

CHAPTER VI

GROSS MARGIN ANALYSIS

Gross margin analysis of 100 sampled households representing both AgS divisions was undertaken to assess the profitability of paddy cultivation, with a point of view of the land ownership, use of family labor and according to the INM adoption under subsidized and non subsidized conditions. The summarized results are given in following sections.

6.1 Cost of paddy production

6.1.1 Constitution of major cost components in paddy production

Using data of the field survey, average cost was computed under each cost component of paddy production; with a view of finding needed measures to minimize the cost of production (COP).

Results showed that 40% of the production cost was input costs and 60% was the cost of hired labor and machinery. Cost of inputs constituted by 9% under seed paddy, 6% under organic fertilizers, insecticides, weedicides and fuel. Another 5% and 2% were under chemical fertilizers and insecticides respectively (Figure 6.1).

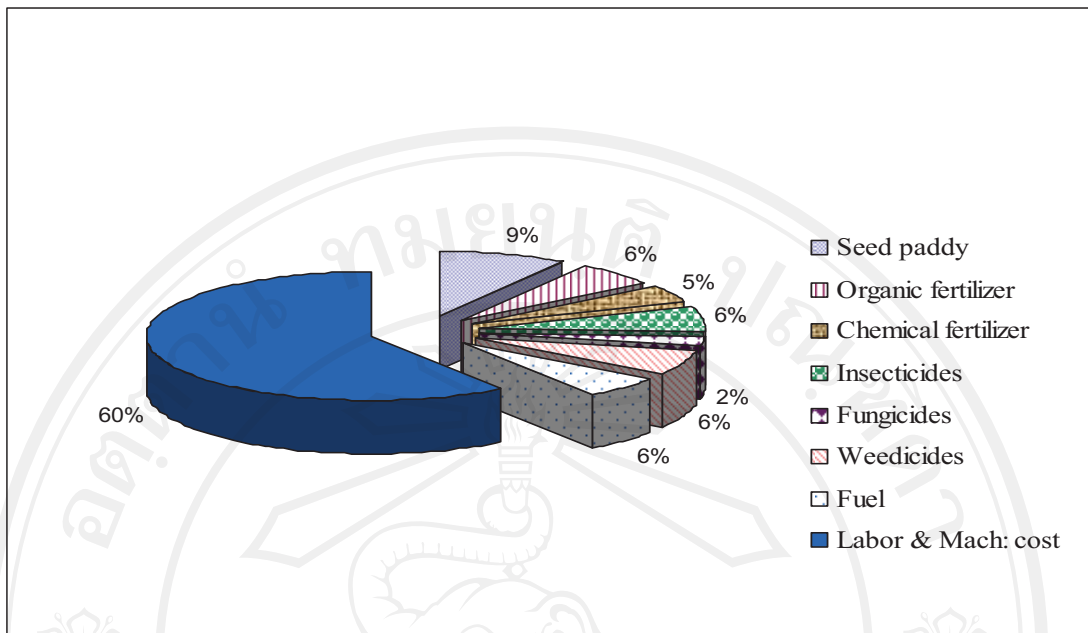


Figure 6.1: Constitution of major cost components in paddy production

All interviewed households applied direct seeding in study area. Some times they used higher rate than the DOA recommendations for direct sowing. So this practice led to a high cost of seed paddy for these farmers. Fertilizer, insecticide, fungicide, weedicide and fuel for machineries were the other major inputs used. Households had to bear a considerable cost on fuel as a result of higher market price for fuel at that time. They normally applied fungicides, when they confronted with a fungal attack.

Based on this situation access to high quality, but low cost seed paddy may have a good contribution for increasing the profits of paddy production as it represented the highest constitution under the cost of inputs. In addition, plans with reference to reducing the cost for purchasing organic fertilizers, weedicides and fuel at farm level may also help paddy cultivating households for their profit maximization. It is therefore important to note that encouraging farmers to produce

their own organic fertilizers such as paddy husk charcoal by themselves will create a favorable condition for this situation. It is further emphasized as 33% of the adopted households applied purchased charcoal in study area.

As the highest cost component represented by 60%, this analysis suggests the importance of reducing the cost on hired labor and machinery for the improvement of profitability in rice sector. Figure 6.2 clearly describes the constitution of major cost components under the cost of hired labor and machinery in paddy production. Accordingly, 33% of the cost was spent on the harvesting process. The second major cost component was land preparation; and it constituted by 31%. Collecting, threshing and bagging, sawing and application of organic fertilizers constituted by 9%, 8% and 5% of the cost of hired labor and machinery respectively. Application of chemical fertilizers, insecticides, weedicides and transportation showed a 3% cost constitution under each category. Application cost of fungicides was only 2% of the total hired labor and machinery cost.

