

CHAPTER IV

RESULTS OF FIELD SURVEY

4.1 The major uses of mangoes and reasons for their growing in the Chom Tong Land Reform area

Thirty-eight mango growers at the Chom Tong Land Reform area were interviewed by using a questionnaire. The results of study revealed that the main purpose of growing mangoes by farmers was for selling, household consumption and other uses in the proportion of 73.6%, 13.2% and 13.2% respectively (Figure 4.1). Likewise, the reasons for the adoption of mango as principal fruit crop in the area were found to be associated with the attributes like easy growing (38.2%), remunerative income (29.1%), adaptation to low input management (18.2%) and drought tolerance (14.5%) (Figure 4.2). The mango growers preferred to grow mangoes with other fruit trees such as longan (62.1%), guava (3.5%), rose apple (6.9%), and coconut (6.9%). In addition, about 3.5% of the mango growers had planted some jackfruit, grape, tamarind, santol, langsats and teak trees in the mango orchards. Mostly, longan and jackfruit were simultaneously grown between mango alleys with other annual crops such as soybean and chili; while there were teak trees planted around fruit orchards for windbreaks. Like in low land areas, longan plantation in rainfed upland has been increasingly expanded because it has produced better income than other crops. However, the longan quality in this area seems lower compared with low land areas because water deficiency affects the fruits setting of longan during dry season.

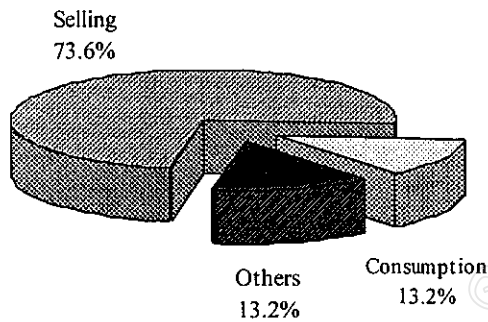


Figure 4.1 The major uses of mangoes grown in the Chom Tong Land Reform area, 2000 (Source: survey, 2000)

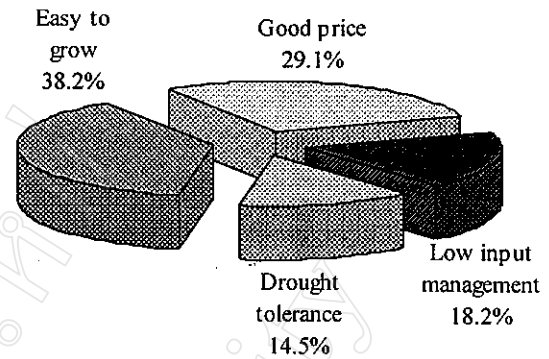


Figure 4.2 Reasons for mango growing in the Chom Tong Land Reform area, 2000 (Source: survey, 2000)

4.2 The problems and constraints of farmer's practices in mango orchard

The crucial constraints of mango growers for planting mangoes in rainfed upland area were ranked in the scale of 1 to 5 (high = 1 to low = 5) in the light of their significant levels, harmful levels and occurring frequency, which are illustrated in Table 4.1. It appeared that the highest significant problem was water deficiency followed in the order by weed interference, fire hazard and insect disturbances. The negative effects of water deficiency and weed interference were more pronounced. In addition, the occurrence of water deficiency problem was often found in mango orchards. However, there was a medium obstacle of plant diseases. The frequency of occurrence of storms and their injury to the mango trees was relatively low.

According to the information provided by mango growers, it was found that the lack of water was the most important limiting factor in the successful planting of fruit trees in rainfed upland areas during dry season. The insufficient moisture in the soil was found to impair growth of mangoes. Symptoms of moisture stress commonly noticed in the mango plantations include yellowing and wilting of foliage, leaf fall, desiccation of shoots, and death of young fruit trees in severe cases. Likewise, the problem of weed interference was relatively high as some weeds surpassed the growth

of young fruit trees and covered their alleys. The weeds often became the habitat of rats and insects. Reportedly, the desiccated biomass of weeds becomes the potential source of fire, which often devastates the fruit orchards during dry season. Furthermore, the disturbing effect of woodworms (*Ploecaderus ferrugineus*) was injuries to stems when the worms penetrated into the branches of fruit trees. Severe infestation of these worms led to the death of mango trees. The effects of lehierry (*Idioscopus clypealis*) and *I. niveosparus* on mango leaves were curled and riddle as well as leafed edge dried. Consequently, the trees became devitalized and less productive. The reaction of plant diseases on mango trees were a rubble flowing, leaf curl, leaf spot, fruit rot and fallen fruits. The storm damage was relatively low and the results were bending and falling of branches.

