

CHAPTER 4. DYNAMICS IN THE AGRICULTURAL SECTOR: 2001-2004

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Introduction

In this chapter we look at the agricultural sector and rely on perceptions and recall questions of focus groups as to get an idea on the dynamics. While there are obvious disadvantages with this type of method, it however allows for a quick snapshot of the situation and dynamics. It can later be complemented and quantified with different more detailed household surveys that are currently in the field.

1. Dynamics in agricultural production

a. Agricultural production of the major staples in the agricultural year 2003-2004 was lower than in previous years.

Focus groups were asked to estimate the average yield of different crops in their commune in the agricultural season in 2003/2004 and to compare it to three years earlier, which was considered an average agricultural year. The results indicate that the 2003/2004 year was worse than normal. Focus groups estimate that productivity levels of rice were, between 6% (comparing average) and 20% (comparing medians), lower than three years earlier. Same negative results were reported for all the other staples (Table 1).

Table 1: Estimated average yields (kg/ha) in 2004 and 2001 (by focus groups)

Crop	Ag. year	Mean	Median
Rice	00/01	2517	2500
	03/04	2373	2000
Cassava	00/01	6649	5011
	03/04	6339	5000
Maize	00/01	2090	1700
	03/04	1887	1500
Sweet potato	00/01	4307	3350
	03/04	4177	3000
Potato	00/01	6330	4500
	03/04	6310	4500
Beans	00/01	1773	1200
	03/04	1574	1000

Source: Commune survey, 2004

To further illustrate the extent to which agricultural yields were lower in the agricultural season 2003/2004, we split the communes in those that reported a decrease, no change and an increase compared to three years earlier. The results indicate that about 41% of the communes state that rice yields were lower this year, 46% say that they were the same and only 13% reported an increase

(Table 2; Maps 1 and 2). It seems that the decrease in rice yields is most pronounced as the yields of other crops are mainly reported to be stable compared to three years earlier. Few communes report an increase in production, except for potatoes where 21% of the focus groups noted an improvement.

Table 2: Percentage of communes that reported a change in the reported agricultural yields in the agricultural season 2003/2004 compared to three years earlier

Crop	Lower	The same	Higher
Rice	41	46	13
Cassava	29	57	14
Maize	36	53	11
Sweet potato	32	60	8
Potato	24	55	21
Beans	38	49	14

Source: Commune survey, 2004

As focus groups might have problems to come up with quantitative measures of yields and agricultural production, we further asked them a general qualitative question on the evolution of the yields of their major agricultural crops in the commune compared to three years earlier. Table 3 shows that 32% of the focus groups state that yields were stable. Half of the focus groups believe that yields have gone down. Only 18% reports them to be higher. The combination of these questions thus indicates that the agricultural production in 2004 was worse than in a normal year.

Table 3: Perceived evolution of the yield of major staples in the commune in 2004 compared to 3 years earlier (% of communes)

	% of communes
A lot higher	1
Higher	17
The same	32
Lower	48
A lot lower	2
Total	100

Source: Commune survey, 2004

b. The change in production is not related to a change of technologies used in the agricultural sector. We note relatively little changes over the last three years and if anything, they should have contributed to higher productivity.

Focus groups were asked to indicate to what extent the adoption of improved technologies had changed compared to three years ago (Table 4). While we see some changes in a positive direction, though admittedly from a low base, the changes are very small and

should not have contributed to significant changes in agricultural production levels.

Table 4: Percentage of communes where nobody uses these improved technologies

Technology	Now	3 years ago
SRI	51	58
Transplanting in line	42	46
Off-season crops	42	43
Semis direct (tanety)	71	72
Manure	30	32
Improved equipment	24	26
Pesticides	45	47
Improved rice variety	57	61

Source: Commune survey, 2004

As the low chemical fertilizer use is an important policy variable, we show their statistics separately. The recent data show that we have seen little changes in their use over the last three years. However, the changes indicate that slightly more farmers might use fertilizer (Table 5). This might partly be due to the voucher program that the PSDR has put in place.

Table 5: Percentage of communes where chemical fertilizer is used

% of households	Now	3 years ago
>75%	5	3
50-75%	6	4
25-50%	7	8
5-25%	12	10
0-5%	17	19
Nobody	53	55
Total	100	100

Source: Commune survey, 2004

c. The decline in the production in 2004 seems especially linked to climatic setbacks. 80% of the communes state they were hit by a cyclone in 2003/2004. 60% of the communes suffered from flooding. This seems to have influenced the production of the main season crop, i.e. rice, in particular.

Agricultural production in general, and especially in Madagascar, is characterized by significant risks that might lead to variable annual output levels. Table 6 gives an overview of the major types of risks that might have an effect on agricultural production in Madagascar. The table shows that the 2003/2004 year was a bad year due to the cyclones Gafilo and Elita. About 80% of the communes state that they were seriously affected by these cyclones. This might have contributed to flooding in about 60% of the communes, significantly higher than in other years, and might thus explain the worse production in the year 2003/2004.

However, the agricultural year was a good year with respect to the other indicators. There were no problems of late rain. Only one third considered this a problem in the 2003/2004 year. This compares to more than half the

communes in the previous years. One quarter of the communes even mentioned earlier than expected rains. Incidences of locus, hail, or drought were also less prevalent than in other years (Table 6). So, communes that did not suffer from cyclone damages might actually have had better production conditions.