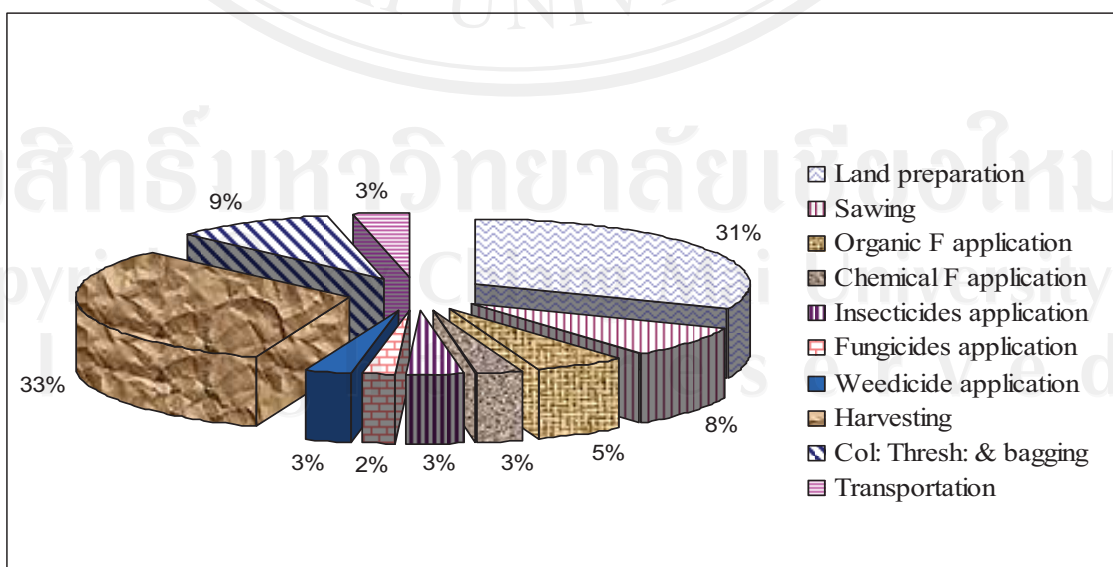


Figure 6.2: Constitution of hired labor and machinery cost components

Therefore this analysis highlighted the challenges facing today to increase paddy farmers' profitability; through promoting and facilitating mechanisms especially to reduce the cost of hired machinery. This is necessary especially for harvesting and land preparation processes.

6.1.2 Cost of production in two Agrarian service divisions

Computation of the average cost of production was conducted in order to get an idea about the cost, that farmers have to bear under the major cost components to produce one kilogram of paddy in two different study areas in both seasons; considering with and without the opportunity cost of family labor and also considering the INM adoption.

Survey results with regards to the average cost of production described above; are presented in Tables 6.1 and 6.2. For farm level, evidence showed that paddy households in Lunama AgS division had to bear higher cost of production compared to the households in Ambalantota AgS division. The average cost of production for the households in Ambalantota AgS division was 11.40 and 12.34 (Rs/Kg); while it was 14.90 and 16.21 (Rs/Kg) for Lunama AgS division excluding and including the opportunity cost of family labor, respectively.

It gave evidence to that increased land area under cultivation lead to reduce in the unit cost of production and allows gaining the advantages of economies of scale.

Table 6.1: Average cost of paddy production in two AgS divisions

Average cost of production (Rs/Kg)	Agrarian Service Division			
	Ambalantota (N=51)		Lunama (N=49)	
	Yala	Maha	Yala	Maha
Excluding family labor	11.39	11.41	15.59	14.97
Including family labor	12.34	12.34	17.15	16.53

6.1.3 Cost of production in INM adopters and non adopters

Table 6.2 shows the comparison between the average production cost of INM adopters and non adopters in two study areas. It indicated that INM adopters had slightly higher cost of production comparing with to the non adopters in both AgS divisions. In average, the cost of production of INM adopters was 13.43 (Rs/Kg), while it was 12.72 (Rs/Kg) for non adopters. On average, the opportunity cost of own labor among the households in Ambalantota division was 0.89 (Rs/Kg). But it was 1.30 (Rs/Kg) in Lunama division. This difference was created as a result of the higher usage of their own labor for paddy production practices by Lunama households.

Table 6.2: Average cost of production between INM adopters and non adopters

Average cost of production (Rupees/Kg)	Agrarian Service Division			
	Ambalantota (N=51)		Lunama (N=49)	
	Adopters	Non adopters	Adopters	Non adopters
Excluding family labor	11.50	11.00	15.36	14.44
Including family labor	12.41	11.88	17.07	15.34

6.2 Gross margin analysis of paddy production in two Agrarian service divisions

Data collected with relevant to the cost and return through the survey was used to compare the profitability in two different AgS divisions in both yala and maha seasons and the results are given in Tables 6.3 and 6.4 respectively.

Result of this study showed that the total revenue and gross margin were varied from division to division and season to season; based on the yield and the prices of inputs and outputs.