Table 4.1 Significant level of problems, damaging level and percentage of frequency of occurrence of farmer's practices in their mango orchards

Constraints	Significant levels of problems	Harmful levels	Occurring frequency
Water deficiency	1	2	1
Weed interference	2	2	2
Insect disturbance	2	3	2
Fire hazard	2	3	3
Plant diseases	3	3	3
Storm	4	4	4

Source: survey, 2000

1 =high, 2=relatively high, 3=medium, 4=relatively low and 5=low

4.3 Weed management in mango orchards

About 94.7% of farmers accounted for broadleaved and grass weeds as a major impediment between mango allays, especially when mango trees were one to two years old. Only 5.3% of farmers recorded that weeds were the problem in mango

orchards after 5 years of plantation (Table 4.2). The greatest requirement for weed controls was to diminish competition with mango growth. The weeding practices of the farmers in rainfed upland area involved cultural measures, cutting with machines, tillage and herbicide applications. These techniques were practiced between mango alleys. About 52.1% of mango growers were keen to use the cultural weeding practice involving intercropping (37.0%) and tillage (15.1%). Intercropping was the most favorable cultural practice in the sense that farmers could grow additional cash crops like soybean, mungbean, African marigold and French marigold. Mechanical practice (cutting machines) was the second preference of mango growers, which accounted for 24.7%. However, 12.2% of the farmers were using manual practice such as slash, cutting with knife and pulling. Having adopted by only 11.0% of the farmers, the chemical weed control was less common practice, which depended on the serious interference of weeds.

The preference of different weeding practices varied among mango growers in the rainfed upland area. About 52.6% of farmers often preferred weeding by cutting with machine due to low cost management, convenience and rapid performance. In this circumstance, weed residues were either carried to feed the cattle or put onto mango basement as mulch which after decay became organic matter. However, in the later practice, there is risk of fire since the heaps of weeds can catch fire easily in dry season. Tillage was also preferred by 21.1% of farmers for weed suppression. It was found to be a convenient practice. In addition, weeds were gotten rid off by turning them into the soil through tillage. About 15.8% of farmers showed inclination towards cultural practice due to its convenience and suitability in small areas. The use of herbicide received the preference of 10.5% of farmers by virtue of time and money saving, and effectiveness against serious interference of weeds.

Table 4.2 Weed management of mango growers in rainfed upland area

Topic	Percentage (%)
Weed interference during mango growing	
• 1-2 years	94.7
• > 5 years	5.3
Weeding approaches in farmers' mango orchards	
• Cultural practices	
• Intercropping,	37.0
• Tillage	15.1
• Mechanical practices (cutting machine)	24.7
• Chemical practices (herbicide applications)	11.0
• Manual practices (pull, slash and cutting)	12.2
The appropriate weeding practices in mango orchards	
• Mechanical practices (cutting machine)	52.6
• Cultural practices (tillage, intercropping)	21.1
• Manual practices (pull, cutting knife)	15.8
• Chemical practices (herbicide applications)	10.5
Weeding methods desired to use (have not been done)	
• Cultural practices	
• Tillage	10.5
• Cover crops	5.3
• Chemical practices (herbicide applications)	7.9
• Mechanical practices (cutting machine)	2.6
• All practices had been used	73.7

Source: survey, 2000

Some weed management practices such as tillage, cover crops, herbicide applications and manual weeding were found to be complementary practices for the

mango growers. Majority (73.7%) of the mango growers had judiciously practised almost all methods of weeding in their mango orchards. In contrast, some farmers were found to have picked out single or a couple of weeding practices. Having practised by 10.5% of the farmers, tillage appeared as the most preferred method in the long term weed management strategy with the advantages of good soil tilth, less labor requirement, enrichment of organic matter by incorporating weeds into the soil and compatibility for growing cash crops between mango alleys. Only 5.3% of farmers wanted to plant cover crops after getting knowledge from the Agricultural Organization that cover cropping involves low cost management, augmentation in soil fertility, protection from soil erosion and effective weed control. Notably 7.9% of farmers opted to the chemical applications because of its persistence in weed control, time and labor saving, ease in weed removal. Only 2.6% of them preferred manual practices such as slash and pullout. Cost involved in, and advantage and disadvantage of different practices of weed management are presented in Table 4.3.