Tables 1 and 2 show that especially rice had lower production levels in 2004. As rice is mostly harvested in the first half of the year, it was in the field in most communes when the cyclones, and the subsequent floods, hit. Some of the other crops - especially potatoes - are mainly grown in the off-season and their yields might therefore have been less affected.

Table 6: Agricultural risks over the last three agricultural seasons (% of communes affected)

	Agricultural season		
	01/02	02/03	03/04
Cyclone	30	35	81
Flooding	41	42	59
Drought	28	23	21
Rice fleas	59	53	51
Other major disease	56	58	57
Hail	22	23	18
Locus	17	8	6
Late rain	56	51	33
Early rain	8	10	25

Source: Commune survey, 2004

d. There are significant differences by province. The central and the Northern provinces were most hit by the cyclones.

Not all provinces were hit to the same extent by cyclones and flooding (Map 3). Table 7 shows that all communes report to have been hit (i.e. where a large part of the commune reports to have been affected) in the provinces of Antananarivo, Mahajanga, and Antsiranana. Toamasina and Toliara were reported to have been least affected.

Table 7: Cyclone damage that affected the majority of the population over the last three agricultural seasons (% of communes affected)

Province	Agricultural season		
	01/02	02/03	03/04
Antananarivo	28	37	100
Fianarantsoa	39	36	84
Toamasina	30	34	64
Mahajanga	58	61	100
Toliara	7	23	48
Antsiranana	26	17	100
Total	30	35	81

Source: Commune survey, 2004

If a commune was hit by cyclone Gafilo, the focus group was asked further questions on the percentage of the population in the commune of whom production was affected and that lost assets or part of the harvest. Overall, 46% of the households were affected in productive activities and 25% said they lost assets or part of their harvest (Table 8). Moreover, 7% of the communes reported deaths due to this cyclone. The most severely hit provinces were those of

Mahajanga and Antsiranana. These numbers indicate how severe the impact of cyclone damage was in 2004.

Table 8: Impacts of cyclone Gafilo

Province	% of households (median) that		% of comm. that had deaths
	suffered in productive activities	that lost assets or harvest	
Antananarivo	45	30	6
Fianarantsoa	40	3	7
Toamasina	30	12	6
Mahajanga	70	20	13
Toliara	40	25	6
Antsiranana	61	40	9
Total	46	25	7

Source: Commune survey, 2004

Almost 60% of the communes that were affected further declared that at the time of the survey, they had not yet recuperated from that shock (Table 9). While the significant efforts that were done after the cyclone have to be commented (62% of the affected communes report to have received aid), they were apparently not sufficient to help the households get back to their normal level.

Table 9: Severity and assistance after Gafilo for the affected communes

	% of communes
<i>Time needed to get over the problem</i>	
< 1 month	1%
1-6 months	24%
6-12 months	18%
Not yet gotten over it	57%
<i>Received aid</i>	62%

Source: Commune survey, 2004

2. Agricultural income and prices

a. The decline in production led to a lower commercial surplus.

Focus groups were asked to evaluate the percentage of the produce that was exported outside of their commune, in 2004 and three years earlier. Table 10 shows that this percentage decreased for most crops. In the case of rice, the mean only declined slightly but the median dropped from 30% to 20% of total production.¹

Table 10: Perceived % of production of the crop that was exported outside the commune (by focus groups)

Crop	Ag. year	Mean	Median
Rice	00/01	31	30
	03/04	29	20
Cassava	00/01	26	15
	03/04	25	10
Maize	00/01	22	10
	03/04	21	5
Sweet potato	00/01	14	0
	03/04	13	0
Potato	00/01	16	0
	03/04	16	0
Beans	00/01	25	10
	03/04	24	10

Source: Commune survey, 2004

We further look at the evolution of the percentage commercial surplus of rice compared to three years earlier (for those communes that reported exports three years earlier). 50% of the communes state that the percentage of commercial surplus has decreased, 28% reports it to be stable while 22% indicates an increase (Table 11; Map 4 and 5).

Table 11: Evolution of the percentage of commercial rice surplus sold outside the commune in 2004 compared to three years earlier

Evolution	% of communes
Decreased	50
The same	28
Increased	22

Source: Commune survey, 2004

b. Agricultural prices increased dramatically in 2004. Prices of paddy at the end of 2004 doubled compared to the same period of the previous year. The rise was almost equally high in other agricultural produce markets.

The price of paddy increased by 100% for the country as a whole when we compare the lean period price of 2003 and 2004. The large price rise is found consistently in all provinces (Figure 1). Compared to the lean period of 2003, the harvest prices (April-June) seem to have changed very little. This is abnormal as rice prices normally decline significantly after harvest (Minten and Barrett, 2005; Moser *et al.*, 2004).

The largest price rise was found in the province of Fianarantsoa - also the poorest province of Madagascar (Razafindravonona *et al.*, 2001) - where prices in the lean period this year were even higher than in the province of Antsiranana, which has traditionally the most expensive rice in the country.

Given the importance of rice in the diet and agricultural production systems in Madagascar, it seems that it is the price setter for agricultural produce (Ravelosoa *et al.*, 1999). Prices of other agricultural products followed the trend that was noticed for rice and paddy. The price of maize increased by 58% compared to the same period of the year

¹ It is remarkable that these estimates co-incide rather well with the quantities of rice that are auto-consumed in Madagascar (Minten *et al.*, 2003).

before while the price of cassava increased by 69% (Figure 2).