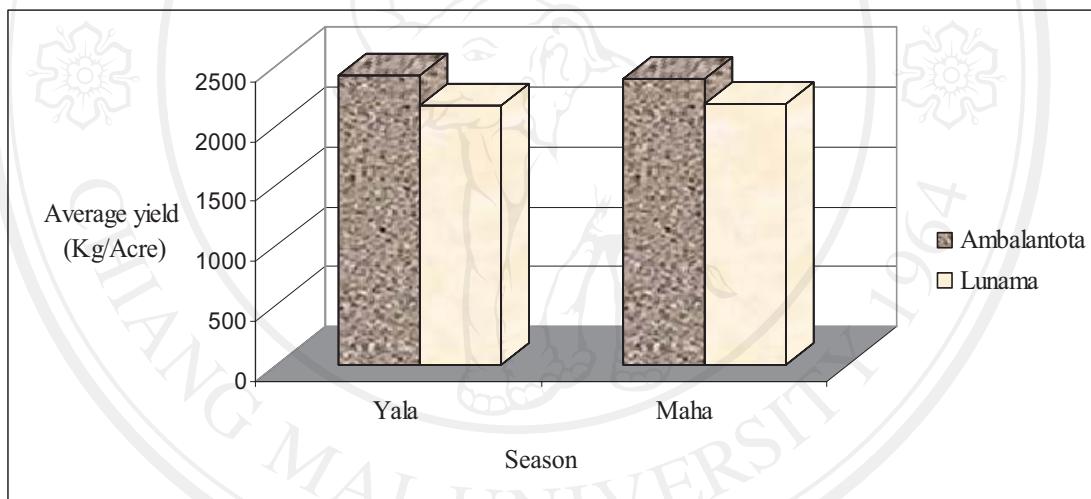


Figure 6.3: Average yield of paddy in two AgS divisions

Figure 6.3 demonstrates that in both yala and maha seasons, households in Ambalantota AgS division were able to get higher yields than the households in Lunama AgS division.

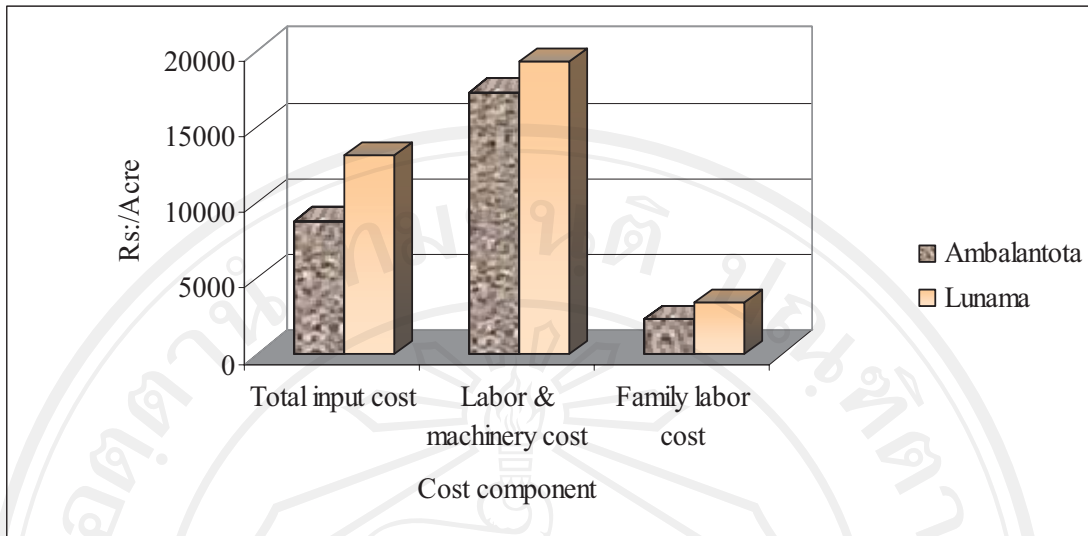


Figure 6.4: Major cost components of paddy production in two AgS divisions

On average, 37% to 42% of the operating cost was spent on inputs in Ambalantota and Lunama AgS divisions, respectively. Two factors have led Lunama households to bear this increased cost for inputs; under the cost for purchased organic fertilizers and fuel. Increased labor and machinery cost also could be noticed in that area, with significantly increased manual harvesting (51%) compared to Ambalantota AgS division (3%) (Figure 6.4).

Price differences for a unit of production, which was created as a result of late cultivation and harvesting of Lunama households; also contributed to this situation to become worsen, with significantly lower prices compared to the Ambalantota AgS division. Paddy cultivating households in Ambalantota were able to fetch a higher farm gate price for a kilogram of paddy in yala as 30.32 Rs, and it was significantly different with the price at Lunama 28.64 Rs ($p < 0.05$), and paddy price in maha 29.98 Rs was also significantly higher than the price in Lunama 26.03 Rs ($p < 0.01$). In both divisions paddy farmers were used to sell their products directly to the middlemen at

farm premises. Therefore Ambalantota farmers were able to gain a higher price, as the early harvesters of the season. But with increasing production, the unit price gradually decrease as a result of decreasing demand. Being the late harvesters Lunama farmers were affected by this situation. As most of the farmers haven't enough storage facilities, this increases the bargaining power of the middlemen to get their products comparatively at a lower price than at Ambalantota. This created a decrease of the average price by 2.81 Rs/Kg in Lunama in two cropping seasons.

