991.3	2,918.4	3,278.7	3,158.7	1.14	1.06	80	81	161	40.5	**20.4**
Rice (dry season)*	Lowland	Lowland	Tech Irrig	6,360	6,042.0	-	-	-	-	-	2,314.1	-	-	363.9	3,727.9	-	1.61	-	183	24	207	154.3	**18.0**
Nilam (yr 2)	All	Lowland	High	31,000	15,500.0	7,103.0	-	7,103.0	435.2	7,538.2	7,538.2	450.8	7,989.0	257.7	7,961.8	7,511.0	1.06	0.94	452	81	533	98.3	**14.9**
VA-Kretek Tobacco	Upland	Upland	High	1,200	24,984.0	12,907.3	-	12,907.3	1,254.7	14,162.0	14,162.0	749.1	14,911.0	12,425.9	10,822.0	10,073.0	0.76	0.68	568	350	918	30.9	**11.8**
Carrots	Upland	Midland	High	6,000	3,600.0	1,905.5	-	1,905.5	167.4	2,072.9	2,072.9	120.0	2,192.9	365.5	1,527.1	1,407.1	0.74	0.64	137	52	189	29.4	**8.1**
Garlic	Upland	Upland	High	2,550	12,750.0	7,885.0	1,650.0	9,535.0	912.9	8,797.9	10,447.9	120.0	10,567.9	4,144.3	2,302.1	2,182.1	0.22	0.21	348	62	410	37.1	**5.6**

* Because of different data source for rice, missing financial indicators could not be calculated.

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