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## **Scarcity of Agricultural Labour in Cold-Arid Ladakh: Extent, Implications, Backward Bending and Coping Mechanism<sup>§</sup>**

**S.H. Baba\*, M.H. Wani, F.A. Shaheen, Bilal A. Zargar and S.S. Kubrevi**

Division of Agricultural Economics & Marketing, Sher-e-Kashmir University of Agricultural Sciences & Technology of Kashmir, Shalimar Campus, Srinagar-191 121, Jammu & Kashmir

### **Abstract**

This paper has investigated the extent of agricultural labour shortage, its implications and combating strategies in a cold-arid eco-region of Ladakh in Jammu & Kashmir. The study has observed that the intensity of male agricultural labour has decreased and of female labour has increased in the cold-arid region of Ladakh, thereby, suggesting imparting of professionalism through extension trainings and other capacity building programmes among female labourers. Regression analysis has revealed that the extent of mechanization, literacy and income of non-agricultural workers are significant and negative determinants of labour availability, while improvement in landholding size and land productivity would significantly improve their supply to the farming sector. At the farm level, labour scarcity has been estimated at 27 per cent in fodder to 70 per cent of total labour requirement in apricot. Labour shortage, especially during critical farm activities, has negative implications on farm profitability and productivity levels. Farmers have adopted various strategies to combat labour scarcity, but an optimum strategy seems to be still absent. Out-migration of rural labour has been observed as a regular livelihood-security gesture in the villages. Higher number of labour days and in turn, higher annual income has been found in the non-farm avenues. Interaction of variables like wage rates and tourism in the Ladakh region has resulted in backward bending of labour supply in agriculture. On the basis of findings of this study, a few policy suggestions have emerged which include linking of production with marketing through value addition to engage labour for most part of the year and innovation in the form of location and farm-size specific machines to combat labour scarcity. Study has also emphasized on encouragement of micro-agricultural enterprises and labour exchange system as a viable strategy to reduce severity of labour scarcity problem.

**Key words:** Labour scarcity, Implications of labour scarcity, Coping strategies for labour scarcity

**JEL classification:** J21, J23

### **Introduction**

Agricultural labour is a vital input in the agricultural production system in India. The phenomenon of under-employment is manifested in daily lives as a large

proportion of labour demand is met by wage labour, due to the skewed land distribution and seasonality of demand in agriculture. They usually get low wages, undertake labourious jobs and have highly irregular employment (Padhi, 2007). Agricultural labourers are at severe risk of poverty that permits routes out of agricultural labour, particularly across generations; however, agricultural labourers are not generally well placed to take advantage of them and mobility out of agricultural labour remains low (Dreze *et al.*, 1992). The labour market is characterized by a very low level of labour tying and interlinkages; payments to casual labourers may be in the form of piece rates or daily

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\* Author for correspondence,  
Email: shbaba@rediffmail.com; drshbaba@gmail.com

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wages and there is involuntary unemployment and wage stickiness in the slack season (Mukherjee, 1994). Though free market operation is not beneficial to agricultural labourers (Senthilnathan and Varadarajan, 1993), the process of new agricultural technology diffusion has benefitted the agricultural labourers and if this trend continues, the absolute income disparities between labourers and owners of land and capital will decrease (Reddy, 1994). Scholars have suggested that the problem of exploitation must be addressed to avoid rising agrarian tension and unrest (Chakravarti and Sethia, 1991). To sum up, over the past couple of decades there is a growing concern that the farm labour has been decreasing which has been caused by occupational change, people mindset, government policies and reforms, making it imperative to investigate into the dynamics/scarcity of agricultural labour in relation with associated implications.

Although plethora of references are available in literature on this theme, this kind of research output with respect to Himalayan state, Jammu & Kashmir (J&K) appears to be scanty. Moreover, farmers' response to labour scarcity and their strategies to overcome this problem have not received much attention even at the national level. Therefore, it becomes imperative to capture the entire gamut of relationship between labour dynamics, agricultural productivity and coping mechanism of labour scarcity in the state.