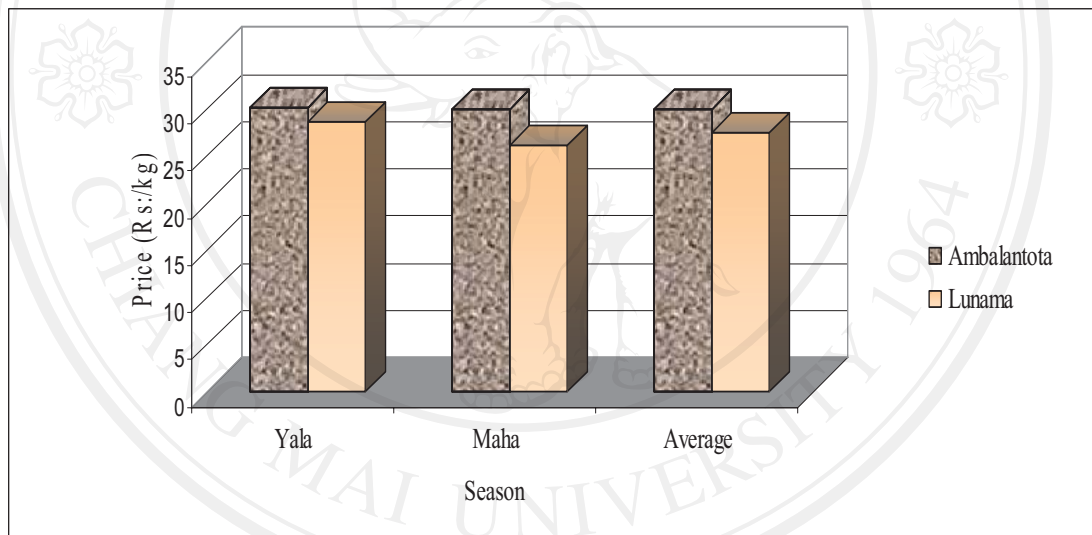


Figure 6.5: Average price of paddy in two AgS divisions

Due to comparatively low yield and price; households in Lunama AgS division gained less total revenue in both seasons. Under this condition, paddy cultivation in Lunama was less profitable compared to Ambalantota in both seasons.

(Figure 6.6)

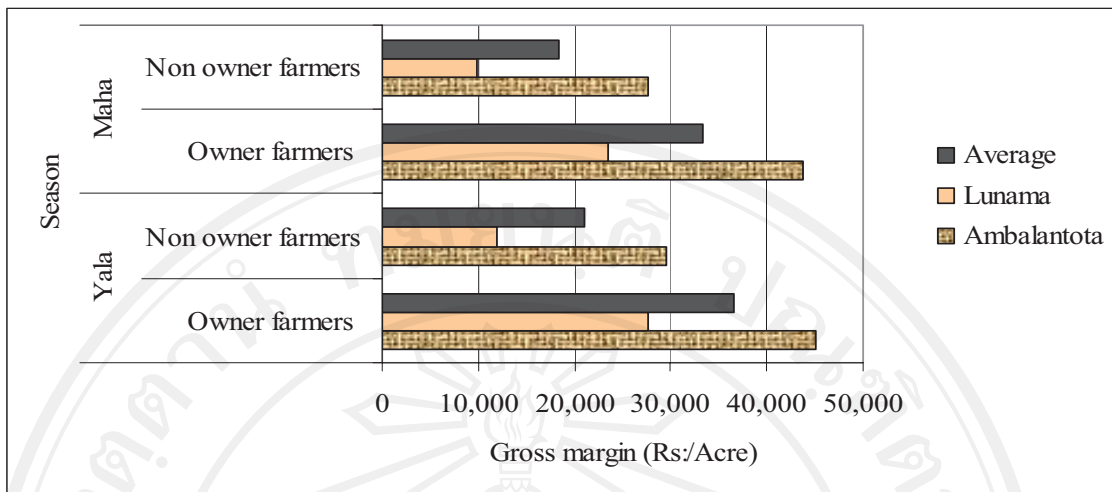


Figure 6.6: Gross margin of paddy production in two AgS divisions

This situation in 2008 yala season is clearly described in Table 6.3. The average total revenue earned by a household at Ambalantota was 73,192 and it was 62,149 Rs/Acre at Lunama division. While the average total input cost was 10,007 Rs/Acre in Ambalantota division, it was increased by 4,594 Rs to be 14,601 Rs/Acre at Lunama. This increment under the cost of input was created as a result of the high cost incurred for purchased organic fertilizers and also being the victims of ever increasing fuel price at that time. Therefore as late harvesters, they were severely affected by this price hike; increasing more than two folds under the cost of fuel than at Ambalantota division. The hired labor and machinery cost was also increased under this background with 41% of mechanical harvesting and 51% of manual harvesting in this AgS division. As the households at Lunama division were used to practice significantly higher manual harvesting, normally it creates an increased average hired labor cost in this division. Within this background, the gross margin was higher among the households at Ambalantota than the households at Lunama division. Comparatively it was higher among the owner farmers than the tenants or leased.

