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Economics of Subsistence Farming: A Comparative Analysis of Paddy-wheat and Maize-wheat Rotation Cropping System in Himachal Pradesh

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ABSTRACT

Background: Marginalisation of Indian agriculture, due to increase in marginal and small agricultural households, brings the focus back on subsistence agriculture. Among other things, understanding the economics of subsistence agriculture will go a long way in making its practice viable by making sure the help that these subsistence farmers need are provided. Therefore, the present study attempts to study the economics of paddy-wheat and maize-wheat rotation cropping system practiced by subsistence farmers of Himachal Pradesh whose agriculture sector is known for its diversification towards high value crops.

Methods: The study has used survey data collected from 60 randomly selected households from Rait block of district Kangra, Himachal Pradesh. 30 households practicing paddy-wheat rotating cultivation are selected from Boh and Drini village and 30 households doing Maize-Wheat rotating cultivation are from Machhlini, Panjol, Khridi, Rulede and Lahri village. The study is based on primary data which has been collected through a pre-tested schedule. Using the primary data, we have brought out factors other than self-consumption needs that determines choice between two farming systems and also two group of farmers are compared in terms of productivity, cost of cultivation and net returns from cultivation.

Result: Our study found that irrigation facilities play an important role in the choice between the two cropping systems. Return from cultivation is negative for both groups of farmers if imputed value of family labour is included. Performance of paddy-wheat farmers is significantly better than maize-wheat farmers in economic terms in the study area.

Key words: Cost of cultivation, Cropping system, Irrigation, Net returns, Subsistence farming.

INTRODUCTION

Rice-wheat rotation is regarded as the principal cropping system in South Asian countries and the system is also widely prevalent in India and Himachal Pradesh (HP) (Mahajan and Gupta, 2009). In India around 12.3 million hectare (M Ha) is under Paddy-Wheat farming system (PWFS) and 85 per cent of total area under this crop rotation system fall in the Indo-Gangetic plains (Ladha *et al*., 2003) and optimum irrigation facilities can improve the yield (Kadasiddappa and Rao, 2018) and technical efficiency (Sharma and Sekhon, 2021) which have a positive impact on total produce from this system.

However, this system has given rise to issues like declining underground water table, ground water pollution, spread of diseases and insect-pest, degrading soil structure and declining soil health and declining crop response (Bajwa, 1993; Kukal and Aggarwal, 2003; Tyagi *et al*., 2012; Bhatt *et al*., 2016). Due to these reasons and decline in total factor productivity (TFPs) in this system, Swaminathan (2002) commented that a major part of India under PWFS may become food insecure. Much of the above-mentioned problems in the PWFS arise from paddy cultivation and therefore finding an alternate *Kharif* crop to paddy is often suggested. Also, there is evidence of reduction in nutrient deficiencies of soil and increase in productivity of land or water when paddy is replaced with maize (Bhatt *et al*., 2016; Chatterjee *et al*., 1987; Sur *et al*., 1981). There are two extreme ends of farming on development scale. At one end there is subsistence farming whose main aim is to meet self-consumption needs and at the other extreme there is commercial farming in which producers produce for market. RWFS and maize-wheat farming system (MWFS) are present in both types of farming. Commercial farmers have a profit motive but it is not clear whether subsistence farmers, besides consumption needs, evaluate their performance in terms of net returns or profit. Furthermore, there has been an increase in the number of landless labourers and small farmers and it has put huge pressure on land which has created negative effects on labour productivity (Bhalla,

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2014). More often than not, subsistence farmers fall in landless labour, marginal, or small farmer category. In India 85 per cent of 138.3 million land holdings are small holdings and 45 per cent 159.6 million ha of operated area are performed by small farmers (GoI, 2015-16). Due to this over crowdedness of Indian agriculture, viability and sustainability of farming by small farmers is under serious question (Chand *et al*., 2011). Himachal Pradesh (HP) is not immune to this problem. As per its Economic Survey-2018-19, 88 per cent of 9.61 lakh holdings are marginal and small holdings and 54 per cent of 9.55 lakh hectares of cultivated land are operated by marginal and small farmers. Furthermore, 51 per cent and 69 per cent of total food grain area of 7.53 lakh hectare are under PWFS and MWFS. Therefore, there is clear evidence that agricultural sector of HP is dominated by marginal and small farmers and more often than not these farmers are subsistence farmers. Further, as is the typical characteristic subsistence farming these farmers may be cultivating for the sole purpose of meeting their consumption needs with application in large quantity of family labour. However, it is not clear from available literature whether or not these subsistence farmers take into account economic factors such as productivity, returns from cultivation and so on when they decide their cropping pattern. The present study, therefore, attempts to study economics of subsistence farming by comparing two groups of farming households, one who practice paddy-wheat rotation cropping system and the other who practice maize-wheat rotation cropping system. The analysis will bring out the factors other than self-consumption needs responsible for households deciding between the two rotation cropping systems. Performance of both group of farmers on net returns and cost of cultivation of both cropping systems has been compared to see which of the systems is more profitable. Rest of the paper has been divided into three sections. Immediately following section deals with sample selection technique, data and methodology used in the study followed by discussion of results and then the last section contains conclusion and policy prescriptions. It has been found in the study that households practicing paddy-wheat rotation cropping are performing better on all economic indicators as compared to those who practice maize-wheat rotation cropping.