### Data and Methodology

J&K is an agrarian state, wherein agricultural sector contributes 27 per cent to the state gross domestic product and provides direct livelihood to about 49 per cent of the workforce (DES, 2008-09). It has four distinct agro-climatic zones, each providing specific production environment to livestock mix and crop enterprises. This study was conducted in Cold-arid Zone of the state purposively based upon higher extent of labour scarcity/migration, especially due to spurt in tourism sector. The study is based upon both secondary and primary data. While the secondary data were collected from various published reports of Directorate of Economics & Statistics (DES), Government of J&K, primary data were obtained from 200 sample respondents distributed equally in two blocks (Leh and Khamti) from the Leh district that constitutes major proportion of Cold-arid Eco-region of Ladakh. In addition, 62 labours were also interviewed for required information.

To quantify the determinants of labour availability, an agricultural labour availability model of the following structural form was developed with various exogenous variables on the basis of possible impact on endogenous variable and estimated in linear form employing ordinary least square procedure (OLS):

$$AGLB = f(LIT, LPD, MECH, CI, INCNAG, AHS, U) \dots(1)$$

where,

AGLB = Agricultural labour (No. per '000 ha of total cropped area),

LIT = Rural literacy (%),

LPD = Agricultural land productivity in the state (AGDP/ha of total cropped area),

MECH = Mechanization [(tractors + power tillers)/ha of net sown area],

CI = Cropping intensity (%),

INCNAG = Income of non-agricultural workers (non-agricultural gross domestic product per non-agricultural worker),

AHS = Average holding size (ha), and

U = Error-term

### Results and Discussion

Recently there has been an apprehension regarding scarcity of skilled/unskilled labourers especially in the activities that demand them more. In this direction the structural changes in agricultural labour have been discussed in the first section.

#### Structural Changes in Agricultural Labour and Gender

The figures documented in Table 1 revealed that the proportion of agricultural workers in total workforce in the state declined from 73 per cent in 1971 to 47 per cent in 2011, though their absolute number has increased over the years. State agriculture is gradually diversifying in favour of horticultural crops, especially vegetables and fruits (Baba *et al.*, 2010; Wani *et al.*, 2009). This agricultural phenomenon coupled with increase in area under labour/capital-intensive HYVs demand that the proportion of agricultural workers and labourers in particular should have increased in the state. It is interesting to note that agricultural labourers constitute

**Table 1. Growth of agricultural work force in J&K**

Year	Total agricultural workers (%)		Labour/ '000 cultivators	Total agricultural workforce ( <sup>'000</sup> No.)	Agricultural workers (% of total workers)	Total workers ( <sup>'000</sup> No.)
	Agricultural labourers	Cultivators				
1971	4.50	95.50	5	932	72.98	1277
1981	5.79	94.21	6	1097	60.31	1819
1991	10.56	89.44	12	1468	52.69	2786
2001	13.41	86.59	15	1838	48.96	3754
2005	14.25	85.75	17	1986	47.96	4141
2011	15.30	84.70	18	2208	46.77	4721
CGR (%)	5.70*	1.96*	3.74*	2.30*	68.25*	3.37*
SE	(0.14)	(0.02)	(0.13)	(0.03)	(50.00)	(0.06)
Prop. change	8.06	2.10	3.83	2.37	0.64	3.70

Note: \*Denotes significance at 0.05 probability level or better level

only 4 per cent of the total workforce depending on the agricultural sector and there has been about four-fold increase in their proportion towards 2011. On the other hand, though cultivators in absolute terms have grown at an annual rate of about 2 per cent, their proportion in total agricultural workers has gone down. Further, the ratio of agricultural labourers to cultivators has improved gradually since 1971, but still only 18 labourers are available to one thousand cultivators. It could accordingly be inferred that cultivators employ their own family members for performing various farming activities and hire only 15 per cent of labour during a year or resort to other coping mechanisms like hiring of labour from other regions that need to be investigated comprehensively to put forth pragmatic policy suggestions to sustain agricultural system with available labour.