Barrett (1996) illustrates the higher rice price variability for villages that are further away from town. He explains this observation by a reversal of flows phenomenon, i.e. traders that store the rice are mostly located in town: they store the rice there after it has been bought up after harvest and they sell it during the lean period. Rice then often has to travel twice the same distance. These costs have to be reflected in the rice prices.

The results of the commune survey show that this pattern of rice trade is still going on now (Minten *et al.*, 2003; Moser *et al.*, 2004). The reasons for this type of trade can be multiple. Farmers might not have the liquidity or the storage capacity to store rice themselves. Sometimes, there is also too much insecurity in the more remote villages to allow for storage.

c. As price increases for major staples happened after the main marketing season, most small farmers did not benefit from these price increases and they are significantly worse off this year given the general price inflation after they sold their crops.

Figures 1 and 2 indicate that the price levels for agricultural products only started their increase from July-September 2004 on. The price levels during the period April-June 2004, i.e. the main marketing season in Madagascar (Minten and Zeller, 2000), were only slightly higher than one year earlier. Compared to one year earlier, the price of paddy, maize and cassava was at that point 14%, 19% and 25% higher respectively.

However, as the prices of consumption goods rose significantly more (Chapter 1) and as they also had less agricultural produce to sell than in previous years due to the lower production levels, it seems that for most agricultural producers, income levels were relatively lower than in previous years.

d. The winners due to the high agricultural prices are those producers and traders that bought during the major harvest of 2004 and sold after June 2004. These include the large farmers and traders that store rice.

The economic environment seems to have caused an extra windfall for the storage of agricultural produce this year. A major reason for this windfall can probably be found in the exchange rate depreciation that led to an inflationary environment. In such an environment, prices do not play very well their allocation roles and led to unexpected rents and costs.

The exchange rate depreciation happened during the main marketing season.² As there were transmission lags between the depreciation and the setting of prices in rural areas, this depreciation seems to have hurt the smaller farmers that are obliged to sell immediately after harvest. More farmers might also have been obliged to sell immediately due to the Gafilo damages.

This might have created extra rents for people that do store. Storage agents have an important role to play in the dampening of seasonal movements. In a normal situation, their costs show up in the regular seasonal movements that are generally noted in rice markets. However, as for other products, this year might have been exceptional for them.

Figure 3 shows to what extent the year 2004 was exceptional. We take the region of Lac Aloatra as the example. Paddy prices in that area, as in the rest of Madagascar, are characterized by significant but fairly regular seasonal patterns, with high prices in the lean period and low prices in the harvest period. The average price rise between the lean period and harvest period price before the year 2004 was about 52%. In 2004, this increase was 150%. It seems that the combination of bad harvests, the depreciation of the local currency and the international price increases have led to an exceptional large price increase in 2004. It seems unlikely that this set of circumstances will be repeated this year (as no major cyclones were reported) and we will probably move to a situation of regular seasonal patterns this year, *ceteris paribus*.³

e. The farmers in the rice baskets of Madagascar that produce later during the year (the Lac Aloatra areas in July and the Marovoay areas in November) also benefited disproportionately from the higher prices.

Not only people that stored gained from the price changes. Also the producers that happen to produce and sell rice in the second half of the year were better off. These include most importantly the rice producers in the Lac Aloatra region and the Marovoay region.

A qualitative question on the evolution of purchasing power was asked for these areas. The results indicate that their perceived purchasing power (as indicated by focus

² The exchange rate was about 7000 Fmg/\$ in February and 11,500 Fmg/\$ in June.

³ It is unclear with the data at hand to deduct to what extent the state involvement in rice marketing might have actually added to the rise in prices in the lean period due to the unclear and untransparent signals given to the private sector concerning rice imports.

groups) evolved much better than in the rest of the country.

Anecdotic evidence also suggests that the increase in rice prices has led to a boom in these areas. For example, it is estimated that the purchase of small tractors ('kubota') in the Lac Aloatra area, the rice basket of Madagascar, increased to 400 kubota this year. This compares to a dozen sales during a regular season.⁴

f. Given the small number of farmers that store, purchasing power overall went down and lean periods were longer in 2004. Rural focus groups link this to the price increases and the incidence of the natural disasters.

Figure 4 shows the percentage of communes that reported to be in the lean period in the year 2004 and 2001. The graph shows that the bad harvests had an impact on a significant number of communes. The lean period started considerably earlier this year. While in a normal year, 50% of the communes state to be in the lean period in the month of November, this year this percentage was almost as high as 70%.

84% of the focus groups state that their purchasing power went down in 2004. A follow-up question was then asked for the reason (Table 12). The results indicate the influence of the cyclones on welfare. 31% of the focus groups link their worse situation this year to natural disasters. 11% link it to a worsening of their agricultural income (which must be due to less commercial surplus as prices did not decline). 54% state purchasing power declined due to the higher prices of basic products (Produits de Première Nécessité).

Table 12: Stated reasons for the decline in purchasing power (by focus groups) for those communes where purchasing power declined

Reason	% of communes
Natural disasters	31
Reduction agricultural income	11
Increase prices PPN	54
Other	4
Total	100

Source: Commune survey, 2004

3. Constraints and incentives for future agricultural production

a. The changing prices might create opportunities for investments in the agricultural sector. However, it is currently unsure that the price ratios are sustainable.