Table 6.3: Comparison of gross margin between two AgS divisions in yala season

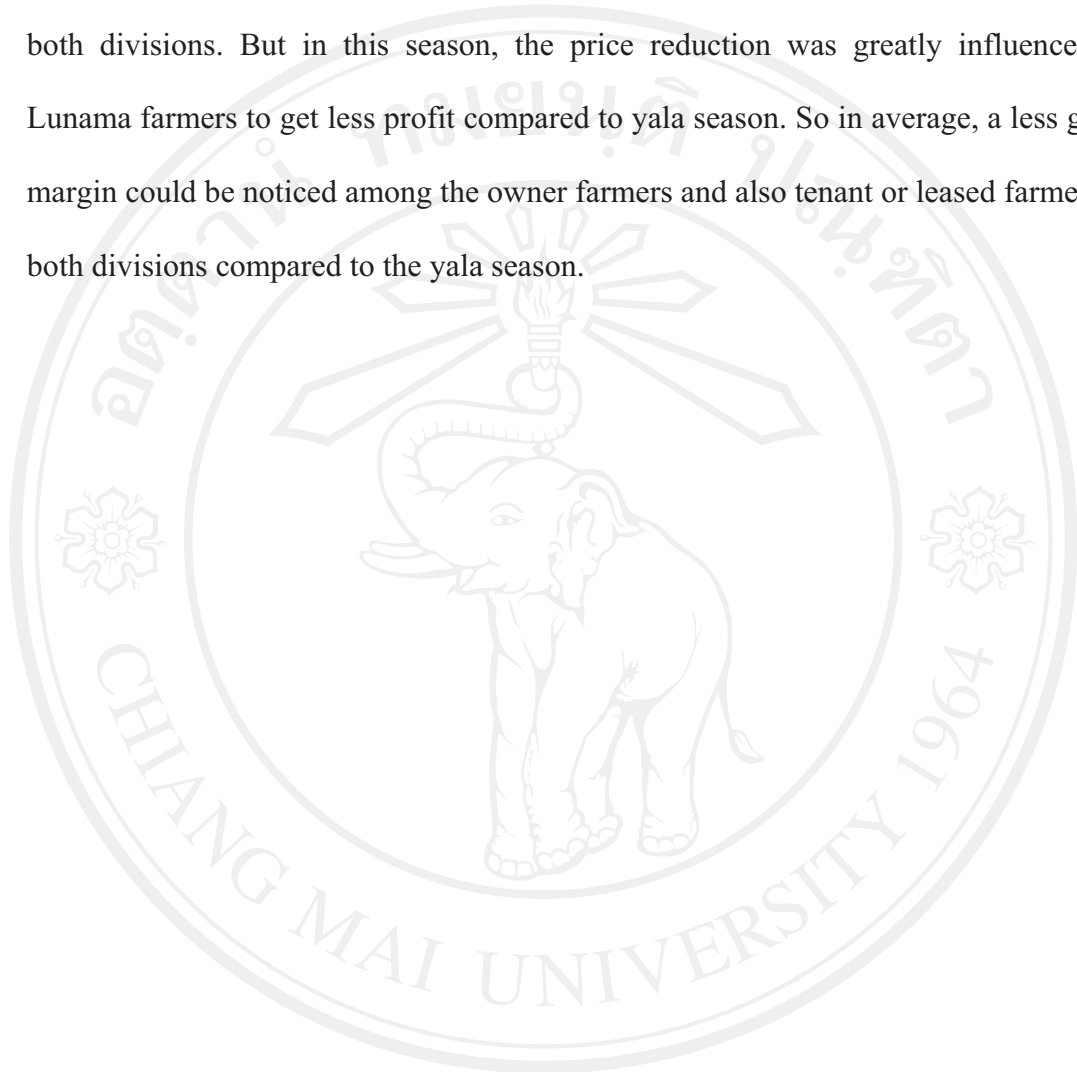
Budget item (Rupees/Acre)	Ambalantota (N=51)	Lunama (N=49)	Average (N=100)
Average yield (Kg/Acre)	2,414	2,170	2,301
Average price of paddy (Rupees/Kg)	30.32	28.64	29.44
Total Revenue (Rupees/Acre)	73,192	62,149	67,741
Total input cost (Rupees/Acre)	10,007	14,601	12,233
Labor and machinery cost	17,604	19,302	18,462
Operating cost -owners	27,611	33,903	30,695
Interest for working capital	506	622	563
Total variable cost for owner farmers	28,117	34,525	31,258
Gross Margin–owners ExFL	45,075	27,624	36,483
Opportunity cost of family labor	2,417	2,386	2,400
Gross Margin–owners InFL	42,658	25,238	34,083
Rental for the land owners	15,263	15,391	15,319
Operating cost– tenants/leased	42,874	49,294	46,014
Interest for working capital	786	904	844
Total variable cost for tenants/leased	43,660	50,198	46,858
Gross margin– tenants/leased ExFL	29,532	11,951	20,883
Opportunity cost of family labor	1,561	2,075	1,810
Gross margin– tenants/leased InFL	27,971	9,876	19,073

Note: ExFL- Excluding family labor, InFL- Including family labor,

Cost of hired labor –700 Rs/man day, Interest rate - 5.5% annually,

Exchange rate – Rs: 114 = 1 US\$ (May, 2009)

With the escalation of fuel prices, the same condition could be noticed also in 2008/2009 maha season. Reduction of the average price was a common situation in both divisions. But in this season, the price reduction was greatly influenced to Lunama farmers to get less profit compared to yala season. So in average, a less gross margin could be noticed among the owner farmers and also tenant or leased farmers in both divisions compared to the yala season.



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Table 6.4: Comparison of gross margin between two AgS divisions in maha season

Budget item (Rupees/Acre)	Ambalantota (N=51)	Lunama (N=49)	Average (N=100)
Average yield (Kg/Acre)	2,387	2,178	2,295
Average price of paddy (Rupees/Kg)	29.98	26.03	28.13
Total Revenue (Rupees/Acre)	71,562	56,693	64,558
Total input cost (Rupees/Acre)	10,425	14,505	12,565
Labor and machinery cost	16,954	19,294	18,101
Operating cost - owners	27,379	33,799	30,666
Interest for working capital	502	620	562
Total variable cost for owner farmers	27,881	34,019	31,228
Gross Margin–owners ExFL	43,681	22,674	33,330
Opportunity cost of family labor	2,248	2,386	2,321
Gross Margin–owners InFL	41,433	20,288	31,009
Rental for the land owners	15,676	13,385	14,670
Operating cost– tenants/leased	43,055	47,184	45,336
Interest for working capital	789	865	831
Total variable cost for tenants/leased	43,844	48,049	46,176
Gross margin– tenants/leased ExFL	27,718	8,644	18,382
Opportunity cost of family labor	1,717	2,073	1,845
Gross margin– tenants/leased InFL	26,001	6,571	16,537