Over the years, the dynamics of agricultural labour is expected to appear differently in different geographical regions of the state. It is clearly visible from Table 2 that while the number of agricultural labourers per thousand hectares of cropped land has gone up in Kashmir and Jammu region, it shows a significant decline in the Ladakh region, despite increasing area under labour-intensive vegetable cultivation. The increasing number of tractors/power tillers in this region compared to other regions of the state might have displaced few a male labourers.

This decline of agricultural labour in the Ladakh region was exclusively due to the decline in male labour

which is expected to migrate out of farming business (Table 3). The agricultural labour force in this region is shifting in favour of female labour. The female labourers are increasing at an annual growth rate of about 2 per cent while male labourers have declined significantly since 1971. This scenario signifies that future farming in this region would increasingly depend on the female labour, demanding improvement in its skill through professional trainings. Since Ladakh region has experienced a decline in labour, an attempt has been made to quantify the determinants of agricultural labour availability per unit of area in this region.

#### Determinants of Labour Availability

Agricultural labour availability model was developed to quantify the determinants of labour availability per unit of area and its estimates have been presented in Table (4). The regression estimates of land productivity (agricultural gross domestic product per hectare of total cropped area) and average size of holding were positive and significant determinants of labour supply. The labour productivity may improve income of the cultivators that could lead to an increase in real wage rates constantly over the years and in turn labour supply. This would encourage agricultural labourers to keep associated with farming with constantly rising wages. The average size of holding also turned out to be positive implying that holding size is also moving in the same direction with the declining labour supply in this region. Ceiling on further fragmentations and more complex phenomenon of land

**Table 2. Number and ratio of agricultural labourers in various regions of J&K**

Year	Kashmir			Ladakh			Jammu			J&K		
	Agricultural labourers		M	Agricultural labourers		M	Agricultural labourers		M	Agricultural labourers		M
	'000No.	PH TCA		'000No.	PH TCA		'000No.	PH TCA		'000No.	PH TCA	
1981	32134	84	-	3164	159	-	28242	49	-	63540	65	-
1991	102785	253	3	3142	150	0	49054	75	2	154981	144	2
2001	173436	417	5	3120	149	10	69865	104	7	246421	223	6
2005	201696	497	6	3111	147	14	78190	116	8	282997	257	8
2011	244087	603	8	3098	144	20	90676	128	11	337862	297	10

Note: M = Mechanization (tractor + power tillers/'000 hectares of total cropped area)

PH TCA = Agricultural labourers/'000 hectares of total cropped area

**Table 3. Gender-wise labour growth in various regions of J&K**

Year	Kashmir			Ladakh			Jammu			J&K		
	M	F	T	M	F	T	M	F	T	M	F	T
1981	96.89	3.11	32.13	66.53	33.47	3.16	94.36	5.64	28.24	94.26	5.74	63.54
1991	81.45	18.55	102.79	58.96	41.04	3.14	80.61	19.39	49.05	80.73	19.27	154.98
2001	78.59	21.41	173.44	51.28	48.72	3.12	75.05	24.95	69.87	77.24	22.76	246.42
2005	78.01	21.99	201.70	48.18	51.82	3.11	73.65	26.35	78.19	76.48	23.52	282.99
2011	77.39	22.61	244.09	43.5	56.5	3.10	72.04	27.96	90.68	75.64	24.36	337.86
CGR (%)	5.48*	9.35*	6.03*	-1.48*	1.66*	-0.07*	2.92*	7.57*	3.74*	4.55*	8.16*	5.15*
	(0.24)	(0.85)	(0.29)	(0.02)	(0.02)	(0.00)	(0.06)	(0.49)	(0.11)	(0.16)	(0.59)	(0.21)
Prop. change	6.07	55.30	7.60	0.64	1.65	0.98	2.45	15.92	3.21	4.27	22.55	5.32

Note: M = Male, F = Female, T = Total agricultural labourers ('000 No.), and CGR = Compound growth rates

