CHAPTER V

ANALYSIS OF FODDER TREES ADOPTION

This chapter explains much about the analysis of fodder trees adoption especially, adoption performance and determinants of fodder trees adoption are discussed here. The latter was analyzed by employing Logit model with Maximum Likelihood technique. While the former including the farmers' perception about the sapling distribution program, constraints and possibility of improvement of fodder problem were interpreted by using simple statistical tool like, index, score, percentage, mean etc. The details are explained as follows:

5.1 Adoption Performance Measurement

Assessment of adoption performance was carried out in order to understand the extent (degree) of adoption as well as the effect of fodder trees adoption to the households of the study sites. The former was computed in index form by the two major expressions; FAI (Farm Adoption Index) and AAI (Activity Adoption Index). The later whereas was expressed in percentages and number.

5.1.1 Extent of Adoption

The degree or extent of adoption was assessed from the spread

of plantation among the farmers of research sites or proportion of plantation (supply) with the proportion of requirement (demand) for each household of research sites. The former was expressed as FAI (Table 34) whereas the later in AAI (Table 35). Both the indexes were calculated in percentage form.

Table 34 Measurement of Farm Adoption Index (FAI)

VDC	Nursery	Non-Adopters no.	FAI no.	(N=54) %
VDC F	Yes	31	23	42.6
VDC K	No	40	14	25.9
VDC M	Yes	11	43	79.6
VDC R	No	44	10	22.7
Total 216		126	90	41.7

Source: Survey,1993.
Note: FAI = [(Adopters No.)/Total]*100

A look at the Table 34 illustrates, an overall 41.7% of FAI with highest in VDC M (79.6%) followed by VDC F (42.6%), K (25.9%) and the least in VDC R (22.7%). The variation in the percentage among the VDCs' shows positive relationship of adoption with the nursery establishment.

The plantation or adoption of fodder tree also depends upon the requirements or in other words "Needs" for each household. Hence, evaluation of AAI was done by using demand and supply terminology. Demand (required) here refers to the number of fodder trees actually required for the total number of ruminants raised. Supply in other hand is the number of planted trees that is available to ruminants in each household.

The calculation is done as analytical methodology applied by Leutel (1991), given in Appendix 5. The term "Actually" is used to distinguish from the total i.e (actual planted+natural grown). Because natural grown fodder trees also supplement fodder for livestock.

As visible from Table 35, apart from VDC M (391%), the estimated results of the AAI of other VDCs are very low (<20%). Inclusion of VDC M, in overall only 21.5% of shortage of tree fodder was observed and surplus in adopters by 73.1%. However, indeed there were a wide gap between demand and supply of tree fodder in other VDCs even among the adopters. The obtained results reflect the influence of nursery in the adoption performance.

Table 35 Adoption Activity Index

VDC	Adopters no.	Total Tree no.	APLT no.	TREQT no.	AREQT no.	AAI %
VDC F	23	820	716	3,922	3,818	18.75
VDC K	14	321	178	1,256	1,113	15.99
VDC M	43	19,422	17,395	6,476	4,449	390.98
VDC R	10	188	145	1,310	1,267	11.44
Subtotal	90	20,751	18,434	12,964	10,647	173.1
Total	216	22,015	18,434	26,957	23,376	78.85

Source: Survey, 1993.
Note:
APLT = Actual Planted Fodder Tree
TREQT= Total Required Fodder Tree
AREQT= Actual Required Fodder Tree (TREQT - Natural Grown Tree)
AAI = Adoption Activity Index (APLT/lu)/(AREQT/lu) =(APLT/AREQT)*100
Total Tree = Planted + Natural grown.

5.1.2 Effect of Adoption

Evaluation of changes that occurred in the farming system by the adoption of fodder trees is the other way to understand the adoption performance. Interview was carried out only with the farmers who grew the fodder trees on their farm land. Among the 90 adopters only 69 (76.7%) of them rejoined that changes has been remarked where as 14.4% reported no realization of such changes and 8.9% did not response anything (Table 36).

Table 36 Impacts on Farming System Response by Adopters (N = 90)

VDC	Farmers' Response					
	Yes		No		NR	
	no.	%	no.	%	no.	%
VDC F	19	82.6	1	4.3		13.1
VDC M	34	79.6	7	16.3	2	4.7
VDC K	10	71.5	4	28.6	-	-
VDC R	6	60.0	1	10.0	3	30.0
Total	69	76.7	13	14.4	8	0.9

Source: Survey,1993.
Note: NR = Not Response

The impact of adoption was reported in terms of changes that has been realized in livestock, crop and household sub-systems. The changes in livestock was assessed in number, types, breeds, milk production, fodder proportion and rearing system. Effect on production of crop and fodder collection time and feed expenses were estimated from crop and household sub-systems respectively (Table 37).

Table 37 Effect of Adoption Assessed by Adopters Number and Percentage of Change assessed in Livestock, Crop and Household Sub-Systems

Changes	VDC F		VDC M		VDC K		VDC R	
	Res. no.	change %	Res. no.	change %	Res. no.	change %	Res. no.	change %
A. Increase:								
Livestock Number	6	46.0	9	34.0	4	16.0	2	16.0
Milk Production	13	103.5	23	113.9	7	46.3	4	144.3
Crop Production	2	1.5	12	113.0	3	11.0	2	-
Fodder Proportion	8	16.3	10	68.1	-	-	1	13.3
Feed Expense	2	35.0	8	37.6	2	18.8	3	15.0
B. Decrease:								
Livestock Number	8	21.0	11	57.0	4	13.0	35	-
Crop Production	7	4.5	1	-	1	3.3	-	-
Fodder Collecting Time	16	56.9	24	68.7	4	57.0	4	63.3
C. Livestock types:								
Local-Improve (1)	5	-	9	-	3	-	3	-
Cattle-Buffalo (2)	2	-	4	-	-	-	2	-
Large-Small Ruminants	1	-	8	-	4	-	-	-
Both 1+2	3	-	3	-	-	-	-	-
D. Rearing System:								
Stall Feeding	14	77.8	13	81.2	7	72.7	3	66.7
Total Respondent	N=19		N=34		N=10		N=6	

Source: Survey, 1993.

