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# Characterization and economic analysis of farming systems in Una district of Himachal Pradesh

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**Abstract**

**The characterization survey of 306 farm families were conducted in Amb and Bangana blocks of Una district using multistage random sampling method. Crops+Livestock farming system adopted by 74.5% of the total households was found as the major Farming System prevalent in the area. Percent income contribution to the total farm income varied from 58.7 % to 85.8% among large and marginal farms respectively. Among different enterprises, contribution of income from crop production to the total farm income in the sample farms varied from 49.7% to 73.9 % among large and marginal sample farms. Overall contribution of crop production enterprise averaged over all the categories in the sample households was 62.50%. Study revealed that majority of the farmers in Amb and Bangana blocks face non-availability of quality seed as a major constraint for crop production. Lack of proper feed for animals and lack of access to veterinary service centre were surveyed to major constraint in respect of livestock component. Menace of wild & stray animals was recorded to the major socio-economic constraint limiting the crop production in the district.**

**Key words:** Farming system, income, constraints, characterization.

Indian economy is predominantly rural and agriculture oriented where the declining trend in the average size of the farm holding poses a serious problem. In agriculture 84 per cent of the holding is less than 2 ha. Majority of them are dry lands and even irrigated areas depend on the vagaries of monsoon. The income from cropping for an average farmer is hardly sufficient to sustain his family. The farmer has to be assured of a regular income for a reasonable standard of living by including other enterprises. For all round development of farming families, farming should be considered as a system in which crop and other enterprises that are compatible and complementary are combined together. This approach aims at increasing income and employment from small-holdings by integrating various farm enterprises and recycling crop residues and by-products within the farm itself (Behera and Mahapatra, 1999; Singh *et al*., 2006).

Farming systems research is a multidisciplinary whole-farm approach and very effective in solving the problems of small and marginal farmers. The primary aim of integrated farming system is to derive a set of resource development, management and utilization practices that lead to a substantial and sustained increase in agriculture production. Since farming systems differ in different situations such studies should be location specific (Singh, 1998). Several studies conducted on farming systems showed that farming system approach is better than conventional farming (Ravishankar *et al*., 2007; Singh *et al*., 2007). As there is no scope for horizontal expansion of our agricultural land, only alternative approach is for vertical expansion through various farm enterprises requiring less space and time, but given high productivity and ensuring periodic income especially for small and marginal farmers.

Therefore, a study was undertaken to characterize and analyse the economics of farming systems in Una district situated in the Agroclimatic Zone-I A in H.P. with the objectives to identify and characterize the major farming systems of the study area and major

constraints limiting the efficiency of different farming sub-systems.

The district falls under 14.2 (A 15cd) H.P. Agro-ecological Sub zone & is a part of submontane low hills subtropical zone. The altitude of the district varies from 335m to 976 m above mean sea level and about 80% of the area ranges from 300-600m above mean sea level.

The district has a lot of scope for agriculture development and farming as a whole. Maize is the main Kharif crop and is cultivated in an area of 32157 hectares with average productivity of 19.79 quintal/ha. Similarly wheat is the main Rabi crop and is cultivated in an area of 34836 hectare with corresponding average productivity of 19.99 quintal/ha (Anonymous 2014). Vegetables and potato cultivation is being taken up in a big way by the farmers having assured irrigation facilities thereby getting good returns per unit land area.

The area receives a good quantum of precipitation i.e., around 1231 mm per annum. There are two rainy seasons in a year. One main rainy season extended from middle of June to middle of September is caused by south-west monsoon & the other from January to February is associated with the passes of Western Disturbances. Some rains are also received in other months of the year also.

## Materials and Methods

The characterization surveys were carried out of 306 households in the district using multistage random sampling method. There are five development blocks in the district. Out of 5 development blocks (Amb, Bangana, Gagret, Haroli & Una), 2 blocks one developed viz; Amb & one under developed viz: Bangana were selected for the survey. In each block 3 villages were randomly selected to carry out the characterization on different categories of households. These farm households as categorized according to the size of land holdings were 244 marginal, 36 small, 17 medium and 9 large in number. The data on socio-economic parameters, existing farming systems, economics of different enterprises, and farm constraints were recorded in schedules developed for the purpose by personally interviewing the farmers in the selected villages.

Village and category wise details of farm families surveyed in each village & each block have been shown in Table 1. In all 155 farm families within block Amb and 151 farm families within block Bangana were surveyed for conducting the characterization work. Out of 155 households in developed block Amb majority 119 (76.7%) belonged to marginal farmers followed by 18 (11.6%) small, 11(7.09%) medium, and only 7(4.5%) to large categories. Village-wise, majority households in Saloi & Chak belonged to marginal farmers followed by Churru village.