Figures within the parentheses indicate standard errors

consolidation would definitely allure agricultural labourers by improving magnitude of work available to them and revenue to the farm families per year. On the other hand, income of non-agricultural population would definitely attract rural youth and hence decrease availability of agricultural labour and the regression coefficient of this variable support this relationship. Another variable that has negatively contributed to the improvement of agricultural labour supply is the extent of mechanization. Employment of power tillers and tractors on farm has replaced a big part of labour force making its non-availability when they are critically required. In this way, mechanization in the form of location-specific digging/cutting/harvesting tools would be a better strategy against labour scarcity in the region.

### Socio-economic Profile of Sample Farmers

The majority of farmers (96%) belonged to either small or marginal farm category (Table 5), with average holding size of 19.2 kanals. Only 4 large farmers in the sample had 65.5 kanals land per farm. The crops grown in the study area were wheat, vegetables, apricot and fodder and were grown under irrigated conditions. Male members outnumbered females; sex ratio being 938 females per 1000 males. This ratio coupled with male migration had made scarcity of agricultural labour for performing various farming activities. About 66 per cent members of farm families had agriculture as the main occupation though some might have other subsidiary occupations also. Over 19 per cent members were

**Table 4. Regression estimates of labour availability equation**

Particulars	CONST	LIT	LPD	INCNAG	MECH	AHS	CI	Adj. R <sup>2</sup>
Regression coefficients	0.57	-9.89*	+1.76*	-0.59*	-2.89*	+7.11*	-0.66	0.7988
	(0.11)	(0.40)	(0.12)	(0.10)	(0.24)	(0.13)	(0.72)	

Note: \* Denotes significance at 0.05 or better probability level and figures within the parentheses indicate standard errors

**Table 5. Socio-economic features of sample households**

Particulars	Value
Average holding size (kanal)	
Small (< or = 2ha)	17.29 (96)
Large (> 2ha)	65.5 (4)
All	19.21 (100)
Family size (No.)	
Male	2.90 (51.60)
Female	2.72 (48.40)
Total	5.62 (100.00)
Sex ratio	938
Age of family members (%)	
Birth – 4 years	4.60
04-10 years	11.60
10 to 30 years	24.40
20-30 years	10.80
30-50 years	37.70
> 50 years	10.90
Family education (%)	
Illiterate	9.96
Pre-schooling	5.16
Primary	28.17
Middle	31.47
Secondary	24.18
Above	1.07
Main occupation (%)	
Agriculture	65.57
Service	19.76
Labour	5.59
Dependants	9.08

Note: Figures within the parentheses indicate percentage

employed in serving corporate/government offices and 9 per cent were completely dependents. The proportion of agricultural labourers among members of farm families was low, to the tune of only about 6 per cent and this was really a concern for sustainable farming.

### Extent of Labour Shortage: Causes and Out-migration

Only three types of labourers were seen at the farms in study area: (i) family labour, (ii) hired labour from within or outside village, and (iii) different combinations of both types of labour. The majority of farmers used both family and hired labour. To find the extent of scarcity, farmers' responses regarding labour scarcity were obtained for each crop grown in the study area separately. It was observed that in raising one kanal of wheat crop, a total of 58 hours labour service was required, of which only 33 hours was available and a shortage of 25 labour hours (43%) was observed. Similarly, the productive labour service required for raising one kanal of different crops along with the perceived shortage has been presented in Table 6.

The scarcity of labour in the study area was responsible for the current cropping pattern in the study area with characteristics of area allocation towards less labour-intensive crops. Besides, farmers reported that scarcity of agricultural labour causes delay in crop establishment (40% farmers), poor crop growth (52% farmers), no or untimely weeding (49 % farmers), irrational use of fertilizers (61% farmers) and insufficient irrigation to crops (69% farmers). These implications of labour scarcity in the Ladakh agriculture if left unattended may discourage farmers who may leave their land as fallow and shift to non-agricultural avenues for livelihood.