Table 4.3 Mango growers' knowledge and perceptions in different weeding practices, advantages and disadvantages, and cost involved

Practices	Average cost	Advantage	Disadvantage
• Cultural (intercropping)	Depend on crops	Weeds were suppressed, soil was well prepared for next cropping	Habitats of insects, rats, worms and aphids, difficult tillage, reduction in crop yields and growing area
• Tillage.	320 bath/rai	Weeds turned into soils as well as tillage	High input practice, difficult doing in small areas, soil erosion

Source: survey, 2000

Table 4.3 (cont.)

Practices	Average cost	Advantage	Disadvantage
• Mowing-machine (Cutting machine)	300 bath/rai	Convenience and rapid practice, money and time saving	Hard doing in rough surface (rock or stone) and tall weeds, weed residue remains in fields (wasted time to take them out)
• Manual (slash and pulling)	384 bath/rai	Fit in small areas, money saving, weed residues can be manure farmyard, absolute death of weeds, no effect on main plants	Many labor using, long time practice and tired
• Chemical (herbicide applications)	300 bath/rai	Time and money saving, complete death of weeds	Burning of mango leaves, dangerous for health, an expensive herbicide, dry weeds become source of fire

Source: survey, 2000

About 42.1% of the mango growers had experiences of fire hazard in their mango orchards. Of them, 56.2% mentioned that damaging levels of fire hazard was moderate. Mostly weed residues inside their orchards caused the occurrence of fire during dry season, and only 6.2% of the fire cases were due to transmission from neighboring orchards. Thus, in the past decade, fire problems were solved through the management of weeds by tillage (37.5%), cutting with machine (37.5%), herbicide applications (12.5%) and other cultural practices (12.5%), which are illustrated in the

Table 4.4. However, the current weeding practice seemed to have relied heavily on mechanical methods (50%), while tillage, other cultural practices and herbicide applications were done by only 31.3%, 12.5% and 6.2% of the mango growers respectively.

Table 4.4 Farmer practices of fire protection in mango orchards in rainfed upland area

Topic	Percentage (%)
Experience of fire hazard damaged in mango orchards	
• Yes	42.1
• No	57.9
Levels of fire hazard on mango orchards	
• High	18.8
• Moderate	56.2
• Low	25.0
The occurrence of fire caused by	
• Weed residues inside the orchards	93.8
• Neighboring orchards	6.2
Farmer practices of fire protection in the past	
• Cultural practices	
• Tillage	37.5
• Other cultural practices	12.5
• Mechanical practices (cutting machine)	37.5
• Chemical practice (herbicide applications)	12.5
Farmer practices of fire protection at present	
• Cultural practices	
• Tillage	31.3
• Other cultural practices	12.5
• Mechanical practices (cutting machine)	50.0
• Chemical practice (herbicide applications)	6.2

Source: survey, 2000

4.4 Cattle feed

Only half (52.6%) of the mango growers in rainfed upland held cattle in their farms during the past ten years (Table 4.5). However, recent study revealed that only 23.7% of mango growers were continuously raising cows in their farms. Nearly half of the farmers (44.8%) had not been raising cattle for last decade because of lack of money and grazing areas. Remarkably, 76.3% of mango farmers discontinued raising the cattle because of lack of grazing facility, lack of money and labor shortage due to the tendency of young generation getting employed in off-farm jobs in the cities. In addition, cattle were also replaced by tractors for draught purpose. However, 52.4% of them desired to raise cattle in the future if money and grazing areas are available as well as they are supported by any government organizations. Natural vegetations (66.7%), rice straw (24.2%) and legume crop residues (9.1%) constituted the major feedstuff for cattle. The dominance of different roughage feed varied with the season. For instance, natural grasses became the major roughage feed for cattle during wet season. In contrast, rice straws were fed during dry season which is lean period of green fodder availability. Legume crop residues were also used as fodder because they were locally available in low cost.

About 40.9% of farmers mentioned the insufficiency of forage for cattle during December through April due to the drought, which caused natural grasses no longer available for the cattle. Thus, their cattle must be fed by using the stored fodder such as rice straws and soybean residue.