As portrait in Table 37, the great impact was noticed in milk production which is more than 100% in all the VDCs except VDC K, where increment was observed only 46.2% responded by 77% of the total farmers of the 4 VDCs. The result obtained was quite relevant for the VDC K, where replacement was detected in livestock types mainly change of larger ruminants (bovine) to small ruminants (goat) rather than others. Similar in VDC R, however, the replacement was inspected in breed, local to improved especially in cows to buffaloes in VDC M and VDC F.

Majority of farmers reported decrease in livestock number ranging from 13 to 57%, while some of the farmers also mentioned increment from 16 to 46%, which is the highest in VDC F (46%). Inspite of increment of tree proportion in feed ration with an average of 27%, expenses on feed still found going up from 15-38%. Of all this, surprising percentage of crop production also responded in VDC M (113%). Contradictory to this negative impact was reported in VDC F and VDC K but in very low percentage (<5%).

A significant change was also mentioned in rearing system. At present, 67 to 81% of the sampled household adopted stall feeding system, consequently, more than 50% time saved was expressed by the respondents of all VDCs. This is because the plantation on private land caused farmers not to go for searching far-away and grazing of livestock, which could provide opportunity for other activities also. Thapa (1990) and Bajracharya (1993) have reported increment in school going percentage by the trees on farm land in eastern hills of Nepal. This shows that the adoption of fodder trees on farm land could bring both economic as well as social changes to rural society.

5.2 Relationship between Socio-economic factors and Adoption

The relationship between adoption and scio-economic factors are discussed descriptively as well as quantitatively (logit model).

5.2.1 Variables and their Measurement

Identification of the socio-economic factors (variables), that are more closely associated with farmers' decision making in fodder tree adoption is one of the major objectives of this study. As displayed in Chapter II (Figure 2) the variables employed are; Knowledge (Knds), Age, Education (Edu), Social participation (Socpat), Highest education (Hedu), Family size (Famsize), Private land size (Tpland), Total gross income (Totgrinc), Total number of natural grown fodder trees (Ngft), Extension contact (Ext) and distance to Forest (Fore), Nursery (Nur) and market (Mark). The dependent variables (adoption) is explained in binary form 1 (those who planted) and 0 (those who did not) as adopters and non-adopters respectively (details are discussed in Chapter II section 2.2).

The variables are subjected to a number of statistical tests both descriptive and quantitative. The former is applied for the comparison of adopters and non-adopters while, the later is selected as a tool for identifying the adoption determinants.

5.2.2 Descriptive Statistics Results

The descriptive statistics of adopters and non-adopters socio-economic characteristics are presented in Table 38. The difference in the characteristics of these two groups are tested by employing mean "t" test.

Table 38 Descriptive Statistics of the Variables and their Relationship with Adoption of Fodder Trees on Farm Land

Variable	Unit	Mean M1 (N=90)	Mean M2 (N=126)	difference (M1-M2)	t-Statistics#
Knds	score	60.59	31.76	28.83	14.5*
Edu	level	3.07	2.47	0.60	1.15 NS
Tgrinc(1)	(000 Rs.)	6.51	4.45	2.06	3.71*
Famsize	number	7.02	7.03	-0.01	0.02 NS
Socpat(2)	score	2.97	1.78	1.19	8.52*
Lru(3)	ha/lu	0.37	0.34	0.03	0.76 NS
Fdmru(4)	tons/lu	2.06	3.79	-1.74	2.94*
Nur	km.	3.16	4.78	-1.62	6.54*
Mar	km.	2.83	3.75	-0.92	4.56*
For	km.	2.58	2.89	-0.31	1.14 NS

Source: Data Analysis.
Two Sample t tests (Statistic 3.5)
* = P<0.01; NS = Not Significant.
(1) = Total gross income in Rs.(100 Rs.=50 baht) or (100 Rs.= 2$)
(2) = Social Participation
(3) = Hectare per Ruminant Livestock Unit
(4) = Supply of Fodder dry matter per Ruminant Livestock Unit.
M1 and M2 = Adopters and Non-Adopters groups respectively.

Looking at the mean differences of adopters and non-adopters, the differences ranging from 0.01 to 28.83. Lowest is for family size while the highest is for knowledge. Knowledge of all types especially, understanding the importance of tree fodder in feed value was found poor in non-adopters2 (47 hh). While in non-adopters1 (79 hh) group, the knowledge concerning about awareness (price, sources etc.) was found lacking (See Appendix 11 for details).

Comparing means of 10 variables chosen, 4 variables (education, family size, land per ruminant livestock unit and forest) are not significantly different. These variables have less than 0.9 mean

difference. Thus, except the above mentioned four variables, the rest of all variables are significant at (P<.01).

The frequency distribution table (Appendix 10) also shows that around 99% of adopters have greater than 34 score with 26.7% in higher level (>66 score) of knowledge while 55% of the non-adopters fall below 34 score. Similarly, in the case of social participation that 38.9% adopters were highly affiliated in participation of social affairs while only 5.6% of non-adopters were in the same rank. However, in case of formal education, the higher concentration of both adopters and non-adopters percentage were in primary level.