#### (a) Causes of Labour Shortage

The reasons for labour scarcity as perceived by the farmers in the Ladakh region are given in Table 7. The 'sophistication in non-farming jobs' has been reported (by 88% farmers) to be a major cause of labour shortage in farming. It is followed by 'negative attitude of the educated youth towards agriculture', as reported by 81 per cent of farmers, 'More physical exertion in farming' (72% farmers), and 'Employment opportunities in security forces especially post-Kargil war period in

**Table 6. Extent of labour scarcity in the Ladakh region**

Crop	Labour requirement (hours/kanal)	Labour shortage		Farmers reporting shortage (%)
		(hour/kanal)	% of requirement	
Wheat	57.6	24.5	42.6	83.0
Fodder	23.0	6.2	27.0	47.0
Vegetables	264.0	151.6	57.4	81.0
Apricot	94.9	66.2	69.8	59.0

**Table 7. Causes for labour scarcity as reported by farmers in the Ladakh region**

Cause	Responses	
	No.	%
Sophistication in non-farming jobs	176	88.00
More working days per year in non-farm jobs	87	43.50
Availability of services in security forces (especially post-Kargil war)	81	40.50
Higher wage rates in non-farm jobs	77	38.50
Glamour in tourism related activities	122	61.00
More physical exertion in farming	143	71.50
Negative attitude of educated members towards farming	162	81.00
Use of tractors	46	23.00
Other (including MGNREGA jobs)	83	41.50

Ladakh' (41% farmers). Moreover, farmers reported that migration of male workers to the nearby Leh city to work in tourism-related activities due to its glamorous nature had reduced the supply of farm workers. Seasonal nature of farming jobs and availability of jobs for more days per annum in non-farm jobs was also highlighted as a reason for labour shortage in farming. Among the respondents, only 41 per cent perceived engagement in government construction works including under MGNREGA as one of the reasons for the less availability of agricultural labour in the region.

#### (b) Out-migration to Non-farming Sector

An attempt was also made to find the pattern of employment of out-migrants from the Ladakh region. It was found that as high as 22 per cent of respondents were appointed in permanent government jobs, mostly in security forces and other 3 per cent were found working on daily wages or on contract basis in private/government offices (Table 8). About 19 per cent of out-migrants were engaged in shops and 16 per cent in hotel business. Though more than 70 per cent of labourers have migrated to other occupations, still a very high proportion (34%) was engaged in the agricultural sector either as skilled (6%) or unskilled

(28%) labour. The higher wage rates could be responsible for the out-migration of agricultural labourers. In this context Table 8 revealed that agricultural labour wage rates were higher compared to some other employment avenues, except commission agents and permanent employment, but it is interesting to see that despite higher wage rates only 34 per cent of labour respondents were engaged in agriculture because of the fact that it provided employment to them for only 60 days (to unskilled labourers) and 30 days (to skilled labourers) per year. The employment days in other non-agricultural jobs were reported to be higher which resulted in higher labour income per year. In this way, these sectors not only engage rural labour for more number of days than agriculture but also provide them higher income per year. Consequently, there is shortage of labour in agriculture.

#### Implications of Labour Scarcity

The scarcity of labour and utilization of inexperienced members of family or migrated labourers from other regions may have implications in the form of less labour-intensive cropping pattern and lower productivity level.

**Table 8. Out-migration of agricultural labourers and corresponding wages and annual income**

Employment	Wage rate (₹/day)	Working days (No./year)	Labourers (%)	Annual income (₹)
Government service				
a. Permanent	400	365	18	1,46,000
b. Ad-hoc	150	300	8	45,000
Hotel and restaurant	170	150	14	25,500
Tourist guide	200	110	2	22,000
Shop salesman	180	250	14	45,000
Transport	200	230	2	46,000
Commission agent	300	125	1	37,500
Agricultural labourer	265	45	34	11,925
a. Unskilled	180	60	28	10,800
b. Skilled	350	30	6	10,500
Others (including MGNREGA)	200	150	6	30,000