MATERIALS AND METHODS

The study has chosen HP as its study area as its agricultural sector, besides being the backbone of its economy along with tourism sector, is developed with cash crops (mainly fruits, seed potato, off-season vegetables and ginger) occupying a significant portion of its gross cropped area. The state also has a large percentage of area under food grains and as shown in previous paragraph there is a large presence of marginal and small farmers and hence it would not be wrong to comment that there is prevalence of subsistence farming in HP. In terms of production, three crops such as rice, maize and wheat occupy 93 per cent of total food grain production 1562 thousand metric tonnes in 2016-17. It has 12 districts out of which Kangra is chosen purposively as maximum cereal production comes from it. Out of the 15 blocks of this district, Rait block is again purposively chosen as in this block PWFS and MWFS are both used in a large number. Out of this block, selection of villages is done on the basis of judgement of the researchers and special care was taken to select those villages in which there is wide practice of either PWFS or MWFS. 60 households are randomly selected which consists of 30 households each practicing PWFS and MWFS. 30 households doing PWFS are from Boh and Drini village and 30 households doing MWFS are from Machhlini, Panjol, Khridi, Rulede and Lahri village. The study is based on primary data which has been collected through a pre-tested schedule. The data were collected in the month of December and January, 2020. Analysis of data has been done using descriptive statistic, averages, percentage, frequency *etc*. By using these tools, we have calculated key agricultural such variables as average land holdings, average production, per hectare productivity, per hectare cost, per hectare returns *etc*. for two groups of sample households. Calculation of cost of cultivation is done using A1 cost and total cost. A1 cost includes all cash expenses (which is paid for out of own pocket) done by the farmer and it includes expenses on fertilizer, weedicides and value of threshing and cleaning. Total cost includes A1 cost plus all other imputed value of own inputs and it includes family labour, seeds and manure. Net returns from both types of costs have been calculated to compare the performance of both group of households (households who practice PWFS are called paddy-wheat farming households or PWFH and other group is called maize-wheat farming households or MWFH). It is to be noted that PWFH and MWFH cultivate maize and paddy, respectively in *Kharif* season and they are their non-dominant *Kharif* crop. Therefore, their categorisation is justified as they are forced to cultivate these non-dominant crops purely for their consumption needs. Independent t-test has been used to see the statistical significance of the difference of mean of key agricultural variables of two groups of households.

RESULTS AND DISCUSSION

There was not much of a difference in so far as family size and average age of both categories of farming households were concerned. However, average family size was slightly higher for MWFH and average age of household members was slightly higher for PWFH. But a stark difference was seen in so far as distribution of sample households as per their social category. All the households of PWFS belong to general category and one third of sample households under MWFS belong to SC category although majority of these households belong to general category. In general, subsistence farmers own smaller size lands and from

Table 1 it can be derived that farmers of both systems fall under marginal category as PWFH and MWFH had only 0.8 and 0.79 ha of owned land, respectively. One revealing point was that, out of the total owned land, percentage of irrigated land was significant for PWFH unlike MWFH. To be precise, 56 per cent and a meagre 2 per cent of owned land was irrigated in case of PWFH and MWFH, respectively. Therefore, it was clear that besides consumption needs of subsistence farming households; irrigation facilities play an important role in the selection between PWFS and MWFS. Availability Irrigation facilities also seem to decide the amount of fallow land to be kept out of owned land. Amount of fallow land was significantly higher for MWFS (0.175 ha for PWFH in comparison to 0.31 ha for MWFH) and the entire size of this land was without irrigation facilities. Therefore, for subsistence farmers, irrigation facilities seem to decide the choice of cultivation and how much portion of owned land was kept as fallow land. There was a significant difference in the GCA of both categories of farmers with 1.237 ha GCA for PWFH and 0.782 ha GCA for MWFH. Why there was this much difference in GCA can be understood from Table 2 which contained in it the cropping pattern of both categories of households.

