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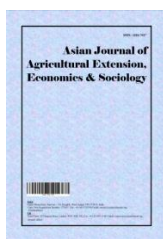
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Labour Absorption in Crop Production for Principal Crops in Semi-Arid and Flood Prone Eastern Plain Region of Rajasthan

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The present investigation was undertaken with a view to study the labour absorption (both family and hired labour) in principal crops in Semi-Arid and Flood Prone Eastern Plain Region of Rajasthan. The primary data were collected from 200 households of 10 villages during the year 2018-2019. To study the labour absorption in crop production for principal crops the model suggested by Singh, 1996 was used. In semi-arid and flood prone eastern region (Region-III), the average labour absorption in crop production was 48.72 man-days per hectare in selected principal crops i.e., pearl millet, green gram, wheat, rapeseed & mustard and chickpea. The participation of family and hired labour was 31.11 man-days per hectare and 17.61 man-days per hectare in region-III. The wage rate for machine labour was maximum on marginal farms (Rs. 849.86 per hour) while minimum on large farms (Rs. 596.71 per hour).

Keywords: *Labour absorption; agro-climatic regions; crop production; family labour; hired labour.*

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1. INTRODUCTION

Labour is the most significant and important factor of production both from the social and economic point of view. The class of agriculture labour is the most exploited and oppressed class in rural hierarchy. Though the situation has improved in the 70 years of independence, even now the class of agriculture labour is the poorest and resource less class in rural areas. Even now their levels of income are very low. As per the census of India, all persons engaged in work defined as participation in any economically productive activity with or without compensation, wage or profit are workers. In India, as per the census, 2011, out of 481.7 million total workers, 118.7 million were cultivators and another 144.3 million were agricultural labourers. There are many reasons for this development such as decreasing average size of operational holdings, farming becoming infeasible, increasing agricultural wages, rampant selling of agricultural land and shift of employment from the agricultural to non-agricultural sector. The decade of 2001-11 also witnessed three drought years. Cultivators are decreasing and such decline in agricultural is replaced by increase in agricultural labourers.

Employment in agriculture sector reduced day by day due to some well-known problems but it can't have solved without appropriate policy and rules & regulations. In agriculture sector there was some huge problems in state of Rajasthan such as improper government policy, lack of irrigation facility (except canal irrigated area), lack of water for irrigation, lack of storage facility, improper marketing infrastructure, transportation problem, high variability in market price, less knowledge about price forecasting, low literacy, imbalance between demand and supply etc. Keeping in view the above situations, a research study was planned to investigate the Labour Absorption in Principal Crops in Semi-Arid and Flood Prone Eastern Plain Region of Rajasthan.

2. METHODS AND MATERIALS

Two districts from Semi-Arid and Flood Prone Eastern Plain Region were selected randomly. One tehsil from each district and one village from each selected tehsil was selected randomly. Twenty farmers from each village were selected randomly according to five standard size classes i.e. marginal (<1 ha), small (1-2 ha), semi-medium (2-4 ha), medium (4-6 ha) and large (>6 ha). The study was based on both primary and secondary data for the analysis. The proposed

study was explored and collected the primary data from the farm households by personal interview by using specially designed comprehensive schedule, during the year 2018-19. Secondary data were collected from the various administrative reports, government publications, surveys, records, articles, and official documents.

2.1 Analysis of Data

2.1.1 Labour absorption in crop production for principal crops

For estimation of labour absorption in crop production, the model suggested by Singh, 1996 was used. The labour absorption in crop production was analysed for principal crops according to marginal, small, semi-medium, medium, and large farm size groups of the Semi-Arid and Flood Prone Eastern Plain Region in Rajasthan state. The principal crops were selected that covered more than 75 per cent gross cropped area in this region.