No significant variation can observe in land per ruminant (Lru) and family size (Famsize) even though it was considered important factor for the rural mid hills' farming system. Conversely, higher feeding of dry matter per ruminant livestock unit (Fdmru) is found by non-adopters as compared to adopters with a difference of.-1.740 tons fodder dry matter. The greater use of crop residues and grasses stated in earlier Chapter (IV) also explain that the non-adopters were adopting other alternatives to maintain their livestock. However, still the deficit of fodder was assessed from the Tables 21 and 33. Because the excess supply of grasses during the monsoon season can not supplement to the dry season due to high moisture contain and lack of technical know how of storage. Besides, green fodder feeding to livestock is essential with regard to the nutritional diet technically and scientifically according to various

literature (Tulachan 1985; Amatya 1991) and widely prevalent throughout the country.

5.2.3 Logit Analysis Result

Application of qualitative choice models in explaining the socio-economic phenomena have a significant role especially in analyzing the relationship between dependent variables (adoption) and explanatory variables (Polson *et al.*, 1992). Therefore in this section a qualitative choice model (Logit) is estimated by the maximum likelihood technique.

While running the model with the hypothesized variables in software program LIMDEP, some of the coefficients gave unexpected result and correlation test shows high multicollinarity problem (r=>0.5) among the independent variables. Despite, the model still remains unbiased but is less efficient because of the large variance. This leads to rejection of null hypothesis (Ho). Therefore, certain modifications was made by dropping and adding of the variables so as to overcome this problem and attain the optimum estimation (Studenmund, 1985).

Regarding the former case, highest education, age, caste and extension were dropped out from the model. This does not mean these variables were not important instead excluding caste the results of all

these variables are still meaningful that can be expressed in one or the other way. These are explained as:

Highest education which was hypothesized that the educated people of the family also may play influential role in decision making, however, this may be the education of the decision maker. But the model consists of education as the other variable, hence this brought collinarity and come up with unexpected sign (negative) in coefficient.

Age, on the other hand though important factor from the various studies but all most all of the decision-maker who were household head were found middle aged. Inclusion of this factor in the model is meaning less hence, dropped out.

Similarly, for Caste 3 dummy variables were applied. But these were not found significant as have been hypothesized. Since there is no theoretical support that it need to be in the model and in order to improve efficiency of estimation of other variables, they were discarded.

Extension was defined as the frequency of the visit of extension people to the sampled households. However, majority of the households responded that they visited only if they were requested for. This could be assessed from social participation as farmers' visit to the concerning institution were used to measure participation.

Additionally, it would be worthwhile perhaps if frequency of contact could assess to evaluate the extension. Therefore, extension is dropped off from the model.

Apart from this, some changes also brought in the variable of land holdings by dividing it with the ruminant livestock unit (lru). Because while used in separated form, the sign of coefficient for land appeared negative due to multicollinarity with ruminants. The null hypothesis was rejected, despite in most of the literature it was mentioned as significant factor.

Similarly, instead of natural grown fodder trees, fodder dry matter per ruminant livestock unit was used (Fdmru). Because it is realized that the other sources of fodder like crop-residues and grasses in combination also supplement the livestock feed. Such surplus or deficit may be the major cause for adoption.

Thus, by all these modifications and combinations, a model containing 10 explanatory variables including constant term (β_0) is regressed against dependent variable (Y).

The variables with their estimated coefficients are presented in Table 39. Since, the study is socio-economic and moreover the adoption is very discrete (0,1), so in this study (P<.15) level of significance has been considered. Harper (1990) has also considered significant level up to 80% (P<.20) in his study of adoption.

Table 40 Quantitative Estimation of Coefficients for the Adoption of Fodder Trees on Farm Land

Variables	Coefficient	T-ratio	Significant Level (P)
One	-4.8581	-3.693	0.00022
Knds	0.1179	5.863	0.00000
Edu	-0.0441	-0.753	0.45166
Socpat	0.4960	2.005	0.04502
Tgrinc	-0.2344E-05	-0.306	0.75958
Lru	0.7961	0.805	0.42073
Fdmru	-0.1483E-03	-1.504	0.13249
Famsize	-0.0112	-0.148	0.88263
Nur	-0.2128	-1.497	0.13429
Mark	-0.2835	-1.600	0.10953
Fore	-0.4921	-0.421	0.67398

Log-Likelihood (Log Lmax) :-67.281
Restricted (Slopes=0) Log-Lo :-146.71
R^2 = 1- Lmax/Lo (%)
= (1-log Lmax/Log-Lo) : 54.2 (Mc. Fadden R^2)
Chi-square (df=10) : 158.85
Significance level : 0.32173E-13
Accuracy of Prediction of over all : 85.18%
Note: (See Appendix 13 for the details of the results)

Apparently, the output of summary statistics of the logit model shows that 5 parameters are significant out of 10 at different levels. The variables that influence the adoption of fodder trees are; Knds, Socpat, Fdmru, Nur and Mark. However, only knowledge is resolute as critical factor at 0.01 level of significance. The rest two, nursery and fodder dry matter per ruminants units while are significant at 85% (P<.15) level. The low intensity of significance in the Nur is actually due to the multicollinarity with Mark, which is suggested by the correlation test (Appendix 12) and the relationship with adoption shows good (r=0.4).

Further, even dropping of variables could not improve the model and these are important variables that could be explained within the considered level (P<.20).

The positive coefficient of the social participation implies that an increase in participation raises the average farmer probability of adoption through gaining the knowledge. The result is found consistent with the findings of Shah (1992). However, the probability of increase in adoption can not be read directly from the coefficient.

The negative sign in Nur, Mark are as expected, implying that nearer the distance the higher the probability of households to adopt.