Before discussing Table 2, It needs to be pointed out that *Kharif* crops were grown between July and October; *Rabi* crops were grown between October and March and Zaid crops were grown between March and June in the study area. Zaid season was not the dominant season in terms of cultivation but vegetables such as cucumber, pumpkin, ladyfinger and brinjal were cultivated in this season to meet their consumption needs. Only 4 per cent and 5 per cent of GCA were cultivated in Zaid season for vegetable cultivation by PWFH and MWFH, respectively. Both the categories of farming households cultivated two crops in *Kharif* season. For example, PWFH allocated 20 per cent of GCA for maize cultivation and MWFH allocated 8 per cent of GCA for paddy cultivation. This was done mainly to meet their household consumption needs. Maize for PWFH and paddy for MWFH were their non-dominant *Kharif* crops. And true to their categorisation, in *Kharif* season PWFH and MWFH allocated 32 per cent for paddy and 38 per cent for maize, respectively. And in the *Rabi* season PWFH and MWFH allocated 48 per cent and 49 per cent of their respective GCA for wheat, respectively. The reason for the significant difference in the GCA of two groups was that PWFH allocated more area (0.20 ha) for maize cultivation than the 0.06 ha allocated by MWFH for paddy cultivation. And this was so because of the lack of irrigation facilities (98 per cent of owned land of MWFH was unirrigated) in the land owned by MWFH. The 8 per cent area of GCA allocated for paddy by MWFH was entirely without irrigation. This put them in a disadvantageous position compared to PWFH in so far as meeting household

Table 1: Farming system-wise demographic and social characteristics and land possession of sample households.

Average values of select variables	Unit	PWFS	MWFS
Family size	Number	3.06	3.66
Age of Household Members	Years	35.4	32.4
General category households	Percentage	100	62.3
Scheduled caste (SC) households		0	33.3
Other backward class (OBC) households		0	4.4
Owned land	Hectare	0.804	0.784
Irrigated owned land*	Percentage	56.29	1.92
Leased-in Land	Hectare	0.01	0
Fallow land		0.175	0.31
Unirrigated fallow land	Percentage	100	100
Gross cropped area (GCA)	Hectare	1.237	0.782

Note: PWFS and MWFS practice Paddy-wheat rotation cropping and Maize-wheat rotation cropping. *Main source of 95 per cent of irrigated owned land is Kuhl in case of with PWFS.

Source: Primary Survey, 2020.

Table 2: Farming system-wise cropping pattern in all seasons.

Farming	*Kharif*				*Rabi*		Zaid	
systems	Paddy (Ha)	% to GCA	Maize (Ha)	% to GCA	Wheat (Ha)	% to GCA	Other Crops* (Ha)	% to GCA
PWFS	0.40[a]	32	0.20[b]	16	0.59[c]	48	0.05[d]	4
MWFS	0.06[e]	8	0.30[f]	38	0.38[g]	49	0.04[h]	5

Note: a-97 per cent of the area is irrigated and sources of irrigation is Kulh; b-Zero per cent of the area is irrigated; c- 65 per cent of the area is irrigated; 95 per cent of area is irrigated; e- Zero per cent of the area is irrigated; f- Zero per cent of the area is irrigated; g-Only 3 per cent of area is irrigated; and h- Zero per cent of the area is irrigated.

Source: Primary survey, 2020.

consumption needs of paddy was concerned. It was clearer from Table 3 where farmer category-wise use of total production was shown.

As was the case with all subsistence farming households, majority of the produce of both farming households was used to meet their domestic consumption needs. It can be seen from Table 3 that PWFH had a very low marketable surplus of paddy, wheat and maize which they distributed among their relatives. A small portion of total produce was kept for seeds for the next season. Marketable surplus was only occurring in case wheat for MWFH. They also kept for seeds a small portion of produce of paddy, wheat and maize. Total produce of paddy and wheat for PWFH was significantly higher than that of maize and wheat for MWFH. It was interesting to note that although 81 per cent of wheat produced by PWFH was used for their consumption needs, a sizeable portion was kept for seeds (14.6 per cent to be precise). Same was the case for MWFH in so far as paddy was concerned. The entire number of vegetables produced in the Zaid season by both categories was used for their self-consumption. Efficiency of production by both farming households can be known only when there was a comparative analysis of per hectare production of each crop in both quantity and monetary terms and this was presented in Table 4. Only productivity in monetary terms was presented for other crops and total as variety of vegetables produced in Zaid season cannot be aggregated in quantity terms as was done for cereal crops.