Farm size group wise labour absorption estimates for selected crops was estimated on per hectare gross cropped area. For the purpose of crop operation wise labour absorption estimates, all crop operations grouped under various heads such as ploughing, sowing/transplanting, intercultural operation, fertilizer application and manuring, plant protection measures, irrigation, harvesting, threshing, marketing operations and other miscellaneous work like purchase of inputs, etc. Therefore, estimation of labour requirement for these activities were made on the basis of information from sample household for Semi-Arid and Flood Prone Eastern Plain Region. Per hectare labour absorption for selected principal crops which were grown on the sample farms, for irrigated and unirrigated conditions were used for total labour absorption. To arrive at region level labour absorption, firstly summed over all crops in the given district to arrive to zonal estimates and summed over all zones to arrive at the region level estimates and after that over all summed of all crops gave the state level estimates of total labour time actually utilized in the crop production. The weighted average technique was used for aggregation at each level of district, zone and region [1].

Precisely, estimation procedure of labour time requirement in crop production in r^{th} region can be expressed as follows;

Per hectare labour use in the district /region/state was calculated as-

$$L_R = \sum_{i=1}^n W_i L_i$$

Where,

L_R = Per hectare labour absorption in the district/region/state

W_i = Proportion of cultivated area in i^{th} district/region/state to the total cultivated area in the district

L_i = Per hectare labour use in the district

n = Number of districts/zones/regions

3. RESULTS AND DISCUSSION

3.1 Labour Absorption in Semi-arid and Flood Prone Region on Marginal Farms

The labour absorption (human labour and machine labour) in semi-arid and flood prone region in selected principal crops on marginal farms are presented in Table 1. The principal crops included were pearl millet and green gram in *kharif* season and wheat, rapeseed & mustard and chickpea in *rabi* season. The annual average absorption of human labour on marginal farms was 61.04 man-days per hectare, out of which family labour absorption was 59.74 man-days per hectare and hired labour absorption was 1.30 man-days per hectare. There were some probable reasons for less absorption of hired labour on marginal farms. The first reason may be small size of land holding, due to which available family labour was fully utilized or over utilized on their marginal farms and therefore, no requirement of hired labour was observed. The second reason was short duration employment opportunity on marginal farms. Therefore, hired labour preferred large size farms, where they get more wages with more working days and the third reason was more availability of off-farm works such as factory, industry and MGNREGA in this region.

The average human labour absorption in *kharif* and *rabi* season was 63.02 man-days per hectare and 59.34 man-days per hectare, respectively. In this region the average human labour absorption was more in *kharif* season than *rabi* season. The probable reason may be that during *rabi* season the human labour (family and hired) get off-farm work along with higher wages with more working days in factory, industry and MGNREGA. Due to which average

human labour absorption in *rabi* season was less than *kharif* season.

In *kharif* season the average family labour absorption and average hired labour absorption was estimated to be 60.77 man-days per hectare and 2.25 man-days per hectare, respectively. In *rabi* season average family labour absorption and hired labour absorption was 58.86 man-days per hectare and 0.48 man-days per hectare, respectively.

The annual average per hectare machine labour absorption was 48.69 hours. In *kharif* season the average machine labour absorption was 9.22 hours per hectare while in *rabi* season it was more than eight times of *kharif* season i.e. 82.34 hours per hectare.

The reason for more absorption of machine labour (mainly in tube wells) in *rabi* season was due to irrigation whereas *kharif* season crops were mainly cultivated in rainfed conditions. In this region the *rabi* crops were more mechanized than *kharif* crops. Some operations viz., preparatory tillage, sowing and irrigation were more frequently used in *rabi* season than *kharif* season. The reason for high machine labour used in wheat was mechanized nature of many operations. The crop activities viz., preparatory tillage, sowing and irrigation were performed through machine by which wheat crop required more machine labour than rapeseed & mustard and chickpea. Among these crop activities the irrigation operation was performed up to six times in wheat due to which total machine labour absorption as well as owned machine labour was maximum in wheat than rapeseed & mustard and chickpea. In this region over all annual average wage rate for woman and machine labour were ₹43.42 per hours and ₹849.86 per hours, respectively.