Likewise in underdeveloped block Bangana majority 125 (82.7%) belonged to marginal farmers followed by 18 (11.9%) small, 6(3.97%) medium, and only 2(1.3%) to large categories. Village-wise, majority households in Boul and Chowki Maniar belonged to marginal farmers followed by Tiar village (Table 1).

**Table 1. Village and category-wise details of farm families surveyed**

| S.No. | Name of village | No. of Farmers | | | | Total |
|---|---|---|---|---|---|---|
| | | Marginal (<1.00 ha) | Small 1.00-1.99 ha | Medium 2.00-3.99 ha | Large (>4.00 ha) | |
| **Block Amb (Developed Block)** | | | | | | |
| 1 | Churru | 37 | 6 | 2 | 4 | 49 |
| 2 | Saloi | 41 | 7 | 4 | 2 | 54 |
| 3 | Chak | 41 | 5 | 5 | 1 | 52 |
| **Total** | | **119** | **18** | **11** | **7** | **155** |
| **Block Bangana (Under developed Block)** | | | | | | |
| 4 | Chowki Maniar | 44 | 5 | - | 1 | 50 |
| 5 | Boul | 48 | 2 | - | - | 50 |
| 6 | Tiar | 33 | 11 | 6 | 1 | 51 |
| **Total** | | **125** | **18** | **6** | **2** | **151** |

## Results and Discussion

### A. Socio-Economic Characteristics of Sample households

**Land holding and Education status of sample farmers**

Overall average land holding size of selected sample households was recorded to be 0.78 ha with average land holding size of marginal farmers being 0.34 ha & that of small, medium & large farmers being 1.26 ha, 2.26 ha and 7.94 ha, respectively.

Education status revealed that among marginal households 21% were illiterate, 17%were educated up to primary whereas 62% were above primary. Likewise, overall analysis of sample households showed that 19 % were illiterate, 15% were educated up to primary and 66% were more than primary (Table 2).

Information on family size of sample farmers revealed that average family size recorded varied from 6 to 9 in different categories with overall value of 6.4 .Average family size was 6 for marginal households & 9 for small households. Among overall sample households average number : of adult male, average number : of adult female & average children number : recorded was 2.165, 2.156 and 2.14, respectively (Table 3).

### B. Cropping pattern of sample households

**(i) Kharif crops**

Analysis of studies on cropping pattern in households revealed that during kharif season maize was occupying largest share of area under crops among all the categories. Maize was grown on more than 90% of sum of crop area holding in respect of marginal & small farmers. Medium category households, besides, putting 92% area under maize had been also growing rice on 6% of sum of crop area holding. For large category households, maize was crop I (48.59% area), rice crop II (40.42%area), vegetables crop III (6.46% of area) and Sorghum crop IV (4.83% area).Sorghum as fodder crop was being grown by all households for feeding livestock whatsoever in possession. Further vegetables as 3rd important crop were being grown only by large households where farmers were having sufficient available cultivable area (Table 4).

**(ii) Rabi crops**

Likewise studies on cropping pattern in households revealed that during Rabi season wheat was occupying largest share of area under crops in all the categories. Wheat was grown on more than 95% of sum of crop area holding in respect of marginal &small farmers & on about 88% of sum of crop area holding in respect medium & large households. All categories of farmers were found to be putting some area under vegetables including potato. Potato & rabi season vegetables were third important crop for medium & large households being cultivated over about 9.6% & 10.1% of sum of the crop area holding ,respectively. Besides, Berseem and oats were most popular green fodder crops being grown during Rabi season by all farm households for feeding the livestock population (Table 5).

**Table 2. Land holding & Education status of sample farmers**

| Category | No. of sample farmers | Average holding size (ha.) | Average Age (Yrs.) | Education | | |
|---|---|---|---|---|---|---|
| | | | | Illiterate | Primary | Above Primary |
| Marginal | 244 | 0.34 | 52 | 51 | 41 | 152 |
| Small | 36 | 1.26 | 62 | 6 | 4 | 26 |
| Medium | 17 | 2.26 | 60 | 1 | 0 | 16 |
| Large | 9 | 7.94 | 52 | 0 | 2 | 7 |
| **Overall** | **306** | **0.78** | **53.6** | **58** | **47** | **201** |

**Table 3. Family size of sample farmers**

| Category | No. of sample farmers | Average Family size (No.) | Average Adult Male | Average Adult female | Average Children | Average Number of farm fragments(No.) |
|---|---|---|---|---|---|---|
| Marginal | 244 | 6 | 2 | 2 | 2 | 2 |
| Small | 36 | 9 | 3 | 3 | 3 | 2 |
| Medium | 17 | 7 | 2.5 | 2.41 | 2.06 | 2 |
| Large | 9 | 8 | 2.67 | 2.56 | 2.78 | 2 |
| **Overall** | **306** | **6.4** | **2.165** | **2.156** | **2.14** | **2** |