As the prices of agricultural produce show a large relative increase, this might create

incentives to use more inputs, purchase equipment and lead to further investments in the sector, as we have seen in the Lac Aloatra area this year. One example could be the use of chemical fertilizer. To calculate the change in incentives of fertilizer use, we compare the ratio of the price of chemical fertilizer over the price of rice (Figure 5). To avoid incorrect inferences due to geographical factors, we only do this for the Lac Aloatra area.

The results show that the incentive to use fertilizer on rice (or on any other crop) is high compared to other years. The cost-benefit ratio has declined to 2 at the end of last year (the lean period). The last time that the ratio was that favorable was at the end of 2001.⁵ However, the more relevant comparison would be to compare fertilizer prices in the lean period (when they are used) with the price of the subsequent harvest. Given the normal seasonal pattern in rice prices, it is therefore highly unlikely that the ratio will stay that low.

It should also be noted that this ratio is still significantly higher than the ratio of other rice producing countries, especially in Asia. For example, the current ratio of urea over paddy prices is 0.8 in India. This difference in ratios explains to a large extent why fertilizers are relatively little used in Madagascar compared to these other rice economies. The favorable ratio in Asian countries is often due to the much lower fertilizer prices which are locally produced and/or subsidized in many of these countries.⁶

b. The stated long-term priorities of the local population to improve agricultural productivity concerns most importantly access to better equipment, to cattle to work the land and to irrigation.

The focus groups were then further asked to state the importance of different constraints to improve agricultural productivity of rice and other crops. They were given the choice between four categories, ranking from 'not important' to 'very important'. 85% of the population states that better irrigation is the most important constraint in having better rice productivity (Table 13). The two other most important constraints are access to cattle to work the land and access to better equipment. The most important perceived constraints for other crops are access to agricultural equipment, credit and the reduction of phytosanitary diseases. It seems that these

⁵ The ratio was extremely high at the harvest of 2002. This was the time of the political crisis when fertilizer was rarely available.

⁶ For example, the current price for a kg of urea at the farmgate is 0,10\$ in India, 0,14\$ in Pakistan and 0,19\$ in Vietnam. This compares to 0,70\$ per kg in Madagascar.

⁴ Claude Chabaud, personal communication.

statements indicate that lack of capital is a major problem for improved agricultural productivity.

It is also interesting to note the constraints that are *not* considered to be that important. They include more secure property rights and silt in the rice fields. While security in property rights is in general an important determinant for soil investment and thus higher productivity (Reardon and al., 1996; Feder and Feeny, 1991), it seems that the overall land tenure situation is such that little land conflicts exist that would make such investments risky. An alternative explanation might be that credit markets, that might allow for such investments, are imperfect or missing and might not be linked with improved property rights as farmers currently know them. Silting of ricefields is often linked to deforestation but this might cause less production problem than is commonly assumed, especially in the highlands (Brand *et al.*, 2002; Larson, 1993).

Table 13: Stated importance of different constraints to improve agricultural productivity in rice and other agricultural crops (% of focus groups that said this constraint was 'important' or 'very important')

Constraint	rice	Other crops
Land tenure	36	37
Access to livestock to work the land	70	45
Access to livestock for manure	42	44
Access to labor	56	54
Access to agricultural equipment	77	64
Access to chemical fertilizer	42	43
Access to improved seeds	58	57
Access to better irrigation systems	85	55
Access to credit	60	59
Avoid silting	41	27
Avoid losses due to plant diseases	58	60
Avoid floods	57	39
Avoid droughts	37	37

Source: Commune survey, 2004

4. Conclusions

This chapter - based on qualitative communal survey data - shows to what extent the agricultural year 2004 was an exceptional year. Agricultural production and commercial surplus were lower than normal. Combined with the depreciation of the Ariary and the rise in international rice prices, this led to a doubling of the paddy and rice prices compared to one year earlier. Other agricultural prices also show large increases but less so than rice.

Agricultural production levels seem to have been lower this year due to the incidences of cyclones and flooding. Given that production conditions seem to have been better in the agricultural season 2004/2005, it might thus be expected that agricultural prices return to their previous levels, but adjusted for the

depreciation of the Ariary, international price levels and internal marketing costs.

Unfortunately, the rise in agricultural prices in 2004 happened when most of the smaller farmers had sold their production. They were then faced by significantly higher prices in the lean period when most of the smaller farmers become net buyers of agricultural produce. The winners were the people that stored rice until the later part of the year and production areas where rice is harvested later. Given the importance of the first group in rural areas, it can be expected that poverty went up significantly in the lean period of the year 2004.

We note little dynamics and changes in the adoption of agricultural technologies over the last three years. While improved technology adoption has increased a little bit, it did not change enough as to allow for significant production increases. Given the strong link of agricultural performance and welfare, agricultural investments and technology adoption remain the corner stone of any poverty reduction strategy in Madagascar, especially given the large number of poor that depend on the agricultural sector for their living. However, as the experience of 2004 shows, these investments have to happen in stable macro-economic environments as to allow them to achieve their intended poverty alleviation effects.