Similarly, Fdmru which represents supply of fodder per ruminant lu (an aggregation of all types of fodder straw, stover, husk, grasses and tree fodder) in the form of dry matter, gives presumed result. It is logical that when such fodder dry matter is sufficient, farmers would have less attention to introduce the fodder tree on farm land as indicated by negative coefficient. However, during the peak dry season, availability of fodder (especially green fodder) is far from adequate as the surplus fodder of the flush season can not keep to dry season. Thus, the impact of the variable is not as great as Knds and Nur as shown in Figures 14 and 15 respectively.

Nevertheless, the negative sign for the Edu, Fore, Famsize and

Tgrinc are not as anticipated but insignificant. But these could be explained by taking the example of VDC K (Tables 4 and 29) that the majority of the households of the study sites have limited education and those who gained higher education may look for off-farm occupation rather than risky farming practice.

Similarly, the insignificance sign of forest refers that the legal prohibition for the encroachment to forest is strictly followed by the farmers so the distance of the forest does not affect the adoption. Small families have labor constraint to go to collect fodder in distant area so they are inclined to grow more fodder trees around homesteads than the larger families. However, it is insignificant and may not be appropriate explanatory variable as it can not reflect size of labor. Gross income on the other hand has negative sign because of inclusion of off-farm income. As since, farmer with high off-farm income is likely to divert his attention from farm and be less willing to put time and energy required to adopt new farming practices.

For illustration VDC K in Table 29. Moreover, the lesser the income, the more adoption also reveals that the technology could be transferred to small income group where resources are constraint. However, the variable is not significant. While the Lru even the sign is as expected but the result is insignificant. Because majority of the households (63%) were holding less than 1 hectare of land of the study sites.

The correlation test shows that inspite of majority of the coefficients are non significant, the overall sign of the model was statistically in the sense that Maddala (R^2) is fairly high (54.2). The Chi-square is significant (158.8) at 10 degree of freedom 99% level. The model could predict accuracy of 85.2% for over samples and 82.9% for adopters (Appendix 13).

Calculation of probability of adoption provides the probable role of each explanatory variable in adoption. Therefore, by taking the partial derivative the effect of change of each individual variable with respect to probability of adoption is measured (Appendix 14). The estimated probability of adoption for all variables at mean is 26.3%.

Since knowledge has influencing role in this study, relationship between knowledge and fodder tree adoption as well as with some selected coefficients (Fdmru and Nur) are simulated. With changing the value of the interested variable and keeping the others at mean level provides the result as shown in Figure. 14, 15, 16 and Appendix 14.

The simulated result depicts that, probability of adoption with the mean level of knowledge (43.77 score) is only 26.3%. The steep slope of probability shows its rapid increment (Figure 14). With in 70 and above score of knowledge, 88% and more probability could be attained. As soon as knowledge reaches to 100 score, the probability of adoption is 99.6%, i.e, approximately 100%.

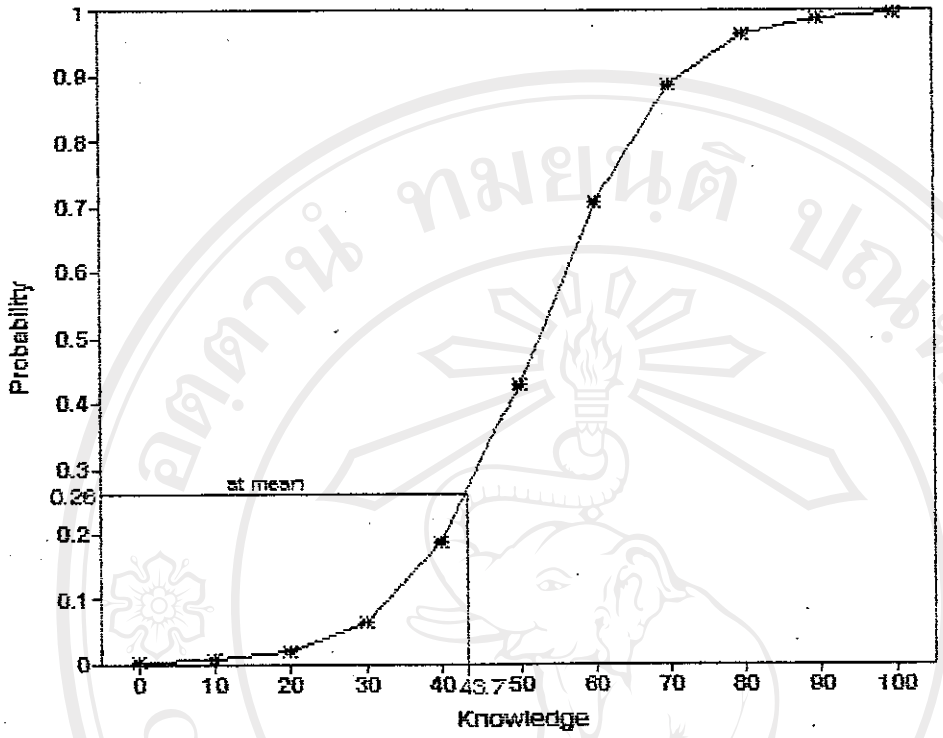

Figure 14 Probability of Adoption of Fodder Trees at Different Levels of Knowledge while remaining others variables are at their mean. Source: Survey, 1993

Comparing the probability of adoption at different levels of Knowledge and Nursery distances and former with Fdmru, it shows that the effect of change at nursery distance in every level is more compare to Fdmru. While considering the relationship of adoption with knowledge at different nursery distances (Figure 15), distance at 0.5 to 1 km. is found more effective in adoption as just 60 score will attain more than 80% of adoption. But with Fdmru, no such significant impact could be seen (Figure 16).