**(a) Cropping Pattern in Favour of Less Labour-intensive and Less Profitable Crops**

Farmers in the study area allotted more area under wheat followed by fodder, apricot and vegetables. The current cropping pattern has emerged owing to interplay of resource endowments and availability of labour. The existing cropping pattern gave annual net revenue of ₹ 7604/kanal out of which vegetables appeared to be a highly profitable enterprise, followed by apricot and wheat. In consonance with relative profitability of crop enterprises, the higher proportion of cropped area should have been allocated to vegetables and apricot; however, as perceived by the farmers, the scarcity of labour has compelled them to allocate the major proportion of cropped area to less labour-intensive crops like wheat (55.6%). The irrigation water is critical input for raising vegetable crops and this facility was available

on 84 per cent of total cropped area (Table 9). Despite this facility and the presence of other favourable factors, only 8 per cent of the total cropped area was allocated to vegetable crops. Similarly, only 13 per cent of cropped area was allocated to apricot.

Driven by labour scarcity, the existing cropping pattern is less profitable compared to optimum cropping plan. Accordingly, reallocation of cropped area in favour of profitable crops like vegetables and apricot would have higher pay-off not only in the form of higher net revenue per farm but also through multiple cropping of vegetables with the existing level of input-use per kanal. If 50 per cent of area under different crops, other than vegetables is brought under vegetables, then the farm profit would increase by over ₹ 22,000/farm and if 75 per cent of it is brought under vegetables then profit would increase by over ₹ 33,000/farm. The decline in

**Table 9. Labour scarcity and cropping pattern in the study area**

Crop	Area (kanal)	% of total cropped area	RFFR	Labour shortage (%)
Wheat	8.2	55.6	1.77	42.6
Fodder	3.4	23.1	1.63	27.0
Fruits	2.0	13.3	1.92	57.4
Vegetables	1.2	8.0	2.2	69.8
Total cropped area	14.8	100.0	-	-
Irrigated area	12.4	83.8	-	-
Cultivated area	14.3	-	-	-
Cropping intensity (%)	-	103.7	-	-

Note: RFFR = Return to farm fixed resources



**Table 10. Expected gains in profitability due to shift in area towards vegetables and apricot**

(₹/farm)

Crop	Existing farming system		Gains in profitability per farm due to shift in area towards			
	Area (kanal)	Profit/farm	Vegetables from other crops		Apricot from wheat & fodder	
			50% shift	75% shift	50% shift	75% shift
Wheat	8.22	3289	1645	822	1645	822
Fodder	3.42	1283	642	321	642	321
Fruits	1.96	5546	2773	1386	22020	30257
Vegetables	1.19	4756	31969	45574	4756	4756
Total cropped area	14.79	14874	37028	48104	29061	36155
Difference with existing profit	-	-	22155	33230	14188	21282

the area under wheat, fodder and apricot would certainly result in decrease in the profitability from these crops but the expected gains in profitability from vegetables would be significantly higher than the existing cropping system. This gain is expected to increase even more than estimated in view of multiple cropping of vegetable crops on the same area. Similarly, the farm revenue would increase significantly if some area is shifted from wheat and fodder towards apricot (Table 10).

#### b) Lower Productivity of Crops

Employment of inexperienced labour, excessive work load on family members and lack of division of labour have resulted in lower productivity of crops. In this regard, it was observed that if labourers were made available to the cultivators as per their activity schedule, then the crop productivity was reported to be 41 per cent higher than the existing levels. Out of the expected gains in yield levels better management of intercultural operations by the required labourers would alone be to the tune of 28 per cent. There would be another 8 per cent and 5 per cent gains in the productivity level of crops if labourers were available at the time of harvesting and field preparation, respectively at current wage rates per day. For this there is a need to evolve labour shortage combating mechanisms to bridge labour supply-demand gaps in the study area.