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Figure 1: Prices of paddy (quality C2) - producer prices

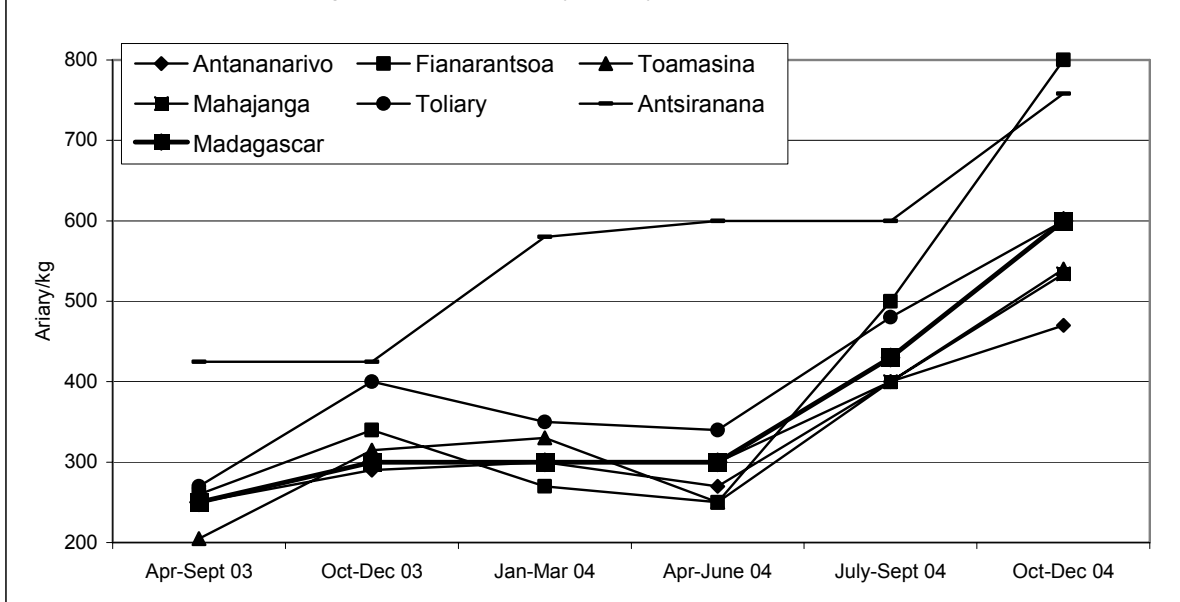


Figure 2: Agricultural producer prices for major crops

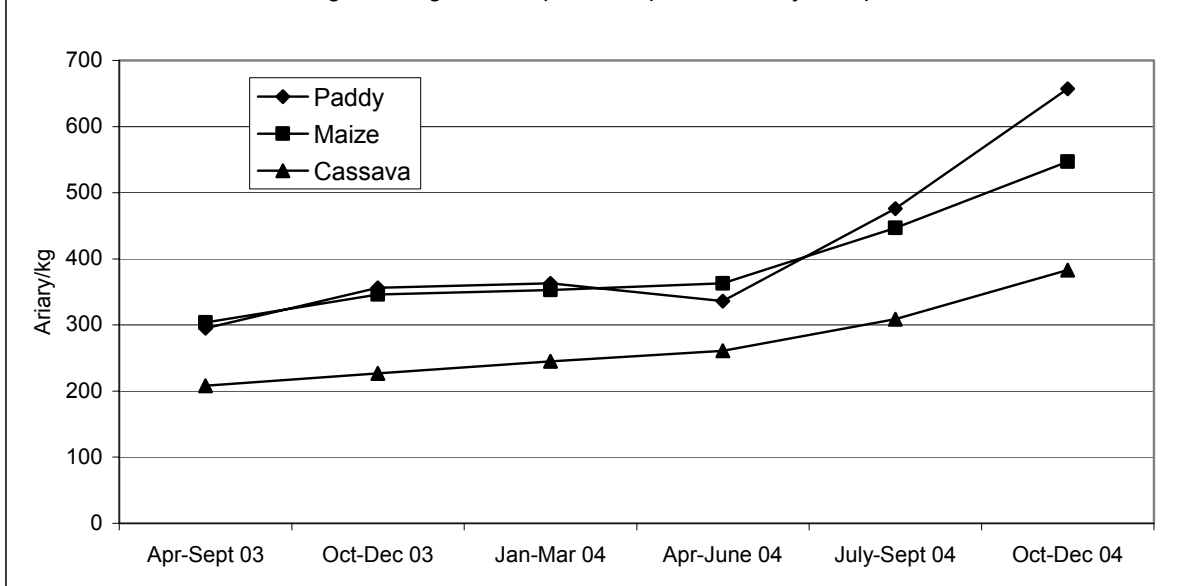


Figure 3: Paddy prices in the Lac Aloatra region (Ariary per kg)