Thus, it can be concluded that the absorption of human labour was more in *kharif* season than *rabi* season while machine labour absorption was found more in *rabi* season than *kharif* season. The average hired labour was more (2.25 man-days/ha) used in *kharif* season than *rabi* season (0.48 man-days/ha). These results were in conformity with Singh [2], Alam [3], Devi et al. [4], Basu and Nandi [5], and Raju et al. [6]. The female labour absorption (family and hired) was more in both the seasons i.e. *kharif* and *rabi* than the male labour. The similar results were reported by Das [7], Kispotta et al. [8] and Singariya et al. [9]. The average wage rate for

machine labour varied from ₹740.34 per hours to ₹910.20 per hours.

3.2 Labour Absorption in Semi-Arid and Flood Prone Region on Small Farms

Labour absorption i.e. human and machine labour in semi-arid and flood prone region in selected principal crops on small farms are presented in Table 2. The principal crops included were pearl millet and green gram of *kharif* season and wheat, rapeseed & mustard and chickpea of *rabi* season. The annual average of human labour absorption was 57.16 man-days per hectare out of which family labour absorption was 53.72 man-days per hectare and hired labour absorption was 3.44 man-days per hectare. The average human labour absorption in *kharif* and *rabi* season was 62.42 man-days per hectare and 52.46 man-days per hectare, respectively. The same results were found on marginal farms also.

In *kharif* season the total human labour absorption was more in pearl millet (64.95 man-days/ha) than green gram (45.88 man-days/ha). In *rabi* season average family labour absorption was 48.79 man-days per hectare and average hired labour absorption was 3.67 man-days per hectare. The total human labour absorption was highest in wheat (69.49 man-days/ha) while lowest in chickpea (31.76 man-days/ha). In *rabi* season total family labour absorption was highest in wheat (63.46 man-days/ha) and lowest in chickpea (30.28 man-days/ha) while hired labour absorption was highest in wheat (6.02 man-days/ha) and lowest in rapeseed & mustard (1.26 man-days/ha).

The annual average machine labour absorption was 45.05 hr/ha. In *kharif* season per hectare average machine labour absorption was 10.89 hours and in *rabi* season it was 75.57 hours. It was observed that in *kharif* season the total machine labour absorption was higher in pearl millet (11.09 hr/ha) than green gram (9.60 hr/ha) while in *rabi* season it was the highest in wheat (125.31 hr/ha) and the lowest in chickpea (11.61 hr/ha). The same type of result was found on marginal farms also.

Thus, it can be concluded that the absorption of human labour was more in *kharif* season than *rabi* season while machine labour absorption was observed more in *rabi* season than *kharif* season. The average hired labour was more (3.67 man-days/ha) used in *rabi* season than

kharif season (3.18 man-days/ha). These results were in conformity with Devi et al. [4] and Raju et al. [6]. The female labour absorption (family and hired) was more in both the seasons i.e. *kharif* and *rabi* than the male labour. The similar results were reported by Kispotta et al. [8] and Singariya et al. [9]. The average wage rate for machine labour and women labour varied from ₹625.52 per hours to ₹860.00 per hours and ₹32.50 per hours to ₹42.25 per hours, respectively.

3.3 Labour Absorption in Semi-Arid and Flood Prone Region on Semi-Medium Farms

The principal crops included were pearl millet and green gram of *kharif* season and wheat, rapeseed & mustard and chickpea of *rabi* season (Table 3). The annual average per hectare human labour absorption was 51.52 man-days out of which family labour absorption was 38.73 man-days and hired labour absorption was 12.79 man-days. The average human labour absorption in *kharif* and *rabi* season was 57.12 man-days per hectare and 48.99 man-days per hectare, respectively. The same results were found on marginal and small farms also.

In *kharif* season the total human labour absorption was more in pearl millet (61.03 man-days/ha) than green gram (42.39 man-days/ha) as found same on marginal and small farms. In *rabi* season average family labour absorption was 37.03 man-days per hectare and average hired labour absorption was 11.96 man-days per hectare. It was noticed that the total human labour absorption was highest in wheat (66.76 man-days/ha) while lowest in chickpea (31.53 man-days/ha).