**Table 4. Cropping pattern of sample households (Kharif crops)**

| Category | Sum of the crop area holding (ha) | Crop I | Crop II | Crop III | Crop IV |
|---|---|---|---|---|---|
| Marginal | 65.22 | Maize (98%) | Sorghum (2%) | - | - |
| Small | 28.48 | Maize (97.12%) | Sorghum (2.66%) | Vegetables (0.22%) | - |
| Medium | 16.59 | Maize (92.40%) | Rice (6.03%) | Sorghum (1.57%) | |
| Large | 22.76 | Maize (48.59%) | Rice (40.42%) | Vegetables (6.46%) | Sorghum (4.83%) |

Figures in parentheses are the percentage of area occupied by a particular crop to the sum of crop area holding

**Table 5. Cropping pattern of sample households (Rabi crops)**

| Category | Sum of the crop area holding (ha) | Crop I | Crop II | Crop III | Crop IV |
|---|---|---|---|---|---|
| Marginal | 65.86 | Wheat (97.35%) | Berseem+ Oats (1.79%) | Vegetables including potato (0.48%) | Rapeseed and Mustard (0.36%) |
| Small | 29.03 | Wheat (95.83% ) | Berseem+ Oats (2.06%) | Vegetables(Potato & other veg.) (1.79%) | Rapeseed and Mustard (0.27%) |
| Medium | 20.77 | Wheat (88.25% ) | Vegetables including potato (9.63%) | Berseem+ Oats (2.48%) | - |
| Large | 27.70 | Wheat 88.30% | Vegetables including potato 10.10% | Berseem+ Oats 1.60% | - |

Figures in parentheses are the percentage of area occupied by a particular crop to the sum of crop area holding

**C. Livestock status of sample households**

Surveys on livestock status revealed that buff aloes are more common livestock as compared to cows in the study area. All categories of households possessed more number of buffaloes as compared to cows. Number of local cows was as good as that of crossbred cows in respect of marginal farmers, whereas, in respect of other farm households local cows outnumbered the crossbred ones. Total numbers of buffaloes in possession with all category sample farms was 273 whereas total number of cross bred & local cows with all sample farms was 30 & 53, respectively (Table 6).

Data on milk production reveals that among overall sample households per animal (cow+ buffalo) per annum milk production was 417 litres. Per animal per annum milk production varied from 486 litres among marginal farm house holds to 1232 litres among large farm households. Taking into consideration the value of total milk produce as well as that of total FYM production at the farm, income from livestock enterprise per annum ranged from Rs. marginal farms to Rs.29733 among large ones with an overall average value of Rs.13465 for all the sample farms surveyed (Table 7).

**D. Average farm Income from Sample farms**

Total income of sample households from main occupation i.e. agriculture was recorded to vary from Rs.78071/per year in respect of marginal households to Rs.164822/per year in respect of large households where as that from livestock component varied from Rs. 12484/- to Rs. 29733/- per annum, respectively for these categories Income from other sources i.e. wages, business etc. was highest for large households (Rs.136888) & least for marginal ones (Rs.14973).

Total farm income/annum for different categories was Rs. 105528, Rs. 151795, and Rs.197267 & Rs. 331443 in respect of marginal, small, medium and large households, respectively (Table 8).

**E. Predominant Farming Systems**

Analysis of survey results revealed that irrespective of the category of households Crops+Livestock was the major Farming system among all the sample farms. In respect of marginal farms 72% farm families were adopting Crops+Livestock farming system, 23 % were growing only crops whereas 5 % were growing field crops, vegetable crops & rearing animals. Similarly in other categories also Crops+Livestock was found to be the main farming system being adopted by 80 to 89 % of sample farms. Overall figure revealed that Crops+Livestock system was common with 74.5% samples, only crops with 20.9% samples and Crops +Livestock+Vegetables with 3.9% sample households (Table 9).

**F. Share of different enterprises in farm income on the sample farms**

Contribution of income from crop component to the total farm income in the sample farms varied from 49.7% among large sample farms to 73.9 % among marginal farms (Table 10). Overall contribution of crops averaged over all the categories in the sample farms was 62.50%. Income contribution from livestock component varied from 6.5 % in medium sample farms to 11.9 % in marginal ones .In fact Crops+ Livestock farming system was recorded to be the major farming system among all the categories & percent income contribution from this system to the total farm income varied from 58.7 % among large farms to 85.8% among marginal ones.