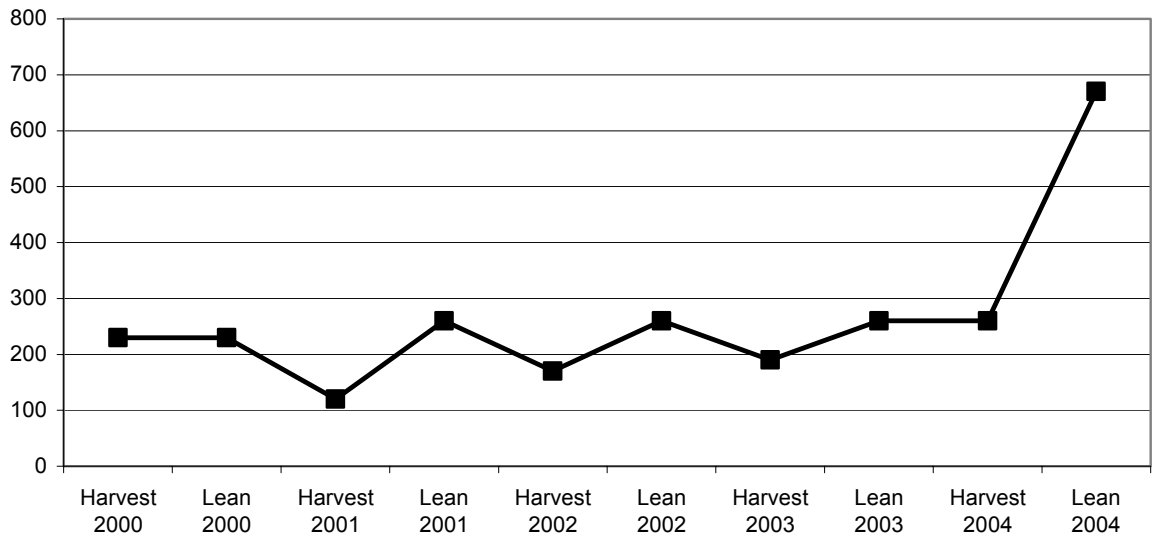


Figure 4: Percentage of communes that are in the lean period

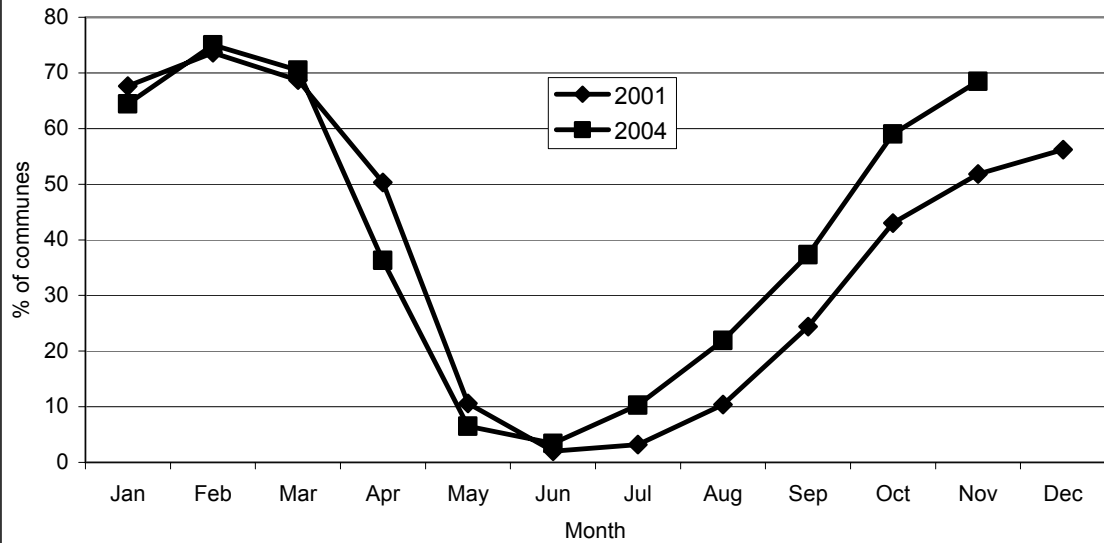
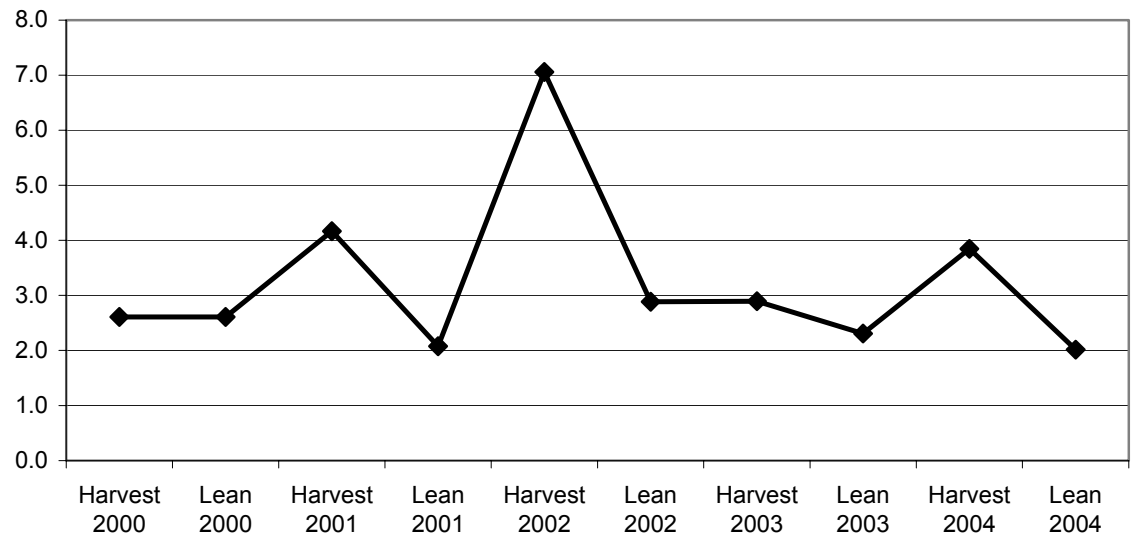
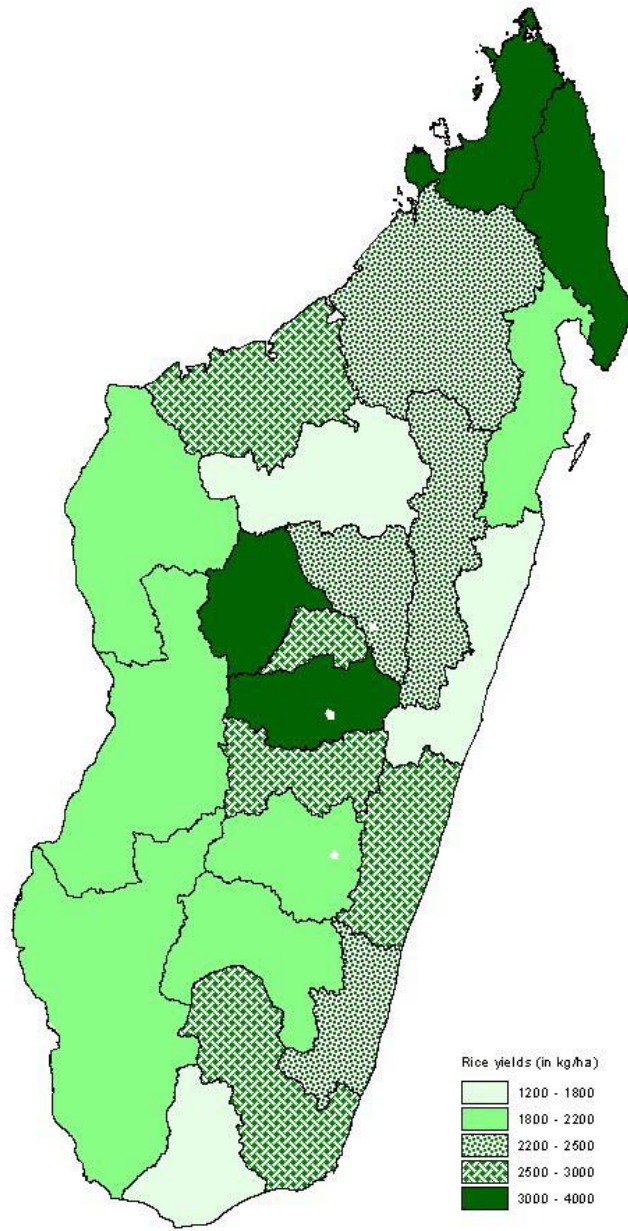