#### Farmers' Labour Scarcity Combating Mechanism

Different farmers were found to employ different mechanisms to overcome labour shortage (Table 11). Labourers (both skilled and unskilled) from other parts of the country were visible in the study area and it was a common practice (reported by 30% of farmers) to

hire these labourers for various farming activities. Among the hired labourers, the majority were from Bihar (51%), followed by Kashmir/Jammu region (36.5%). Another strategy adopted by about 60 per cent of farmers was engagement of family labour, continuously for more working hours, even till late nights. Further about 36 per cent of farmers reported the use of labour-saving cultivation practices, including hiring of tractors in land preparation, broadcasting of vegetable seeds instead of transplantation and no weeding of crops. These methods could save time and labour and also farmers could complete farming operations in time. About 40 per cent of farmers were seen to allocate their cropped land in favour of less labour-intensive crops like fodder and wheat. Yet another strategy of leaving land as fallow was also adopted by farmers as a response to labour shortage. The practices of mutual labour exchange between farm families/friends/relatives was almost absent in the study area.

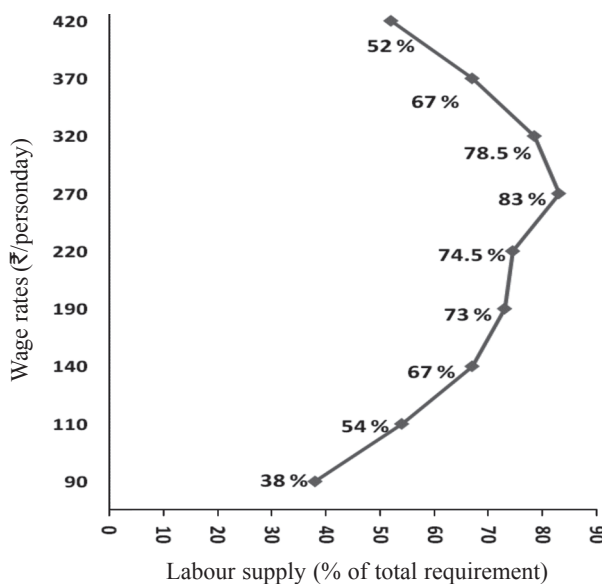
#### Evidences of Backward Bending

The time series data with respect to labour wages in the state are not available and accordingly an attempt was made to study labour availability in relation with different wage rates using cross sectional data to observe the signs of backward bending in labour supply. Based upon the extent of requirement/availability of labourers, a wide range of wage rates was generally offered to agriculture labourers for rendering their services, especially during peak seasons. Labour supply in the Ladakh region is a phenomenon determined not only by wage rates but also by the status of tourism at that point of time. It was observed that prior to the onset of tourist season, i.e. in the initial stages of crop

**Table 11. Famers' labour shortage combating strategies**

Strategy	Responses	
	No.	%
Hiring labourers from other regions	59	29.5
(a) Bihar (51%)		
(b) Nepal (3.5%)		
(c) Uttar Pradesh (4%)		
(d) Kashmir/Jammu region (36.5%)		
Excessive use of family labour	119	59.5
Adoption of labour-saving techniques	71	35.5
Growing less labour-intensive crops	79	39.5
Leaving land fallow	11	5.5

season most agricultural population after long and harsh winter looked for wage employment and accordingly their supply increased with increase in wage rates (Figure 1). At wage rate of ₹ 90/person day, only 38 per cent of labour requirement was available and their supply increased steadily with increase in wage rates to ₹ 270/day. With the onset of tourist season, farm labour supply gradually declined even further increase in wage rates was not helpful. Moreover, employment of a major proportion of available agricultural labourers by large farmers added to the severity of labour shortage to small and marginal farmers that constitute a major section of farm households. The backward bending behaviour of labour supply curve appeared prominent with the interplay of factors like wage rates and tourism



**Figure 1. Labour supply in relation with wage rates**

and related activities in the Ladakh region. It could be inferred that measures that could help to engage agricultural labourers for the major part of the year regularly may encourage them to keep the venture, though they may work on part time basis in other activities at the same time.

