# CHAPTER VI

## SUMMARY, CONCLUSION AND IMPLICATION

### 6.1    Summary

Inspite of the enforcement of fodder tree plantation program, the scarcity of fodder and its consequent affect in the mid hill farming system of Nepal is the major concern of the study. Therefore, this study focuses on the measurement of adoption performance, investigation of factors that were responsible for the adoption and their relationship with farmers' adoption behavior. Furthermore, through the application of performance scoring technique, farmers perception about the program also evaluated to find out the probable measures for the overwhelming problem.

Applying the multistage purposive sampling 216 households from 4 VDCs of Kavre district were selected. Both nursery and market were confined in VDC M. While only market was existence in VDC K. VDC F had lack of market facilities but existence of nursery. Both nursery and market were lacking in VDC R. Despite proximity of the resources, (nursery, market and forest) majority of the households were 2-5 km distance, only VDC M and K were accessible as these were linked by road. All VDCs except K had forest area coverage but under the control of government.

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Each household of 6-7 family members was composed of equal proportion of male and female population with greater percentage (55%) of economic active population (16-60 years). About 85% of labor supply was from adult population. Female contribution was envisioned higher to male by 3 hours. However, role of male was found dominating in fodder tree plantation and management decision by 80% and 60% respectively.

Around 85% of the households education was limited up to primary level. Heterogeneity was observed in caste composition and dominance among the VDC.

Integration of fodder trees on crop-livestock farming system was widely prevalent in the research sites. The average land holding size was less than one hectare (0.98 ha). While adopters holding (1.16 ha) was higher than mean and non-adopters (0.84 ha). Low land and upland were prioritized for paddy and maize crop respectively. Potato and tomatoes were the major cash crops for income generation. The upland terrace riser was found fully utilized by fodder trees for livestock feed.

The average livestock holding was 3.0 lu with highest in VDC F (3.7) where there is market and nursery while least in VDC K (2.1) where no market and nursery exist. Comparing to mean and non-adopters (2.7 lu), the holding was higher in adopters (3.5 lu). The average buffalo holding (lu) was higher to cattle in VDC M and F but vice versa for VDC R and K. The non-ruminant holding was higher in VDC R (0.4 lu) compare to (0.1) in other

VDCs. Raising of ruminants were mostly prevalent in higher caste while non–ruminants were mostly kept by small caste and low income group of farmers. However, greater diversification in species composition was observed in small farmers' (<1 ha.) farm.

Green grass and crop–residues (roughage) were the major constituent of feed inspite of, concentrate was fed through out the season. The supply of feed per livestock unit was highest in VDC M (over 4,000 kg) with comparatively greater percentage of concentrate (16%), forage (4%) and tree fodder (39%) than other VDCs. However, deficit of green fodder was prevalent through out the research sites ranging from 0.5 to 5 tons. The deficit in terms of fodder as well as supply of metabolic energy was higher in VDC F and R compare to VDC M and VDC K.

No variation was observed in average livestock per hectare of land among the research sites, a markable difference was seen in tree per hectare and consequently tree per livestock unit. Adopters had approximately 18 and 2 times greater number of fodder trees per livestock unit compare to non–adopters and over all sampled farmers. However, a deficit of 2.7 tons of green fodder was realized per annum. Inspite of this, the total gross income and net return to cost was greater among the adopters. Especially, when compare to other VDCs, with VDC M, it had highest tree/ha (309) and tree per lu (109). Hence, the share of income from livestock sector to total income was also more (Rs. 10,000) than other VDCs. The greatest contribution was realized from buffalo milk production

throughout the VDCs. The tree fodder in ration was reported as the essential constituent in feed for higher milk production and feed supplement especially during the peak dry season. The lopping seasons of fodder trees coincide with the findings (Figure 8).

Wide diversification was found in fodder tree species but major domination was of *kutmiro* in the household level of all the VDC except VDC K. Exotic species like *ipil and mulberry* were greater in number than natural grown in VDC M and F where there is nursery, while vice versa in rest of the two VDCs. *Kutmiro, ipil and mulberry* were ranked in first, second and third degree of preference for high bio-mass, nutritious and availability respectively.

Majority of the households (63%) had small holdings (<1 ha. of land). But the resource holdings in terms of income, family size as labor force, and livestock unit were not in measurable (poor) condition. Livestock contribution was in second position after crop in VDC M and F, while it was third in VDC K and R. VDC K had highest off-farm income among the other VDCs. The priority of farming system activities was found associated with income earned.