Table 4.5 Animal raising by mango growers in rainfed upland area

Topic	Percentage (%)
Kinds of animal raising by farmers for the past decade	
• Cattle	52.6
• Buffalo	2.6
• No animal raising	44.8
Animal raising at present	
• Cattle	23.7
• No cattle	76.3
Future prospect for cattle raising	
• Yes	52.4
• No	33.3
• Not sure	14.3
Major feedstuff for cattle	
• Natural grasses	66.7
• Rice straw	24.2
• Legume crops	9.1
Sufficiency of feedstuff	
• Yes	59.1
• No	40.9

Source: survey, 2000

4.5 Legume cover crops

Perception of mango growers on legume cover crops in rainfed upland area was illustrated in Table 4.6. Among thirty-eight mango growers, only 13.2% were familiar with the cover crops such as Verano stylo, soybean and sorghum; 39.5% of farmers knew a feed (not natural vegetation) for cattle such as Verano stylo, maize, soybean, rice straws and sorghum; 81.6% of them were familiar with Verano stylo through field experiment of Faculty of Agriculture, Chiang Mai University; and 60.5% of them have seen Townsville stylo at roadside and their orchards in rainfed

area. Moreover, some mango growers understood the functions of Verano stylo. Half of them knew that decomposition of Verano stylo help to enrich the soil. The fertile soil was recognized by having a black color and moisture. These functions were perceived from the local agricultural extension. Similarly, 34.2% of them knew that Verano stylo was palatable and highly nutritious. Hay from this legume cover crop can replace some rice straws and natural feeds, which were scarcely found during dry season.

Table 4.6 Farmers' knowledge on cover crops and contribution

Topic	Percentage (%)		
	Yes	No	Not sure
• "Cover crops" were known to the farmers	13.2	86.8	-
• "Feeds (not natural vegetation)" were known to the farmers	39.5	60.5	-
• Verano stylo have been seen	81.6	18.4	-
• Townsville stylo have been seen	60.5	39.5	-
• Verano stylo enrich soil fertility	50.0	50.0	-
• Verano stylo is highly palatable and nutritious and can replace the native forage during dry season	34.2	65.8	-
• Verano stylo able to use a cover crop to suppress weeds in mango orchards	57.9	42.1	-
• Verano stylo able to use as green strip crops for fire protection during dry season	44.7	55.3	-
• Verano stylo being perennial crops with no tillage, can protect soil from erosion	50.0	50.0	-
• Growing legume cover crop i.e. <i>S. hamata</i> in mango orchards is acceptable	76.3	18.4	5.3
• Expecting to grow <i>S. hamata</i> in mango grower orchards	50.0	44.7	5.3

Source: survey, 2000

About 57.9% of the mango growers noted that cover crop was able to suppress most weeds in mango orchards with a few exceptions. While 44.7% of them observed that ground coverage with a very short green stem of cover crop with no dry weeds in the field can reduce fire hazard during the dry season. In addition, half of them seemed to understand that the Verano stylo was a perennial crop; as such, tillage was no longer needed after establishment in the first years. They added that it reduced cost and protected soil erosion. About 76.3% of them were likely to accept *S. hamata* as a legume cover crop for its multiple advantages in mango orchard. Only 5.3% of them did not decide to plant *S. hamata* due to informative insufficiency.

The explanation of the 44.7% of mango growers who showed reluctance to grow Verano stylo included: cash crops as the better alternatives for growing between mango alleys, budget deficiency, lack of Verano stylo information, difficult to harvest and labor shortage in the proportion of 13.2%, 13.2%, 7.9%, 5.3%, 2.6% and 2.6% respectively.

4.6 Farmer's perceptions of intercropping *Stylosanthes hamata*

The farmer's perceptions of *S. hamata* intercropping in rainfed upland area is shown in the Table 4.7. It was found that 50.0% of them expected to grow Verano stylo in their orchards. About 38.1% of the growers intended to help *S. hamata* establishment by cutting weeds. Nevertheless, 61.9% of them defied the need of helping Verano stylo establishments since it was believed that Verano stylo was a drought tolerant species with good weed compatibility. About 33.3% of those who wanted to grow Verano stylo expressed that they would apply fertilizer by broadcasting while 66.7% would do nothing. However, 76.2% of them preferred to harvest Verano stylo twice a year while one and three harvesting were favoured by 19.0% and 4.8% respectively.

Table 4.7 Farmers' perceptions of *S. hamata* intercropping in rainfed upland area

Topic	Percentage (%)
Will you help <i>S. hamata</i> establishment during rainy season?	
• Yes	38.1
• No	61.9
Will you apply fertilizer?	
• Yes	33.3
• No	66.7
How often will you cut <i>S. hamata</i> and carry to the cattle?	
• One time	19.0
• Two times	76.2
• Three times	4.8

Source: survey, 2000