**Conclusions and Policy Suggestions**

The study has investigated the extent of shortage of agricultural labour, its implication and coping strategies in the cold-arid region of Ladakh. The availability of male labourers has gone down and of female labourers has increased over the years in this region. Therefore, there is a need of evolving capacity building programmes for female labourers. Regression estimates of agricultural labour availability have revealed that extent of mechanization; literacy and income of non-agricultural workers are the significant and negative determinants of labour availability while improvement in land holding size and land productivity significantly improve their supply to the farming sector. The existing cropping pattern in the study area is an outcome of resource endowments at the command of farmers and availability of labour. At the farm level, labour scarcity ranges from 27 per cent in fodder to 70 per cent of total labour requirement in apricot. Labour shortage has been found to have profound negative implications on farm profit and productivity levels. Study has revealed that there would be significant gains in productivity and in turn, profitability if the required labours with specific skill are made available to cultivators at times they are required. Farmers have adopted various strategies to combat labour scarcity, but an optimum strategy seems to be still absent. Out-migration of rural labour has been observed to be a regular livelihood-security gesture. Interaction of variables like wages rates and performance of tourism in the Ladakh region has depicted backward bending of labour supply in agriculture.

Following policy suggestions for sustainable farming in relation with agricultural labour scarcity have emerged from the study:

- Since farming is laborious and seasonal activity, to attract rural people and youth in particular, agriculture has to be mechanized with division of labour. Innovations in the form of location and farm-size specific machines and farming tools are required as substitute to a good proportion of

agricultural labourers. Further, farm equipment should be female-labour friendly in view of increasing role of females in agriculture in this region.

- There is a need of integrating production with marketing through value addition and other post-harvest management practices to secure livelihood of agricultural labour by engaging them for most part of the year. Encouragement of micro-agricultural enterprises like mushroom cultivation, home-based processing units, apiculture, etc. at farm level around each production centre could also provide them employment in farm-based off-farm jobs.
- Unlike paddy-growing regions in Kashmir valley, the labour exchange system is totally absent in Ladakh region which needs to be encouraged in view of its multiple benefits to cultivators.
- Farmers should be encouraged to adopt suitable labour-saving cultivation practices like appropriate farm machinery, chemical weed control, conservation agriculture, etc. to cope with the problem of labour scarcity and reduce cost of production.

## References

- Baba, S.H., Wani, M.H., Wani, S.A. and Yousuf, Shahid (2010) Price spread and marketed surplus of vegetables in Kashmir Valley. *Agricultural Economics Research Review*, **23**(1): 115-127.
- Chakravarti, I. and Sethia, S. (1991) Exploitative employment and income of tribal agricultural labour in Udaipur District, Rajasthan. *Current Research University of Agricultural Sciences Bangalore*, **20**(12): 262- 264.
- Dreze, J., Lanjouw, P. and Stein, N. (1992) *Economic Mobility and Agricultural Labour in Rural India: A Case Study*. Discussion Paper No. 35, Development Economics Research Programme, Suntory Toyota International Centre for Economics and Related Disciplines. London School of Economics; London, UK.
- Mukherjee, A. (1994) *The Labour Markets in Indian Villages*. IED Discussion Paper Series No. 34. Institute for Economic Development, Boston University, pp 54.
- Padhi, Kulamani (2007) *Agricultural Labour in India-A Close Look*. Orissa Review. February-March.
- Reddy, V.R. (1994) New agricultural technology, increasing costs and relative shares of labour and other factors: A spatio-temporal analysis of Andhra Pradesh. *Indian Journal of Labour Economics*, **37**(2) :215-227.
- Senthilnathan, S. and Varadarajan, S. (1993) Market failure in determination of farm wages: An empirical analysis. *Indian Journal of Agricultural Economics*, **48** (3): 488-496,
- Wani, M.H., Baba, S.H. and Yousuf, Shoaib (2009) Market economy of apple in Jammu & Kashmir. *Indian Journal of Agricultural Marketing*, **22**(2): 42-58.