Evaluating the adoption performance in terms of extent of adoption, the farm adoption index (FAI) and adoption activity index (AAI) were 41.6% and 75.8% respectively. The fairly high AAI was due to the greater index from VDC M (173%). Increment in milk (46-146%) and saving

time in fodder collection (>56%), changing to stall feeding system (67-78%) were the major effect of adoption realized.

The descriptive analysis (average, percentage, mean "t" test) of the socio-economic characteristics was carried out mainly for comparison of adopters vs non-adopters. Except supply of Fdmru, in all adopters were found better off than non-adopters.

The logit model was employed for the investigation of influential indicators in fodder trees adoption. High accuracy in prediction estimation and consideration of influential behavior of other factors included are the major merits and concerned for selection of this model.

The proposed explanatory variables taken together as key determinants are: Knowledge (Knds), Social Participation (Socpat), Education (Edu), Nursery (Nur), Market (Mark), Forest (Fore), Family size (Famsize), Land per livestock unit (Lru) and Fodder dry matter supply per livestock unit (Fdmru).

Obtained result of the logit model proved that farmers' knowledge, social participation, distance to nursery, market and fodder dry matter per livestock unit are the major determinants for the adoption of fodder trees on farm land. The estimated result explains that social participation i.e. exposure to the VDC activities could create awareness about the situational context and increase the ability of understanding about the concept of technology. This is how the knowledge was gained.

The simulation result shows that knowledge at the mean level (43.7 scores), the probability of adoption is very low (26.3%). But invariably increases with increment of score i.e. reaches to 88%. in 70 units of score while keeping other factors at their mean level.

Considering the socio—economic study with very wide range of term "adoption" defined, Market (P<.10), Nursery (P<.13) and Fodder dry matter supply per livestock unit (P<.13) had also some influence in the adoption of fodder trees. The result implies that nearer the distance to the resources the higher would be the adoption. The prediction shows high influence in response to nursery distance compare to fodder dry matter supply.

The model predicts correctly of 85.2% of farmers probability of fodder trees adoption. Gross income and education did not have significant influence to adoption because the former includes off—farm income while later could not reflect size of labor. Extension contact, highest education, caste, age were though important but dropped out to avoid multicollinarity problem in estimation and attain optimum estimation.

Assessment of farmers' attitude about the fodder distribution program revealed that BBP family planning nursery and Livestock sector were only preferred agencies for species availability and training in the former while accessibility and extension for the later.

About 26% of the respondents did not like the program because of

unavailability of desirable species, lack of land and extension services. Unknown about the fodder trees importance, lack of land, interest and income were the major constraints expressed by the non–adopters of the research sites. While mortality of the seedlings by insect pest was mentioned as the serious problem among the adopters.

However, majority of farmers (74%) perceived the positively mainly for solving the problem of fodder scarcity. About 83% of the farmers had foreseen the program benefit in long term if desirable species were provided through effective extension program.

6.2      Conclusion

Based on the circumstances of fodder scarcity and requirements for the existing animals of the research sites of the mid–hills of Nepal, fodder tree plantation seem to be a promising program. However the deficit of green fodder through out the VDC even in VDC M where tree/Lu was so large, reflects the need of selection of species which could fulfill the need.

In the study sites, fodder is the primary priority product cited by majority of the farmers. In this aspect, high bio–mass, preferred to livestock and milk yield increment were the major needs that should be taken into consideration.

Generally in the case of technology adoption, the adoptability is greatly enhanced when a farmers' attitude towards adoption is affected by his/her perception of need for and economic resources. However, here the innovation promoted is not simply a reflection of perceived need and access to resources, but also a question of socio-economic and institutional arrangements within and between the households.

The impact of such institutional can be seen from the several changes that has occurred in the household farming system. The major changes could be best seen from the adoption performance. It can be concluded that the areas having both nursery and market i.e VDC M showed better adoption performance in terms of demands and supply or FAI and AAI both. Probably the accessibility to nursery and local markets may have greatly strengthened the adoption of farm practice in the study area, which contributed to increase in crop yields, crop diversification. This is by drawing out the nutrients from the deep soil level and the fertile soil can grow various types of crops. High bio-mass, dominance of exotic species and consciousness about the fodder shortage and impact to the environment are the other significant contributions. This is because of the high income from the livestock (milk production), replacement of breed and types and greater income provide a persisting scenario of the sustainable VDC by the adoption of technology.