The per hectare annual average machine labour absorption was 57.29 hours. In *kharif* season average machine labour absorption was 13.66 hours per hectare and in *rabi* season it was 77.07 hours per hectare. It was observed that in *kharif* season the total machine labour absorption was higher in pearl millet (14.02 hr/ha) than green gram (12.33 hr/ha) while in *rabi* season it was highest in wheat (127.60 hr/ha) and lowest in chickpea (12.22 hr/ha).

Thus, it can be concluded that the absorption of human labour was more in *kharif* season (57.12 man-days/ha) than *rabi* season (48.99 man-days/ha) while machine labour absorption was observed more in *rabi* season (77.07 hr/ha) than *kharif* season (13.66 hr/ha). These results were

Table 1. Labour absorption in semi-arid and flood prone region on marginal farms for the year 2018-2019

S. No.	Crop	Human labour (Man-days/ha)							Machine labour (hr./ha)			Wage rate (Rs./hr)		
		Family			Hired			Total human labour	Owned	Hired	Total machine labour	Human labour		Machine
		M	W	Total	M	W	Total					M	W	
1	<i>Kharif</i> season													
	Pearl millet	30.14	34.06	64.20	0.00	2.77	2.77	66.97	2.98	6.10	9.08	0.00	43.75	740.34
	Green gram	20.91	25.00	45.91	0.00	0.00	0.00	45.91	0.00	9.85	9.85	0.00	0.00	812.18
	<i>Kharif</i>	28.41	32.36	60.77	0.00	2.25	2.25	63.02	2.42	6.80	9.22	0.00	43.75	759.86
	Average													
2	<i>Rabi</i> season													
	Wheat	32.48	40.29	72.78	0.00	0.32	0.32	73.10	103.56	16.73	120.29	0.00	41.25	910.20
	Rapeseed & Mustard	18.82	28.18	47.00	0.00	0.73	0.73	47.73	36.64	13.62	50.25	0.00	42.50	850.10
	Chickpea	14.02	19.51	33.54	0.00	0.00	0.00	33.54	0.00	11.59	11.59	0.00	0.00	881.05
	<i>Rabi</i>	25.26	33.60	58.86	0.00	0.48	0.48	59.34	67.32	15.02	82.34	0.00	42.08	564.96
	Average													
	Annual average	26.71	33.03	59.74	0.00	1.30	1.30	61.04	37.45	11.24	48.69	0.00	43.42	849.86

M= Men, W= Women

Table 2. Labour Absorption in Semi-Arid and Flood Prone Region on Small Farms for the year 2018-2019

S. No.	Crop	Human labour (Man-days/ha)							Machine labour (hr./ha)			Wage rate (Rs./hr)		
		Family		Total	Hired		Total human labour		Owned	Hired	Total machine labour	Human labour		Machine
		M	W		M	W						M	W	
1	<i>Kharif</i> season													
	Pearl millet	29.07	32.21	61.28	0.00	3.67	3.67	64.95	2.34	8.75	11.09	0.00	41.67	625.52
	Green gram	21.25	24.63	45.88	0.00	0.00	0.00	45.88	0.00	9.60	9.60	0.00	0.00	781.25
	<i>Kharif</i> Average	28.03	31.20	59.23	0.00	3.18	3.18	62.42	2.03	8.86	10.89	0.00	41.67	647.90
2	<i>Rabi</i> season													
	Wheat	29.16	34.31	63.46	0.00	6.02	6.02	69.49	114.70	10.61	125.31	0.00	42.25	860.00
	Rapeseed & Mustard	17.53	24.37	41.90	0.00	1.26	1.26	43.16	44.65	9.69	54.34	0.00	32.50	810.50
	Chickpea	14.12	16.16	30.28	0.00	1.48	1.48	31.76	0.00	11.61	11.61	0.00	37.50	804.78
	<i>Rabi</i> Average	22.16	26.63	48.79	0.00	3.67	3.67	52.46	64.81	10.76	75.57	0.00	41.01	754.35
	Annual average	24.93	28.79	53.72	0.00	3.44	3.44	57.16	35.19	9.86	45.05	0.00	41.30	755.21