It was evident from Table 4 that productivity of paddy was higher than that of wheat in both quantity and monetary terms for PWFH. Productivity of other crops, mostly seasonal vegetables, was also higher for PWFH in comparison to that of MWFH. In case of MWFH, productivity of maize was higher than that of wheat in quantity terms but in monetary terms the latter was higher than former primarily because of the low price of maize in comparison to wheat. The interesting result that was coming out of this table was that in the *Kharif* season, crop decisions were also based on higher productivity by both group of farmers. For example, productivity of paddy was significantly higher for PWFH than that of MWFH. However, productivity of maize was higher for MWFH. Here it must be recalled that percentage of irrigated area was higher for PWFH. This was reflected in higher productivity of paddy. So, when it came to choosing between paddy and maize, it was obvious that PWFH chose paddy and MWFH chose maize as their dominant *Kharif* crop. However, in *Rabi* season, both groups cultivate wheat purely on domestic consumption criterion. But it must be underlined again that productivity of wheat in both quantity and monetary terms was higher for MWFH than PWFH. Cultivation of maize in Kharif season may had something to do with this difference in productivity. The reasons for this difference in productivity had clearer when we look at Table 5 which presented per hectare input use for each crop and for both categories of farming households.

Higher productivity of paddy in comparison to wheat in for PWFH can be explained through factors like higher number of labour days, higher quantity of urea and manure and increased application of weedicides. All these inputs were used in higher quantity in paddy cultivation in comparison to wheat cultivation by PWFH. Paddy and maize cultivation were more labour intensive than wheat in case of PWFH. Per hectare application of urea was higher for paddy but if we take into account higher quantity of N:P:K used in wheat then per hectare application of total fertilisers was higher in wheat cultivation in case of PWFH. However, productivity of wheat for MWFH was higher in comparison to other cereal and other crops despite using comparatively

Table 3: Use of total production for own consumption needs, seeds and marketable surplus (Percentages).

Crops	PWFS			MWFS		
	Home consumption	Kept for seeds	Marketable surplus	Home consumption	Kept for seeds	Marketable surplus
Paddy	91.8	5.6	2.6	92.2	7.8	0.0
Wheat	81.2	14.6	4.2	90.2	5.7	4.1
Maize	89.1	5.9	5.0	97.0	3.0	0.0
Other crops	100.0	0.0	0.0	100.0	0.0	0.0

Note: Average production of PWFS and MWFS for paddy, wheat, maize and other crops (in Kg) is 760 and 52.5, 475 and 417.5, 198.5 and 362.5 and 87.5 and 68.8, respectively.

Source: Primary Survey, 2020.

Table 4: Comparison of productivity (quantity and monetary) per hectare of land.

Farming	Paddy		Maize		Wheat		Other crops		Total	
systems	Qty	Value	Qty	Value	Qty	Value	Qty	Value	Qty	Value
PWFS	1914	45554	1005	17589	799	23171	1823	54688	1230	36797
MWFS	882	20956	1210	21181	1093	31695	1698	50926	1153	28469

Note: Qty is quantity in kg and value is in rupees. Value of production is calculated by using prices told by the respondent farmers during primary survey.

Source: Primary Survey, 2020.

lesser quantity of per hectare labour, urea, total fertilisers and own labour. But, there was a significantly higher application N:P:K and weedicides for wheat cultivation by MWFH in comparison to their *Kharif* and Zaid crop. One clear picture that was coming out is that, for PWFH and MWFH, *Kharif* crops were more labour intensive than *Rabi* crop. And for Zaid crops both categories of farmers were using a higher quantity of manures may be to get fertiliser and pesticide free vegetables for home consumption. Both categories of farmers were also using higher N:P:K in the cultivation of wheat.