Note: ExFL- Excluding family labor, InFL- Including family labor,

Cost of hired labor – 700 Rs/man day, Interest rate - 5.5% annually,

Exchange rate – Rs: 114 = 1 US\$ (May, 2009)

6.3 Gross margin analysis of INM adopters and non adopters

Average yield of paddy with relevant to INM adoption was computed in order to find the effect of INM adoption on their profitability. Table 6.5 shows the average yield of INM adopters and non adopters in two divisions studied. It showed a significant difference of the average yield of paddy in two study areas. The average yield at Ambalantota division (2,387 Kg/Acre) was significantly higher than the average yield at Lunama division (2,179 Kg/Acre) at 5% level of significance. Meantime it also reveals that the average paddy yield among the INM adopters (2,314 Kg/Acre) was also significantly higher than the average yield of non INM adopters (2,130 Kg/Acre) in study area at 5% level of significance.

Table 6.5: Average paddy yield of INM adopters and non adopters in maha season

AgS division	INM Adoption	Mean(Kg/Acre)	Std. Deviation	N
Lunama	Non adopter	2093.42	382.589	12
	Adopter	2206.40	560.653	37
	Average	2178.73 ^a	521.251	49
Ambalantota	Non adopter	2241.67	626.941	4
	Adopter	2398.89	587.061	47
	Average	2386.56 ^a	585.214	51
Average	Non adopter	2130.48 ^b	436.289	16
	Adopter	2314.10 ^b	580.159	84
	Average	2284.72	561.787	100

Note: a, b significant at 5% level of significance.

Gross margin analysis was undertaken for the purpose to get an idea on profitability with regards to INM adoption in both divisions, according to the survey data of maha season (Tables 6.6 and 6.7); and it is clearly demonstrated in Figure 6.7.

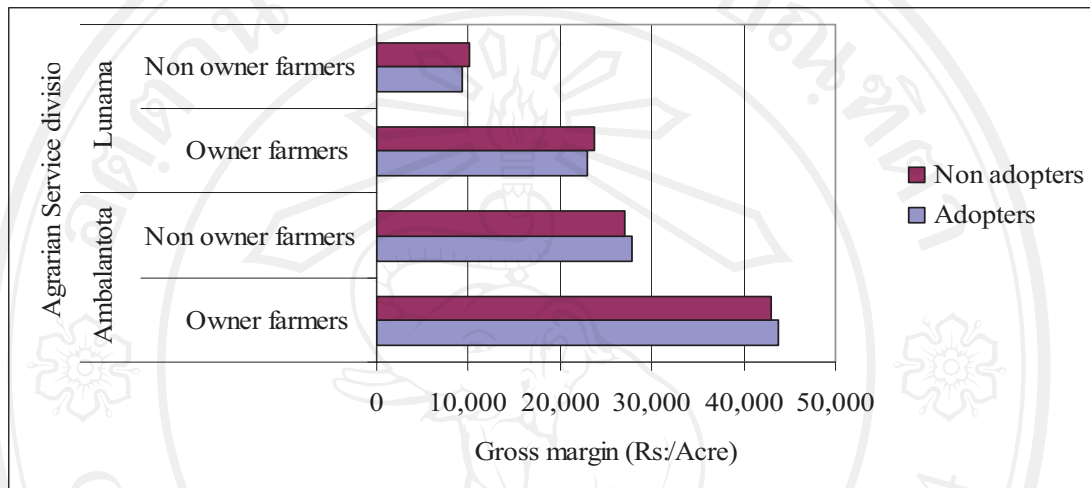


Figure 6.7: Gross margin of INM adopters and non adopters in two AgS divisions

INM adopters in Ambalantota AgS division were able to gain a higher average yield than the non adopters. As there is no price differentiation of paddy with regards to INM adoption; the price was taken as the average farm gate price. Based on the higher average yield, adopters were able to gain higher total revenue than the non adopters. The average difference of total revenue between two groups was 4,707 Rs/Acre. But the average difference of gross margin between these two groups was reduced drastically as the adopters had to bear increased operating cost than the non adopters. This increased cost was created by purchasing organic materials and fuel for transportation and application of those organic materials. So it made to lower the difference of gross margin between the adopters and non adopters in this studied division.

Table 6.6: Gross margin of INM adopters and non adopters in Ambalantota

Budget item (Rupees/Acre)	Adopters (N=47)	Non adopters (N=04)
Average yield (Kg/Acre)	2,399	2,242
Average price of paddy (Rupees/Kg)	29.98	29.98
Total Revenue (Rupees/Acre)	71,922	67,215
Total input cost (Rupees/Acre)	10,496	8,563
Labor and machinery cost	17,104	15,197
Operating cost - owners	27,600	23,760
Interest for working capital	506	436
Total variable cost for owner farmers	28,106	24,196
Gross Margin–owners ExFL	43,816	43,019
Opportunity cost of family labor - owners	2,157	2,940
Gross Margin–owners InFL	41,659	40,079
Rental for the land owners	15,676	15,676
Operating cost– tenants/leased	43,276	39,436
Interest for working capital	793	723
Total variable cost for tenants/leased	44,069	40,159
Gross margin– tenants/leased ExFL	27,853	27,056
Opportunity cost of family labor –tenants/leased	1,458	2,800
Gross margin– tenants/leased InFL	26,395	24,256