M= Men, W= Women

Table 3. Labour Absorption in Semi-Arid and Flood Prone Region on Semi-Medium farms for the year 2018-2019

S. No.	Crop	Human labour (Man-days/ha)							Machine labour (hr./ha)			Wage rate (Rs./hr)		
		Family M	W	Total	Hired M	W	Total	Total human labour	Owned	Hired	Total machine labour	Human labour M	W	Machine
1	Kharif season													
	Pearl millet	17.432	25.81	43.24	0.12	17.67	17.79	61.03	5.24	8.78	14.02	43.75	40.00	603.20
	Green gram	18.944	20.78	39.72	0.89	1.78	2.67	42.39	10.22	2.11	12.33	34.38	31.25	631.58
	Kharif Average	17.749	24.76	42.50	0.28	14.34	14.62	57.12	6.28	7.38	13.66	37.50	39.77	601.89
2	Rabi season													
	Wheat	20.41	28.82	49.23	1.34	16.19	17.53	66.76	121.23	6.37	127.60	36.96	31.53	800.20
	Rapeseed & Mustard	13.67	15.13	28.80	0.29	9.19	9.47	38.27	54.76	5.76	60.52	43.75	32.75	800.00
	Chickpea	12.82	13.19	26.01	0.79	4.73	5.52	31.53	9.70	2.52	12.22	40.00	38.02	750.00
	Rabi Average	16.40	20.63	37.03	0.89	11.07	11.96	48.99	71.91	5.16	77.07	38.33	32.57	729.80
	Annual average	16.82	21.91	38.73	0.70	12.09	12.79	51.52	51.44	5.85	57.29	38.23	35.23	718.20

M= Men, W= Women

in conformity with Singh [2], Alam [3], Devi *et al.* [4], Basu and Nandi [5], and Raju *et al.* [6]. The female labour absorption (family and hired) was more in both the seasons i.e. *kharif* and *rabi* than the male labour. The similar results were reported by Das [7] Kispotta *et al.* [8] and Singariya *et al.* [9]. The average wage rate for men labour, women labour and machine labour varied from ₹34.38 per hours to ₹43.75 per hours, ₹31.25 per hours to ₹40.00 per hours and ₹603.20 per hours to ₹800.20 per hours, respectively.

3.4 Labour Absorption in Semi-Arid and Flood Prone Region on Medium Farms

Table 4 depicts the principal crops included in the study as pearl millet and green gram of *kharif* season and wheat, rapeseed & mustard and chickpea of *rabi* season. The annual average human labour absorption was 45.84 man-days per hectare out of which family labour absorption was 25.56 man-days per hectare and hired labour absorption was 20.28 man-days per hectare. The average human labour absorption in *kharif* and *rabi* season was 49.95 man-days per hectare and 42.99 man-days per hectare, respectively. In *kharif* season the total human labour absorption was more in pearl millet (55.05 man-days/ha) than green gram (35.03 man-days/ha) as found same on marginal, small and semi-medium farms.

In *kharif* season per hectare average family labour absorption was 26.41 man-days whereas per hectare hired labour absorption was 23.54 man-days. In *rabi* season average family labour absorption was 24.97 man-days per hectare and average hired labour absorption was 18.02 man-days per hectare. It was found that the per hectare total human labour absorption was highest in wheat (59.74 man-days) while lowest in chickpea (29.38 man-days/ha). In *rabi* season, total family labour and hired labour absorption was the highest in wheat (31.93 man-days/ha and 27.80 man-days/ha, respectively). Because wheat is more labour intensive crop than rapeseed & mustard and chickpea.

From Table 4, the study indicates that the annual average of machine labour absorption was 52.87 hours per hectare. In *kharif* season average machine labour absorption was 17.34 hours per hectare and in *rabi* season it was 77.53 hours per hectare. The annual average wage rate for

man, woman and machine labour were ₹37.68 per hours, ₹35.64 per hours and ₹659.53 per hours, respectively.