The changes could be pictured out differently in VDC K, where replacement of holdings have been occurred from large ruminants to small.

Small land holding coupled with scarcity of fodder and high off farm income and employment opportunity may be the probable causes for the farmers to change. The highest income from goat among the other VDCs reflects that goat might be the most promising livestock for such areas. The other two VDC F and R where there is resource constraints could have such changes.

The high contribution of livestock income from VDC M and F reflects the importance of fodder nursery. The input and output flow i.e. the supply of quantity of feed/forage (oats) to livestock and percentage share of the livestock products to the markets shows that farmers of the VDC M and K are better off and adopted livestock enterprises in commercial scale. However, the shortage of feed and lack of market facilities had caused sluggishness in development of farm animals and human beings. Hence, there is an urgent need of feeding solution for the survival of farm community.

The findings of the study highlight that the adoption of fodder trees on the farm is dominated by size of holdings associated with socio-economic characteristics of the household. Particularly in a given socio-economic environment, the perception is dependent upon the knowledge of an individual. The formal and informal participation could widen the horizons of the farmers rather than the formal education.

Hence, it can be concluded that a knowledgeable person coupled with highly participation in social activities would readably accept the

technology than others. In this sequence, the role of extension activities could further enhance the rate of adoption process. The results further implies that farmers with primary or elementary school education are capable of adopting innovation and appropriate technology if proper extension services are provided.

In overall analysis of the study, the adopters were found resource full compared to non-adopters and average farmers in land, livestock and tree holdings. However, greatest deficit among such group implies low production of fodder. Which is due to the early stage of adoption or mortality of the species as was mentioned as the serious problem.

With all this it can be concluded with the reference to the VDC M and statistical test that market and nursery establishment seems necessary for over all development of the mid-hill farming system. Along with monitoring and evaluation through an effective extension service is considered as essential factor to accelerate the adoption of agricultural practice. Furthermore, it is the need that farmers put forward. Hence, a comprehensive government program is essential to ensure the timely availability of desirable fodder saplings and to strengthen the extension services for the adoption of fodder trees on the farm land. Above all, institution, extension and local social institution should be supported by government as well as NGOs in order to encourage farmers to participate in developmental activities for formulating plans.

Finally, it must be emphasized that the present analysis is based on a limited number of observations from 4 VDC of Kavre districts. Its limited observations, macro value and regional orientation make generalization difficult. Nevertheless, it may be indicative of the forces at work in the process of adoption of farm practices in Nepal. Additionally, adoption is defined in conceptual basis, which might not show the actual adopters characteristics. Hence, there is need of further study with clear concept in adoption.

## 6.3 Policy Implications

The outcomes of the study brings into conclusion of certain important points that might be helpful for the future policy implication which can be served as:

a) In order to improve the technical know how of introduced farming practices better extension service should be emphasized for the two way communication i.e farm to planners and vice versa.b)

Resource holding especially, small land is the major obstacles for the farmers to encourage adoption of fodder trees plantation. Therefore, it is essential to recommend the farmers of small holdings to shift towards the non—ruminants or small rearing rather to give the pressure to the resource or protect from keeping the unmanaged and unproductive stock.

The other alternatives may be that government should develop a scheme like community forestry for such group. An example of such scheme is Salle village of eastern hills of Nepal regulated by PAC.

c)      Establishment of nursery coupled with desirable species, at certain distances seem essential for the easy assess of the farmer and booming up the adoption of fodder trees.

d)      The findings also show that farmers are anxious to grow more trees, therefore development agencies should not only adopt a strategy focussing on seedling supply alone. An attempt must be made to promote the genetic improvement of the local species. The goal bring to help create an adequate source of desired quality of seedlings. Helping farmers to raise seedling for themselves is one of the other options to be explored.

e)      There is need of dramatic improvement in fodder trees resources. The government could support research to identify the fast growing, high bio-mass nutritive fodder trees for specific agro-climatological condition.

f)      Government and NGOs plans and programs have tended to overlook the importance of market places. Sometimes the key issues related to the adoptability of a new technique lies in market condition. Market analysis become thus an integrated part of farming system.