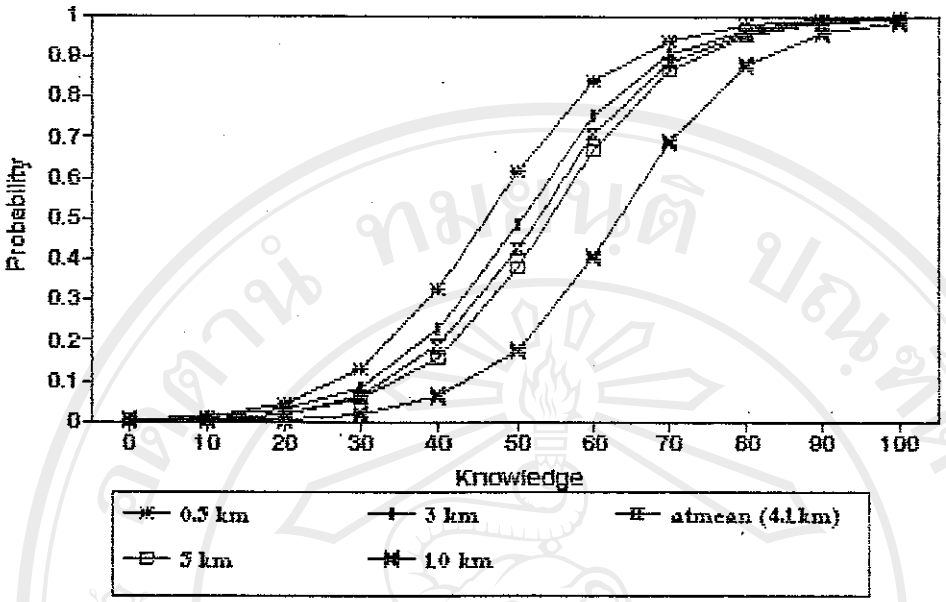

Figure 15 Probability of Adoption at Different Levels of Knowledge and Nursery Distances (Nur) in km. (Other variables at their mean)
Source: Survey, 1993

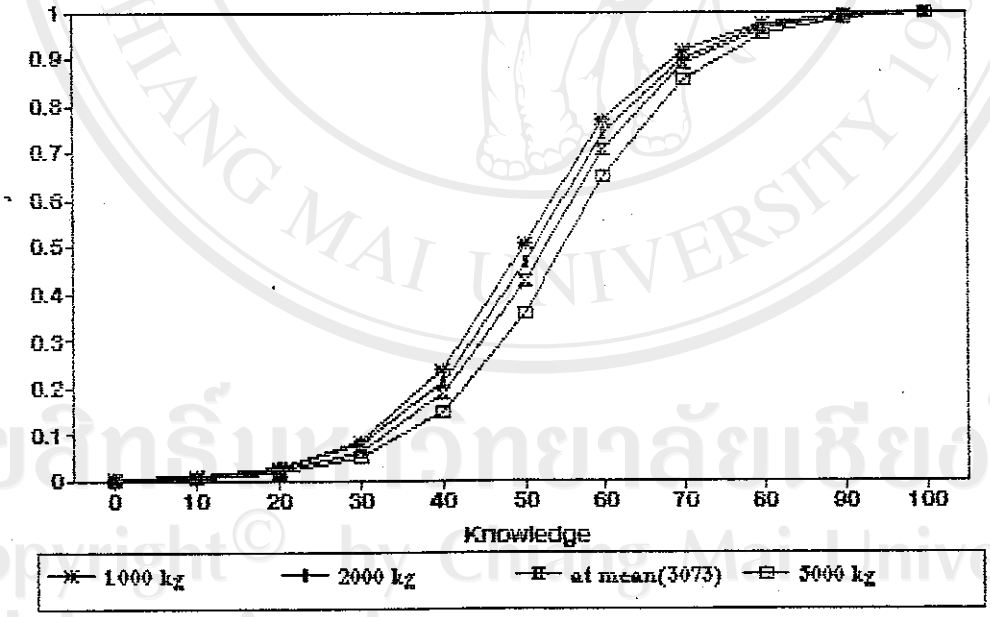

Figure 16 Probability of Adoption at Different Levels of Knowledge and Fodder Dry Matter Supply per Livestock Unit (Fdmru) While Other variables at their mean
Source: Survey, 1993

5.3 Perception about the Sapling Distribution Program

Farmers' evaluation about the fodder tree distribution program at the present context and in long term with reasons are discussed to meet this objective.

5.3.1 Agencies Involved and Preference

The implemented fodder distribution program carried out by GOs and NGOs was evaluated through the assessment of farmers' attitude towards the program. With out knowing the agencies involved and their activities, no one could give his idea about the implemented program. Hence, quantification carried out from farmers' awareness, preferences of agencies and motivation in fodder tree plantation.

The success and failure of any implemented program carried out by GOs and NGOs depend upon how it is accepted in a particular locality. Besides, in order to achieve positive impact, the goal of the agencies should be targeted towards the needs of the farmers. Tables 40 and 41 illustrate both GOs as well as NGOs were involved in one or other ways of the tree plantation program.

Out of 216 interviewees only 73 (33.8%) answered the realization about the agencies and most of them were of VDC M (18.5%). Considering the majority of the percentage of farmers response about the agencies in

each VDC, it was found that 66.3% of the total respondents (54) were familiar with Australian Forestry in VDC F. Bahudha Bahune Pati (BBP) Family Planning Nursery in VDC M (95%). More than 80% of the sampled households of VDC K and 60% of R were found accustomed with Livestock or Veterinary (Table 40).