**Table 6. Total number of dairy animals on sample farms**

| Category | Crossbred Cows (no.) | Local cows (no.) | Buffalo (no.) |
|---|---|---|---|
| Marginal | 28 | 26 | 188 |
| Small | 2 | 5 | 45 |
| Medium | 0 | 9 | 27 |
| Large | 0 | 13 | 13 |
| Total | 30 | 53 | 273 |

**Table 7. Average numbers of dairy animals and milk production on sample farms**

| Category | Average number of Cows (No.) | Average number of Buffaloes (No.) | Milk production/ animal/ annum litre) (Cows + Buffaloes) | Total milk production (litre/ annum) Cows + Buffaloes (per household) | Income from livestock (Rs/annum) |
|---|---|---|---|---|---|
| Marginal | 0.22 | 0.77 | 486 | 481 | 12484 |
| Small | 0.19 | 1.25 | 632 | 913 | 16451 |
| Medium | 0.52 | 1.58 | 506 | 1071 | 12601 |
| Large | 1.44 | 1.44 | 1232 | 3560 | 29733 |
| **Overall** | **0.27** | **0.89** | **417** | **661** | **13465** |

**Table 8. Average farm income of different sample farms**

| Category of sample farm | Income from (crops) (Rs.) | Income from livestock (Rs.) | Income from other sources (wages, petty business, etc.) (Rs.) | Total farm income (Rs./annum) |
|---|---|---|---|---|
| Marginal | 78071 | 12484 | 14973 | 105528 |
| Small | 103687 | 16451 | 31657 | 151795 |
| Medium | 142524 | 12601 | 38142 | 193267 |
| Large | 164822 | 29733 | 136888 | 331443 |

**Table 9. Predominant Farming systems on sample Farms**

| Category of sample farm | Marginal | Small | Medium | Large | Overall |
|---|---|---|---|---|---|
| Crops only | 56 (22.9%) | 5 (13.8%) | 2 (11.7%) | 1 (11.1%) | **20.91** |
| Crops+ Livestock | 176 (72.1%) | 29 (80.5%) | 15(88.3%) | 8 (88.9%) | **74.50** |
| Crops+ Livestock+ Vegetables | 12 (4.9%) | - | - | - | **3.92** |
| Crops+ Livestock+ Fishery + | - | 1(2.7%) | - | - | **0.32** |
| Crops + Fishery ……. | - | 1 (2.7%) | - | - | **0.32** |
| **Total** | **244** | **36** | **17** | **9** | **306** |

Figures in parentheses are the percentage of house holds to the total number of house holds of a particular category

**Table 10. Share of different enterprises in farm income on the sample farms (per cent)**

| Farming systems | Marginal | Small | Medium | Large | Overall |
|---|---|---|---|---|---|
| Crops | 73.9 | 65.7 | 73.7 | 49.7 | 62.50 |
| Crops+ Livestock | 85.8(73.9+11.9%) | 76.1(65.7+10.4) | 80.2(73.7+6.5) | 58.7(49.7+9) | 71.65 |

**H. Constraints in integrated farming systems**

All sample households were interviewed to identify the constraints in integrated farming system. In general following constraints were recorded to be very common among all categories

**(a) Biophysical Constraints**

i) Lack of improved variety seed
ii) Lack of technical advice/know-how
iii) High cost of inputs (seed, fertilizer/pesticide)
iv) Improper method of weedicides application
v) Mineral deficiencies in livestock
vi) Lack of proper feed for animals
vii) Lack of access to veterinary service centre

**(b) Socio –economic constraints**

i) Lack of irrigation water
ii) Small and fragmented landholdings
iii) Menace of wild and stray animals

**Recommendations**

Majority of the farmers are marginal and small and there is high scope for the low cost and no cost technologies related to agriculture and animal husbandry. Such technologies need to be focused & then disseminated to farmers so that their rate of adoption may enhance.

Majority of the farmers particularly marginal ones did not have access to improved quality/recommended crop varieties seed for enhancing productivity at their farms. Hence some efforts are required to made in this respect so that improved quality seed which is one of the most important input is easily available to each & every deserving incumbent. Further concerned households need to be given proper training with respect to proper & scientific use of pesticides/ weedicides.

Also since majority of the farmer faced problem of stray animals, some low cost legally acceptable devices should be invented to keep such animals away from the farm.

For increasing productivity from livestock component, farmers need to be educated regarding benefits of mineral mixture supplementation, feeding with legume+ cereal fodder & benefits of feeding concentrates. Further veterinary service centres should be reasonably &easily accessible. This way milk production as well as productivity from livestock component can be increased.

More than 70 per cent farm women were surveyed to be involved in decision making in different processes related to crop & animal husbandry, hence need based training programmes are required to be organized for farm women.

Majority of sample farms (90% marginal sample farms & > 90% other categories) were surveyed to be possessing mobile phones. Hence efforts need to be made to provide free time to time agro advisory services to such farmers for needful farm operations at proper time and with proper procedure.

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