Input-wise percentage of total per hectare costs (Table 6) throws some interesting results. Following the typical characteristics of subsistence farmers, all the crops grown by both categories of farming households were highly labour intensive. The advantage for these farmers was that labour was family labour and hence they did not have to pay any wages for it. Another point was that non-important cereal crop, maize for PWFH, had the highest percentage of imputed labour crops among all crops. And this crop which was the main *Kharif* crop for MWFH was also having the highest share of imputed labour cost in total cost. So, it was clear that among all *Kharif* crops maize was the highest labour-intensive crop. Apart from imputed costs (which arises for labour, seed and manure) actual paid out costs (involving fertilisers, weedicides, threshing and cleaning) were not beyond 15 per cent irrespective of crops and farmer category. Higher share of imputed costs of manure was observed in Zaid crops for both farming households. Per hectare cost of paddy and other crops were lower for PWFH in comparison to the same for MWFH. On the other hand, per hectare costs of maize and wheat cultivation of MWFH was lower in comparison to the same of PWFH. Therefore, when we combine per hectare productivity in monetary terms and per hectare costs of paddy, wheat and maize selection of rotation crops by both groups of subsistence farming households were justified on the grounds of higher net returns. It was to be recalled that for PWFH productivity in monetary terms (in particular) was higher in case of paddy and for MWFH same was higher for maize. Therefore, besides consumption needs, choice of rotation crops was based on such economic factors as higher returns and lower costs per hectare.

Combining all the crops and after calculating farming household wise per hectare gross returns, paid out costs (Cost A1), paid out costs plus imputed costs and net returns over these costs' figures were presented in Table 7. It can be seen that both farming households were experiencing positive net returns only over paid out costs/all cash expenses. However, net returns turn negative when imputed costs were included and then returns were calculated. In comparison to MWFH, per hectare gross returns, per hectare costs (both types), net returns over A1 and net returns over all costs were higher for PWFH. So, PWFS were performing better in economic terms. However, MWFH were experiencing lower per hectare costs in comparison

Table 5: Farming system-wise per hectare input use.

Inputs	PWFS					MWFS				
	Paddy	Maize	Wheat	Other crops	All crops	Paddy	Maize	Wheat	Other crops	All crops
Family Labour (In days)	54.5	63.8	37.3	103.1	49.7	57.1	58.1	42.4	112.3	53.2
Seed (In kg)	110.3	61.8	124.1	NA	115.2	89.9	42.7	85.6	NA	77.9
Manure (In quintals)	2.5	4.8	1.7	19.4	3.2	3.8	3.2	2.5	24.7	3.9
Fertilizer Urea	78.3	94.4	63.8	0.0	70.9	54.6	56.9	43.9	0.0	47.5
(In kg) N:P:K	0	0	48.86	0	23.49	0	0	7.85	0	3.83
Total	78.3	94.4	112.6	0.0	94.4	54.6	56.9	51.8	0.0	51.3
Weedicides (In packets)	9.7	0.0	0.3	0.0	3.3	0.0	0.5	7.2	0.0	3.7

Note: NA means not available.

Source: Primary Survey, 2020.

Table 6: Farming system-wise and crop-wise percentage distribution of per hectare input costs.

Inputs	PWFS					MWFS				
	Paddy	Maize	Wheat	Other Crops	All Crops	Paddy	Maize	Wheat	Other Crops	All Crops
Imputed value of labour	63	69	59	50	61	62	73	64	48	65
Seeds	9	5	14	9	10	7	4	9	7	7
Manure	13	23	11	41	17	21	17	16	45	21
Fertilisers	2	2	7	0	4	1	1	2	0	1
Weedicides	3	0	0	0	1	0	0	0	0	0
Threshing and cleaning	10	2	8	0	7	9	5	9	0	6
Total Cost/hectare (Rs)	30097	32508	22154	72368	39765	32396	27685	23222	82529	35993

Note: All figures are in percentages unless otherwise mentioned.

Source: Primary Survey, 2020.

to PWFH. When all imputed costs were included, then returns of MWFS were significantly lower than that of PWFH. In monetary terms, subsistence farmers under PWFH and MWFH were generating positive net returns out of crop cultivation over A1 cost to the tune of rupees 24507 and rupees 19802, respectively. However, as their GCA was low and different, annual income from cultivation of these two groups was the actual figure we would like to see which was presented in Table 8.

Form this table we can see that livestock was an important source of income for subsistence farmers. Share of gross revenues from livestock in total income was around 60 per cent for both groups of farming households. Annual income from cultivation was rupees 30312 and rupees 15477 for PWFH and MWFH, respectively. Total annual income from agriculture of PWFH and MWFH (which was the major source of income for these households) stands at rupees 73834 and rupees 38854, respectively which in itself was very low. In comparison to PWFH, annual income of MWFH from agriculture was significantly lower. It may be the case that those who had lower percentage of irrigated land and whose income level was low were choosing maize-wheat rotation cropping and due to its low economic benefit, they were trapped in this vicious circle. And purely on economic terms, the agricultural performance of MWFH was very low in comparison to MWFH.