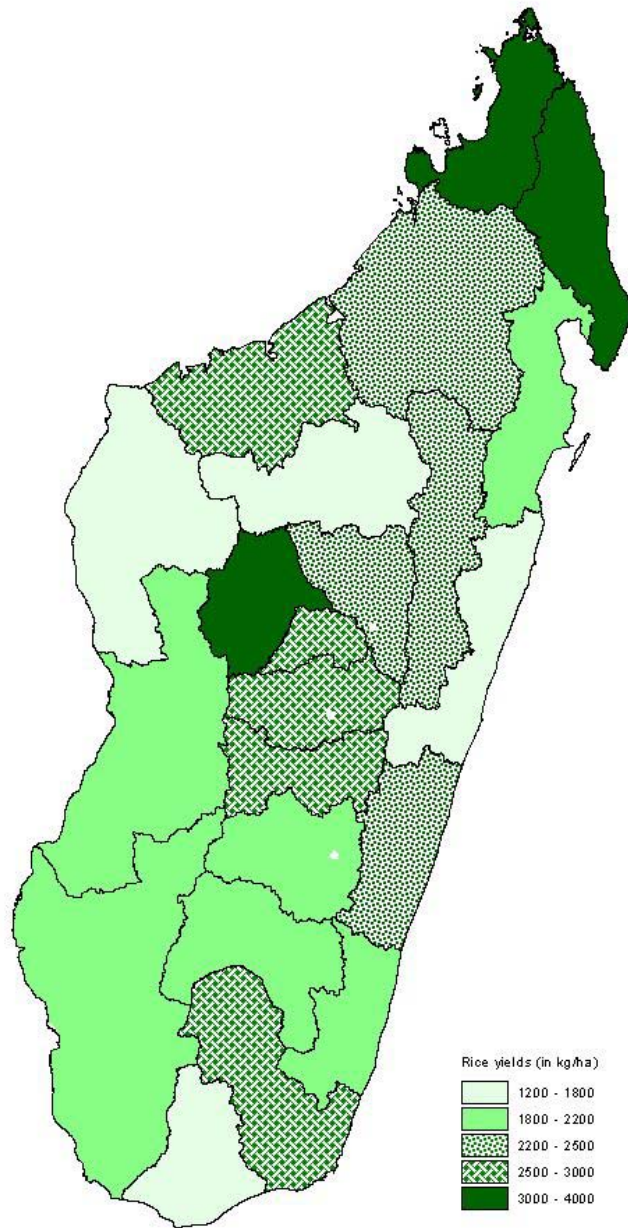
Figure 5: Ratio of fertilizer over paddy prices (kg/kg) in the Lac Aloatra area