Table 40. Awareness About the Agencies (GOs. and NGOs) Involved in Fodder Sapling Distribution Program.

VDC	Res. no.	Percentage of Household Aware of Agencies						
		Government			Non-Government			
		RK	LS	FO	FP	AF	SF	CN
VDC F	11	-	27.3	27.3	9.1	63.6	-	-
VDC M	40	-	50.0	10.0	95.0	-	-	-
VDC K	17	17.6	82.3	23.5	11.8	11.8	11.8	17.6
VDC R	5	-	60.0	20.0	-	20.0	-	-
Total	73	4.1	54.8	16.4	56.1	13.7	2.7	4.1

Source: Survey, 1993

Table 41. Most Preferred Agencies and Reasons for Preferences

Reasons	Number of Farmers Preferred the Agencies							
	VDC F		VDC M		VDC K		VDC R	
	LS	FO	LS	FP	RK	LS	AF	CN
Gives Suggestions			2			4		
Provide Training		1	1	3	1	1		
Accessibility			2	3		5		
Preferred Species	2	1	1	8		4		
	(N=4)		(N=20)		(N=15)		(N=0)	

Survey, 1993.
RK= Resam Kheti
LS= Livestock Department
FO= Forestry
FP= Family Planning Nursery (BBP)
AF= Australian Forestry
SF= Small Farmer Development Project
CN= Care Nepal

However, 39 out of 73 households responded the agencies they known were liked by them with some justifications. Both livestock and family planning were equally preferred by 40% of the responses. The former was liked for accessibility and extensions, whereas the later for providing better species and training aspects.

5.3.2 Usefulness of the program

A mixed type of answers was obtained as the farmers were asked about the program and its usefulness to them. Majority of the responding households (74% of 192) perceived the program positively (Table 42). The reasons given were ranked and quantified by scoring.

Table 42 Farmers' Perception About Distribution Program

VDC	Res. no.	Farmers' Response Number and % Useful		Not Useful	
		no.	%	no.	%
VDC F	49	36	73.5	13	26.5
VDC M	52	47	90.4	5	9.6
VDC K	46	24	52.2	22	47.8
VDC R	45	35	77.8	10	22.2
Total	192	142	74.0	50	26.0

Source: Survey, 1993

Table 43 Reasons for Liking of the Program (N=142)

Reasons for Liking	Res. %	Number of Respondent on Ranks				
		Rank 1	Rank 2	Rank 3	NR	Score
Supply Fodder in Scarcity	97.2	135	2	1	4	96.2
Soil Conservation	6.5	42	5	19	76	27.0
Pleasant Environment	11.3	-	7	9	126	5.4
Multipurpose	48.6	14	7	21	73	27.8
Others	1.4	-	2	-	140	0.9

Source: Survey, 1993

Table 43 reveals that among the several reasons supply of tree fodder during scarcity period was mentioned by highest percentage (97.2%) of the household representative. It was ranked first by 135 persons (95%), securing the highest score of 96.2. This explains fodder scarcity is the most critical problematic situation overwhelming to the study sites. Multipurpose aspects and soil conservation were ranked second and third securing 27.8 and 27 respectively.

In contrast 26% of the responded farmer argued on it. The reasons mentioned in order of score were lack of desired species (64.7), poor extension service (21.3) and not sufficient land (20) respectively. Some of them also put query about provision of subsidy and reward (Table 44). Nevertheless, the institutional and non-institutional problems mentioned were found not similar for all the VDCs.

Table 44 Reasons for Not Liking of the Program (N=50)

Reasons for not liking	Res %	Number of Respondent on Rank				
		Rank 1	Rank 2	Rank 3	NR	Score
Lack of Desired Saplings	66	31	2	-	17	64.7
No Subsidy	12	2	4	-	44	9.4
No Reward	4	-	2	-	48	5.3
No Land	22	9	1	1	39	20.0
No Extension Service	26	8	3	2	37	21.3

Source: Survey, 1993.

5.3.3 Source of Inspiration

According to the adoption theory, farmers first do not adopt any farming practice, certain sources of inspiration are essential in motivating the farmers (Feder, 1985). In this study, extension (50%), local knowledge (32.2%) were mentioned as the main motivating factor followed by NGOs, neighbor success, and Communication media (Table 45).

Table 45 Sources of Inspiration for Adoption of Fodder Trees

VDCs	Res. no.	Adopters' no. and (%) Expressed Sources of Inspiration				
		EX	NG	NGOs	LK	CM
VDC F	23	10 (43.5)	2 (8.7)	4 (17.4)	13 (56.5)	2 (8.7)
VDC M	43	26 (60.5)	11 (25.6)	10 (23.3)	7 (16.3)	4 (9.3)
VDC K	14	8 (57.1)	-	2 (14.3)	7 (50.0)	2 (14.3)
VDC R	10	1 (10.0)	-	-	2 (20.0)	3 (30.0)
Total	90	45 (50.0)	13 (14.4)	16 (17.8)	29 (32.2)	11 (8.2)

Source: Survey, 1993.
Note: More than one sources are mentioned by individual.
EX=Extension; NG=Neighbor; LK=Local Knowledge; CM=Communication Media

Majority of the VDC M and VDC K farmers responded extension as the most inspiring factor while, local knowledge and communication media in VDC F and VDC R respectively. The findings validate the extension service responded by the farmers in each VDC (Appendix 10).

5.3.4 Future Prospective of the Program

In general fodder tree plantation program carried out by different agencies have long term prospective rather than just to meet the present needs. Hence it is useful to understand the farmers' attitude (opinion) concerning about the consequences of such program. This will help to generalize (predict) the situational context of the future.