Results of mean difference on the basis of t-test were shown in Table 9 to see the comparative performance of both PWFH and MWFH on some select variables. Productivity in monetary terms were higher for PWFH (as the mean difference was rupees 8328) and was statistically significant at 10 per cent level which indicated that subsistence farmers of PWFH were more productive than those of MWFH. Similarly, mean difference for application of weedicide, fertiliser and N:P:K were statistically significant indicating the fact that application of all these inputs were higher in the case of PWFH. When it came to all cash expenses during cultivation and profit from crop cultivation over all cash expenses, mean difference was positive and significant. So, in these two variables also PWFH had an advantage over MWFH.

Table 7: Farming system wise comparison of productivity, costs and net returns.

Farming system	Per hectare productivity	Per hectare cost over		Per hectare profit over		Total profit over	
		All cash expenses	All cash expenses +Imputed value	All cash expenses	All cash expenses +Imputed value	All cash expenses	All cash expenses +Imputed value
PWFS	36797	12289	39765	24507	-2968	30312	-3671
MWFS	28469	8668	35993	19802	-7523	15477	-5880

Note: All values are in rupees.
Source: Primary Survey, 2020.

Table 8: Farming system wise annual returns from agriculture.

Farming system	Income from cultivation		Gross revenue from livestock		Total income	
	Total (Rupees)	% Share	Average (Rupees)	% Share	Average (Rupees)	% Share
PWFS	30312	41	43522	59	73834	100
MWFS	15477	40	23377	60	38854	100

Note: Incomes and gross revenue are annual figures.
Source: Primary survey, 2020.

Table 9: Testing the significance of difference of mean values of select variables for paddy-wheat farmers and maize-wheat farmers.

Variables	Mean difference (rupees)	t-value
Per hectare productivity of all crops in value terms	8328***	2.841
Per hectare value of weedicide	350*	7.462
Per hectare total value of fertilizer	1525*	6.627
Per hectare value of N:P: K used in wheat	1295*	7.079
Per hectare value of manure in all crops	-668	-.358
Per hectare value of labor in all crops	247	.092
Total fallow land (hectare)	-.135	-1.277
Per hectare cost with all cash expenses	3621*	4.222
Per hectare cost with imputed and all cash expenses	3772	.743
Per hectare profit with all cash expenses	4706***	1.945
Per hectare profit with imputed and all cash expenses	4555	1.066

Note: *Significant at 1% level, ** Significant at 5% level, ***Significant at 10% level.
Source: Computed by the authors.

CONCLUSION

There is a consensus on the point that subsistence farmers take cropping decisions purely on the basis of their self-consumption needs. However, from our study, it is amply clear that apart from this factor other factors such as availability of irrigation faculties and productivity are deciding the crop choice particularly for *Kharif* season. And productivity is further affected positively by adequate irrigation facilities. Therefore, MWFH are choosing maize as their dominant *Kharif* crop as they have comparatively low percentage of irrigated land. This puts them in a very disadvantageous position as the return from paddy of PWFH is much higher than that of maize of MWFH. Both farming households earn positive net returns from cultivation largely because they employ their own labour for which there are no costs. If we take out this component then their farming practice is not sustainable. However, PWFH are performing lot better than MWFH in so far as key agricultural variables like per hectare productivity, per hectare application of fertilisers and weedicides and per hectare profit are concerned. But even with possession of abundant labour both the farming households are not able to generate respectable annual income from cultivation as their land size is very small. Therefore, higher percentage of annual income from agriculture comes from livestock (primarily cows). Following are the policy prescriptions which can significantly improve the economic conditions of subsistence farmers. First, there is a need to provide irrigation facilities to MWFH so that they can take better crop decisions. At this moment, they are handicapped and are left with no choices to choose maize in *Kharif* season. Second, there is a need to provide them higher leased-in land in favourable terms in their own area so that their abundant labour is better put to practice. This can be done by bringing in fallow land in those areas and then allotting them to these subsistence farmers. Third, there is a need to focus on improving their livestock resources so that their annual income is increased. And by taking note of their abysmally low annual income from agriculture in general and crop cultivation in particular, these households need to be brought under better social security programmes so that their economic conditions are protected.

Conflict of interest

All authors declare that they have no conflict of interest.

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