Note: ExFL- Excluding family labor, InFL- Including family labor,

Cost of hired labor – 700 Rs/man day, Interest rate - 5.5% annually,

Exchange rate – Rs: 114 = 1 US\$ (May, 2009)

INM adopters in Lunama AgS division gained higher average yield than the non adopters same as with Ambalantota AgS division. Price also taken as the average farm gate price, as there is no price differentiation between these two groups. Even though the adopters in Lunama were able to gain higher total revenue than the non adopters; they were unable to gain a higher gross margin. This occurred due to high market prices for purchased organic materials and fuel for transportation and application process of those organic materials to their fields. As INM adopters in Lunama division gained less profit than the non adopters, it can be concluded that the adoption measures should be accompanied with least cost organic fertilizer application technologies such as mechanical harvesting compared to manual harvesting in rice straw application.

Table 6.7: Gross margin of INM adopters and non adopters in Lunama

Budget item (Rupees/Acre)	Adopters (N=37)	Non adopters (N=12)
Average yield (Kg/Acre)	2,206	2,093
Average price of paddy (Rupees/Kg)	26.03	26.03
Total Revenue (Rupees/Acre)	57,422	54,481
Total input cost (Rupees/Acre)	14,688	10,607
Labor and machinery cost	19,193	19,607
Operating cost - owners	33,881	30,214
Interest for working capital	621	554
Total variable cost for owner farmers	34,502	30,768
Gross Margin–owners ExFL	22,920	23,713
Opportunity cost of family labor – owners	2,773	929
Gross Margin–owners InFL	20,147	22,784
Rental for the land owners	13,385	13,385
Operating cost– tenants/leased	47,216	43,599
Interest for working capital	866	799
Total variable cost	48,082	44,398
Gross margin– tenants/leased ExFL	9,340	10,083
Opportunity cost of family labor –tenants/leased	2,410	975
Gross margin– tenants/leased InFL	6,930	9,108

Note: ExFL- Excluding family labor, InFL- Including family labor,

Cost of hired labor – 700 Rs/man day, Interest rate - 5.5% annually

Table 6.8: Gross margin of an INM adopter and non adopter in study area

Budget item (Rupees/Acre)	Adopter (N=84)	Non adopter (N=16)
Average yield (Kg/Acre)	2,314	2,130
Average price of paddy (Rupees/Kg)	28.13	28.13
Total Revenue (Rupees/Acre)	65,093	59,917
Total input cost (Rupees/Acre)	12,592	10,126
Labor and machinery cost	18,024	18,505
Operating cost - owners	30,616	28,631
Interest for working capital	561	525
Total variable cost for owner farmers	31,177	29,156
Gross Margin-owners ExFL	33,916	30,761
Opportunity cost of family labor-owners	2,472	1,479
Gross Margin-owners InFL	31,444	29,282
Rental for the land owners	14,670	14,670
Operating cost-tenant / leased	45,286	43,301
Interest for working capital	830	794
Total variable cost for tenant / leased farmers	46,116	44,095
Gross margin-tenant /leased ExFL	18,977	15,822
Opportunity cost of family labor-tenant /leased	1,900	1,583
Gross margin-tenant /leased InFL	17,077	14,239

Note: ExFL& InFL - excluding and including family labor respectively,

Interest rate – 5.5% annually

Further analysis was conducted in order to get an idea on the profitability of an INM adopter and non adopter in study area.

The results in Table 6.8 clearly show that, average yield of an INM adopter was higher than that of non adopter in study area. With this comparatively higher yield, they were able to gain higher total revenue than the non INM adopters. Even though they had to bear an extra cost for purchasing and applying organic fertilizers; they were able to maintain higher gross margin due to this yield increment. But still it seems to be far away from the potential yield. However, this situation can be improved by following the departmental recommendations for organic fertilizer application. Survey data revealed that besides rice straw, application of recommended rate of organic fertilizers was very low among the majority of adopters. Even though they have some limitations with regards to farm yard manure, they can easily adopt to apply the recommended rate of paddy husk charcoal and with some attempt to apply the required amount of green manure. With this, the chance to achieve the potential yield will be increased. Even though this economic incentive to adopt INM practices seems to be low; if they try to achieve the potential yields of newly improved varieties which they are cultivating at present through following departmental recommendations, this situation can be easily improved.

Besides this, their concentration on the environmental benefits they can gain through this adoption practices; not only for the long term soil fertility improvement, but also for minimizing the environmental pollution is much important. Because at present some irrigated systems in the island are greatly affected by water pollution with the increased use of agro chemicals. Therefore these factors can be considered as the driving forces to intensify the households to adopt INM practices in rice sector.

6.4 Gross margin of paddy production at the absence of chemical fertilizers

subsidy

It was clear that, under the subsidy for chemical fertilizers, paddy farmers under each category (owners, non owners, adopters, non adopters) in both AgS divisions were profitable in two cropping seasons. But gross margin analysis was conducted again to get an idea about the profitability of paddy production at the absence of chemical fertilizer subsidy; with a view of INM adoption in study area. It was assumed that even without the subsidy, paddy farmers will be able to follow the rates of chemical fertilizer recommendations and able to achieve the same level of yield, while the other costs and price of the output keeping unchanged.