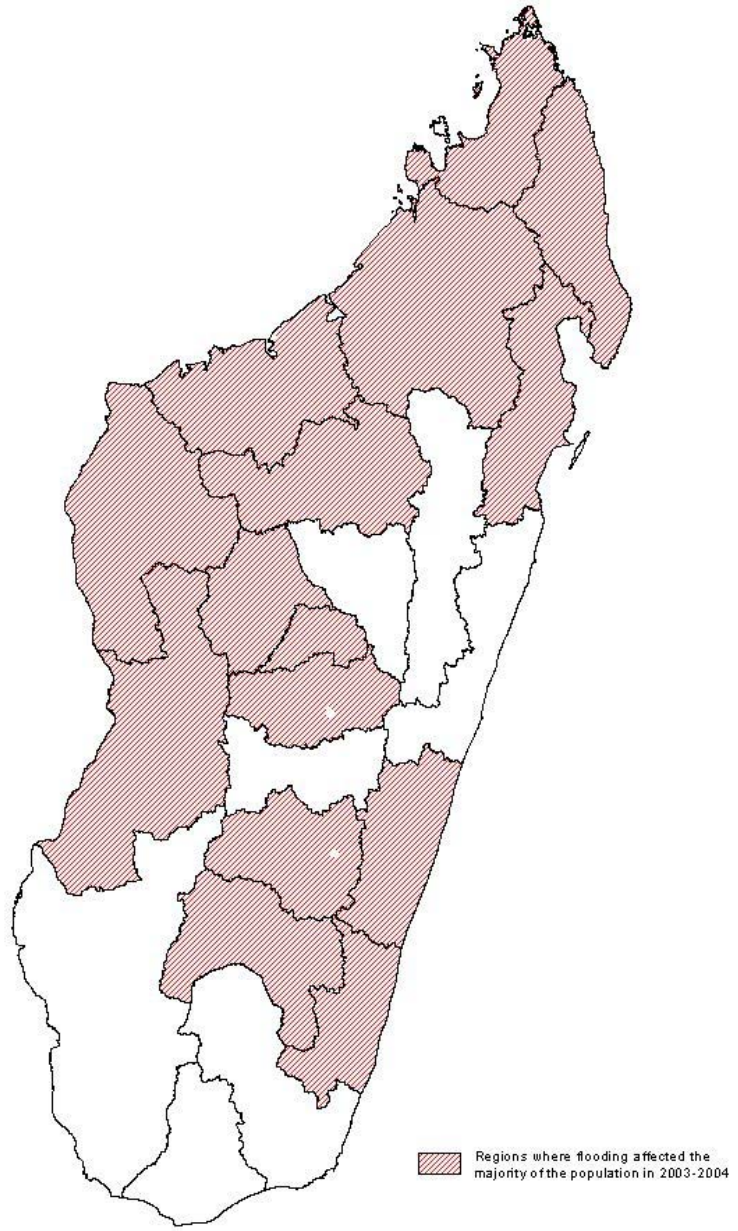
Map 1 : RICE YIELDS IN 2001



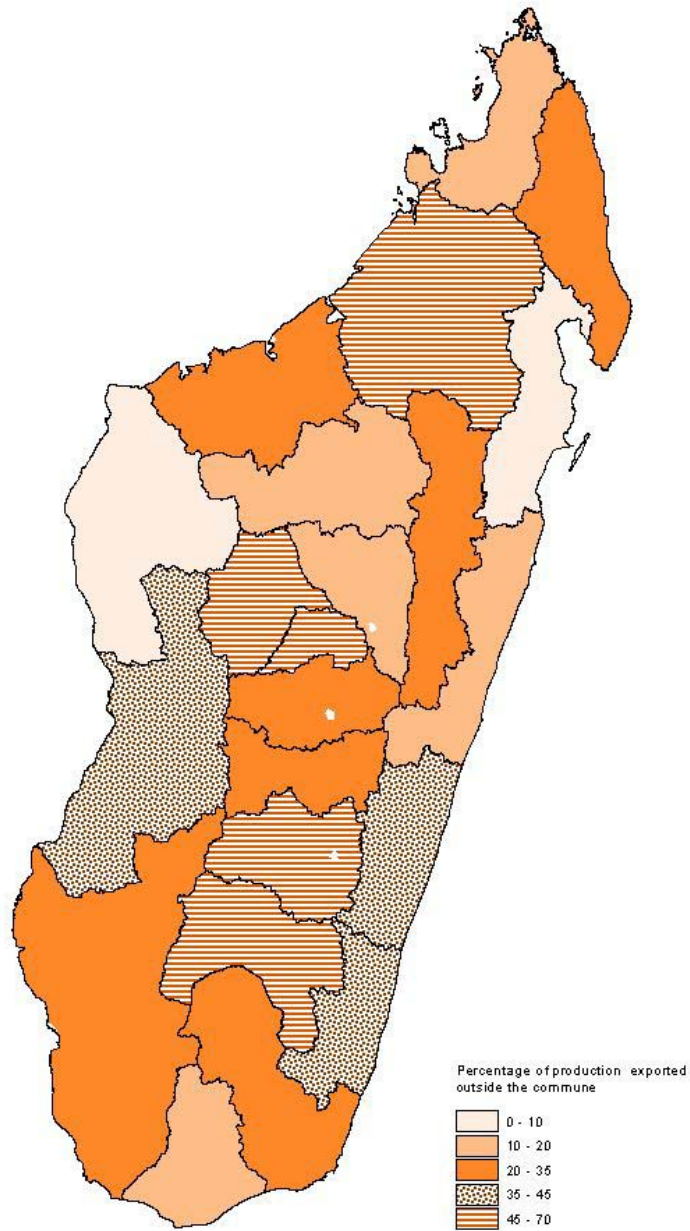
Map 2 : RICE YIELDS IN 2004



Map 5 : THE INCIDENCE OF FLOODING IN 2003 - 2004



Map 3 : COMMERCIAL SURPLUS OF RICE IN 2001



Map 4 : COMMERCIAL SURPLUS OF RICE IN 2004