Table 45 and Table 46 indicate that rural farmers predicted both positive and negative impacts of the fodder tree plantation program. Nevertheless, majority of the farmers (83%) with highest in VDC K (95%) foreseen positive impact for long run in terms of increase in livestock number (61%), replacement of breed (10.5%). Both increment as well as replacement of herd was replied by 23.6% and 5% only responded about the surplus of fodder and fuelwood.

This verdicts the farmers inmost interest for livestock enterprise if the fodder shortage problem overcomes. The disadvantages in terms of shading effect was expressed by less than 5% of the farmers.

Table 46 Farmers' Expectation about the Consequence of the Program

VDC	Res. no.	Farmers' no. and (%) Expressed			
		Advantage (1)	Disadvantage (2)	Both(1+2)	No change
VDC F	50	43 (86.0)	3 (6.0)	1 (2.0)	3 (6.0)
VDC K	41	39 (95.1)	-	-	2 (4.9)
VDC M	53	43 (81.1)	1 (1.9)	5 (9.4)	4 (7.5)
VDC R	50	36 (72.0)	3 (6.0)	4 (8.0)	7(14.0)
Total	194	161 (83.0)	7 (3.6)	10 (5.1)	16(8.2)

Sources: Survey, 1993.

Table 47 Farmers' Number and Percentage for Reasons of Advantage

VDC	Res. no.	Increase Livestock(1)	Replace Breed(2)	Both (1+2)	Increase Fuel & Fodder
VDC F	43	22 (51.2)	1 (2.3)	20 (40.5)	-
VDC K	39	26 (66.7)	6 (15.4)	6 (15.4)	1 (2.6)
VDC M	43	20 (46.5)	8 (18.6)	9 (20.9)	6 (14.0)
VDC R	36	30 (83.3)	2 (5.6)	3 (8.3)	1 (2.8)
Total	161	98 (60.9)	17 (10.5)	38 (23.6)	8 (5.0)

Source: Survey, 1993.
Note: Figures in the parenthesis represent the percentage.

5.4 Assessment of Constraints and Improvement

Problems in adoption of fodder trees in both adopters and non-adopters group are discussed separately. The possible measures to overcome the problems from the farmers are also listed in order to improve in the future implementing program.

5.4.1 Constraints in Fodder Tree Adoption and Production

Both technical and non-technical problems were reported when assessment was made in identifying the constraints that influence the farmers in planting and planted fodder trees on the farm land. Among the 216 households sampled, 47 (21.7%) households did not have even single fodder trees on the farm land revealing that the livestock might have higher dependency either on farm land or forest.

An illustration of Table 47 emerges that maximum number of farmers (48.1%) of VDC K did not own fodder trees on farm land, followed by VDC F (18.5%), R (16.6%) and least (3.7%) in VDC M respectively. The main reasons mentioned by these farmers were unrecognization of the importance of fodder (40.4%). This statement indicates that still the farmers of the study sites were unfamiliar with the concept of growing fodder trees. The low score on purpose of growing fodder trees (Appendix 12) also proofs the poor knowledge of this group of farmers. This indirectly points out the weakness of the extension service.

Apart from this, lack of land (25.5%), not interest in growing (19.1%) and low economic status (14.9%) were the others compulsions. Similar reasons were mentioned in the study carried out by Gajurel (1987), and Gatenby (1990). The inadequacy of extension service can be proved from Appendix 10, which illustrates that majority of the household did not receive the extension service at all. Around 70 to 80% of the farmers of

VDC F and R were never exposed to extension contact. Among the farmers who were exposed also could not get sufficient services.

Mortality as the technical problems were mentioned by persons (78 of 216 hh) who had experienced of growing (Figure 10) is explained in Chapter IV. Therefore, non-technical constraints concerned mainly with institutional were documented as major problems from the survey.

Table 48 Farmers' Reasons for Not Having Fodder Trees on Farm Land

VDC	Res.	Farmers' no. and (%) Giving Reasons			
	no.*	No Land	No Income	No Interest	Unknown**
VDC F	10	3 (30.0)	2 (20.0)	2 (20.0)	3 (30.0)
VDC M	2	-	-	1 (50.0)	1 (50.0)
VDC K	26	9 (34.6)	2 (7.7)	5 (19.2)	10 (38.5)
VDC R	9	-	3 (33.3)	1 (11.1)	5 (55.6)
Total	47	12 (25.5)	7 (14.9)	9 (19.1)	19 (40.4)

Source: Survey, 1993.
Note : * = Farmers who do not have fodder trees
** = Unknown the importance of fodder trees

5.4.2 Possibility of Improvement of the Program

The solution of the encountered problems could make out once the farmers' need for the particular locality, sources of availability and farmers' interest to adopt is known. Based on the formal and informal survey conducted on the research sites, several operational measures were assessed. This does not only overcome the situational context at present but also assist to develop strategies for the future implication of the

program that will be helpful to implement the program in the Nepalese farming system by sustainable basis.

All the suggestions procured from each household were generalized and categorized into 5 different statements. Distribution of the desired saplings was mentioned as the most essential criteria for the improvement of the program by majority of the respondent (41.2% of 153 hh). Since, most of the cases, the distributed species are the same what locally available. Besides, extension and training and nursery establishment were also proposed to consider equally. Especially, VDC R respondent recommended nursery establishment for the improvement of their VDC condition (Table 49).