As a result, the total revenue also will keep unchanged. But the total input cost may increase by 19,074 Rs/Acre according to the market prices of three chemical fertilizers Urea, TSP and MOP. Therefore it creates an increased operating cost for paddy production. But according to the picture emerges through the above analysis reveals that, even without the subsidy owner farmers adopted in INM practices would yield higher profits compared to non adopters. But under such condition, even though the non owner farmers (tenants or leased) may not be profitable; tenant or leased INM adopters seem to be having less vulnerability to loose their profits than tenant or leased non INM adopters. Evidence from this study shows that, economically feasible INM adoption may be a key contributor to gain higher profitability at a non subsidized environment. Table 6.9 gives details of the computation on the above explanation and it is clearly demonstrated in figure 6.8.

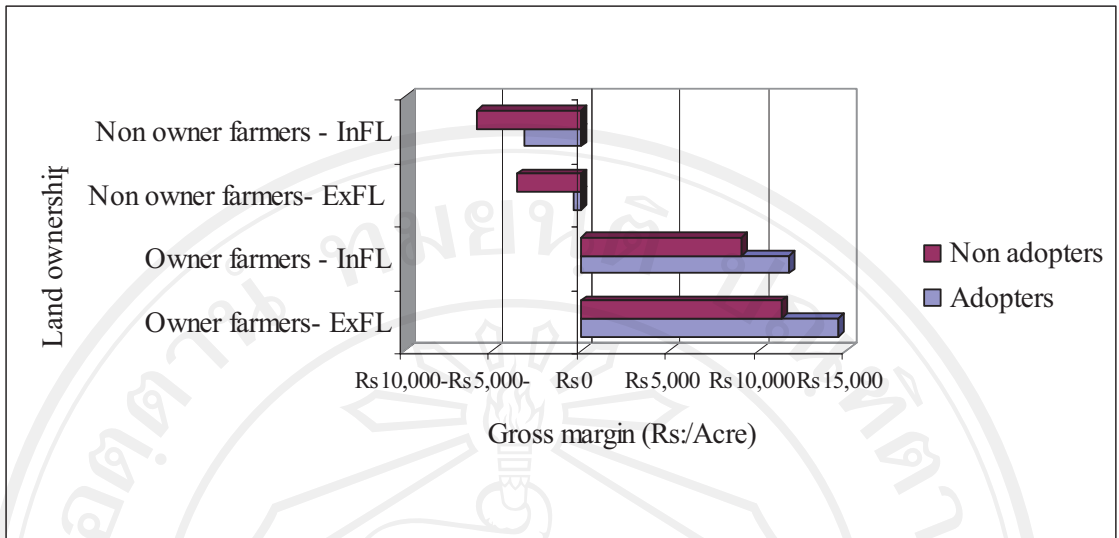


Figure 6.8: Gross margin without subsidy for chemical fertilizers with related to INM adoption

Table 6.9: Gross margin with related to INM adoption (without fertilizer subsidy)

Budget item (Rupees/Acre)	Adopter	Non adopter
Average yield (Kg/Acre)	2,314	2,130
Average price of paddy (Rupees/Kg)	28.13	28.13
Total Revenue (Rupees/Acre)	65,093	59,917
Total input cost (Rupees/Acre)	31,666	29,200
Labor and machinery cost	18,024	18,505
Operating cost - owners	49,690	47,705
Interest for working capital	911	875
Total variable cost for owner farmers	50,601	48,580
Gross Margin–owners ExFL	14,492	11,337
Opportunity cost of family labor–owners	2,472	1,479
Gross Margin–owners InFL	12,020	9,858
Rental for the land owners	14,670	14,670
Operating cost–tenant / leased	64,360	62,375
Interest for working capital	1,180	1,144
Total variable cost for tenant / leased farmers	65,540	63,519
Gross margin–tenant /leased ExFL	-447	-3,602
Opportunity cost of family labor–tenant /leased	1,900	1,583
Gross margin–tenant /leased InFL	-2,347	-5,185

Note: ExFL-Excluding family labor, InFL-Including family labor,

Rs: 84, 127, 123/Kg of urea, TSP and MOP respectively according to the open market prices at the time of survey, Interest rate - 5.5% annually

6.5 Summary of the chapter

The average cost of paddy production ranged between 11.40 Rs:/Kg and 14.90 Rs:/Kg in study area. This is constituted by 40% of the total input cost and 60% of the hired labor and machinery cost. Compared to the surveyed households at Lunama, a lower cost of production could be observed in Ambalantota AgS division. As a result of comparatively higher yield and price, gross margin among the households at Ambalantota AgS division was higher than that of Lunama AgS division. Owner households were able to gain the highest gross margin in both seasons at both divisions. The average gross margin of an owner household in study area was 36,575 and 33,330 Rupees per acre excluding the opportunity cost of family labor in yala and maha seasons respectively. With regards to INM adoption; it was 33,916 and 30,761 Rupees per acre respectively for an owner adopter and non adopter excluding the opportunity cost of family labor in study area. Without subsidy for chemical fertilizers; tenant or leased households showed a risk of losing profits. Even though both adopters and non adopters yield negative gross margin, INM adopters showed a less loss than the non INM adopters. Especially tenant households at Lunama AgS division may highly be affected with this situation.