Table 49 Farmers' Suggestions for the Solving of the Fodder Problem

Most Common Suggestions	Percentage of Farmers' Responded in VDCs				
	VDC F	VDC M	VDC K	VDC R	Total
1.Desired Sapling Dist.	23.9	48.7	47.5	50.1	41.2
2.Dist+ Trn+ Ext+Nur	32.7	15.4	17.5	10.7	20.3
3.Dist+ Trn+ Ext	21.7	5.1	27.5	7.1	16.3
4.Dist+ Ext	4.3	28.2	5.0	10.7	11.8
5.Nursery Establishment	17.4	2.6	2.5	21.4	10.4
	N=46	N=39	N=40	N=28	N=153

Source: Survey, 1993.
Note: Dist:Distribution of Sapling; Trn:Training; Ext:Extension Service.

Regarding the desirable species, farmers were inquired about the sources if they were acquainted with. Out of 192, 140 (73%) mentioned "No". Among the 52 (27%) responded "Yes", majority (63.4%) specified Family Planning Nursery (BBP) where desired species could be available (Table 50). Because, the Nursery lying in VDC M consists of the diversified species with exotic species like *ipil, mulberry,* etc. which the farmers prefer the most. The highest percentage of adopters (79.3%) in VDC M is one of the reasons of finding the desirable species.

Table 50 Availability of Desired Species Mentioned by Farmers

VDC	Res. no.	No no.	Yes no.	no. and (%) of Farmers Response Sources			
				FP (1)	LS (2)	Both (1+2)	NGOs
VDC F	49	43	6	- -	3 (50.0)	2 (33.3)	1 (16.7)
VDC M	52	23	29	26 (89.7)	1 (3.4)	NR	NR
VDC K	46	35	11	1 (9.1)	2 (18.2)	8 (72.7)	
VDC R	45	39	6	6 (100.0)	-	-	-
Total	192	140	52	33 (63.4)	6 (11.5)	10 (19.2)	1 (1.9)

Source: Survey, 1993.
Note: FP= Family Planning Nursery; LS= Livestock Nursery; Both=FP+LS

Farmers were found even ready to pay (80% of 201) for the species they preferred (Table 51). Similar type of finding was reported by Evans (1991) in Terai region of Nepal, that 77% of 450 households were positive towards paying for the good seedlings.

Table 51 Farmers Readiness to Pay for the Fodder Saplings

VDC	Res no.	Response of the Farmers					
		Yes		No		NR	
		no.	%	no.	%	no.	%
VDC F	53	40	75.5	13	24.5	1	1.9
VDC M	53	47	88.7	6	11.3	1	1.9
VDC K	48	37	77.1	11	22.9	6	11.1
VDC R	47	37	77.1	10	21.3	7	13.0
Total	201	161	80.1	40	19.9	15	6.9

Source: Survey, 1993.

In chapter (IV) already depicted that *kutmiro, ipil, mulberry* etc. are the preferred species mentioned by the farmers of the research sites. Recognizing the source of availability, species preferred and farmers' attitude for the program could give some hints for the improvement of the program. Additionally, in order to overcome the bias towards the fodder trees as only the source of feed during the scarcity period, a query was put forward for the alternatives that could solve the problem of fodder deficit.

However, the findings of the Table 52 reveals that the greater percentage of farmers (64.7% of 153) stated that there is no other such alternatives except fodder trees. Forage grass, especially in VDC K (37.5% of 40) replied after the fodder trees. Hence, desired species should be provided by the establishment of nursery and monitoring and evaluation should be carried out through effective extension services.

Table 52 Alternative to Overcome the Fodder Shortage Problem

Alternatives	no. and % of Farmers' Response of VDCs				Total
	VDC F	VDC M	VDC K	VDC R	
Plantation Only	36 (78.3)	26 (66.7)	19 (47.5)	18 (64.2)	99 (64.7)
Making Silage, Hay	1 (2.2)	8 (20.5)	-	5 (17.9)	14 (9.2)
Forage Grass(Oat)	9 (19.5)	2 (5.1)	15 (37.5)	5 (17.9)	31 (20.2)
Communal Forest+GL(1)	- -	3 (7.7)	6 (15.0)	- -	9 (5.9)
Total N	46 (100)	39 (100)	40 (100)	28 (100)	153 (100)

Source: Survey, 1993.
GL(1): Grass Land.

5.5 Highlights

The heart of the research lies on this chapter. Analysis results and explanation are presented for almost all of the objectives, viz; adoption performance, indicators of adoption, and perception about the program. The VDC where both nursery and market for livestock inputs and outputs are available (VDC M) shows better performance while analyzing in terms of FAI and AAI and the effect of adoption. The greatest impact assessed were milk production and saving time. Both descriptive and quantitative methodology figured out farmers' knowledge, social participation, distance to nursery, market and supply of fodder per ruminant livestock unit are the important determinants for adoption.

However, only result of the logit model is discussed for the factors influencing adoption of fodder trees. Knowledge regarding

understanding the importance (purpose) of growing of fodder trees especially, in non-adopters2 group and creating awareness regarding market price of inputs and outputs of livestock, sources of availability of desirable species in non-adopters1 would increase the probability of adoption.

Especially, knowledge obtained by farmers' exposure to outside (social participation) could cause more adoption than formal education. The simulation result shows that just 70% of knowledge will lead to 88% of adoption and the relationship when compared with nursery and fodder supply, the former has higher probability compare to later. The result shows attention need to be paid in strengthening the local organization. Despite only 5 out of 10 parameters were significant, the model could predict correctly 85.2% of probability of adoption.

Both GOs/NGOs were involved in spreading the fodder tree adoption technology but only BBP of (VDC M), livestock sector was explained as better institution regarding availability of species in the former and services and near to visit for the later one. While unavailability of desirable species, land, extension were the important problems lined up by the non-adopters. Anyway, majority of the farmers have foreseen positive impact in over all farming system if the desirable species were distributed with effective extension program.