Thus, it can be concluded that the absorption of human labour was more in *kharif* season (49.95 man-days/ha) than *rabi* season (42.99 man-days/ha) while the absorption of machine labour was found more in *rabi* season (77.53 hr/ha) than *kharif* season (17.34 hr/ha). The average hired labour was more (23.54 man-days/ha) used in *kharif* season than *rabi* season (18.02 man-days/ha). These results were in conformity with Singh [2], Devi *et al.* [4] Hazarika (2015) and Raju *et al.* [6]. The female labour absorption (family and hired) was more in both the seasons i.e. *kharif* and *rabi* than the male labour. The similar results were reported by Das [7], Kispotta *et al.* [8] and Singariya *et al.* [9].

3.5 Labour Absorption in Semi-Arid and Flood Prone Region on Large Farms

The principal crops included were pearl millet and green gram of *kharif* season and wheat, rapeseed & mustard and chickpea of *rabi* season were presented in Table 5. The annual average human labour absorption was 45.21 man-days per hectare out of which family labour absorption was 20.34 man-days per hectare and hired labour absorption was 24.87 man-days per hectare. It was observed that as the size of land holding increased the utilization of family labour decreased, while hired labour absorption increased. The average human labour absorption in *kharif* and *rabi* season was 49.19 man-days per hectare and 41.97 man-days per hectare, respectively.

In *kharif* season the total human labour absorption was more in pearl millet (51.06 man-days/ha) than green gram (33.38 man-days/ha) as found same on marginal, small, semi-medium and medium farms. In *kharif* season per hectare average family labour absorption was 20.01 man-days and per hectare hired labour absorption was 29.17 man-days. In *rabi* season average family labour absorption was 20.62 man-days per hectare and average hired labour absorption was 21.35 man-days per hectare. It was observed that the per hectare total human labour absorption was the highest in wheat (54.78 man-days) while the lowest in chickpea (24.45 man-days/ha).

Table 4. Labour absorption in semi-arid and flood prone region on medium farms for the year 2018-2019

S. No.	Crop	Human labour (Man-days/ha)							Machine labour (hr./ha)			Wage rate (Rs./hr)		
		Family		Total	Hired		Total human labour	Owned	Hired	Total machine labour	Human labour		Machine	
		M	W		M	W					M	W		
1	<i>Kharif</i> season													
	Pearl millet	12.79	12.63	25.42	3.83	25.79	29.63	55.05	8.95	10.06	19.01	33.64	31.89	582.04
	Green gram	13.93	15.38	29.31	0.00	5.72	5.72	35.03	9.97	2.46	12.43	0.00	32.14	598.01
	<i>Kharif</i> Average	13.08	13.33	26.41	2.86	20.69	23.54	49.95	9.21	8.13	17.34	33.64	31.91	583.27
2	<i>Rabi</i> season													
	Wheat	13.69	18.25	31.93	1.77	26.03	27.80	59.74	122.92	7.08	130.00	43.30	40.36	770.84
	Rapeseed & Mustard	7.93	10.33	18.26	3.03	12.61	15.64	33.90	58.11	5.33	63.45	40.00	36.42	735.00
	Chickpea	11.33	12.21	23.54	1.05	4.78	5.83	29.38	10.50	3.50	14.00	43.75	36.89	630.00
	<i>Rabi</i> Average	11.05	13.92	24.97	2.04	15.98	18.02	42.99	71.96	5.57	77.53	41.61	38.99	746.05
	Annual average	11.88	13.68	25.56	2.38	17.91	20.28	45.84	46.25	6.62	52.87	37.68	35.64	659.53

M= Men, W= Women

Table 5. Labour absorption in semi-arid and flood prone region on large farms for the year 2018-2019

S. No.	Crop	Human labour (Man-days/ha)							Machine labour (hr./ha)			Wage rate (Rs./hr)		
		Family		Total	Hired		Total human labour	Owned	Hired	Total machine labour	Human labour		Machine	
		M	W		M	W					M	W		
1	<i>Kharif</i> season													
	Pearl millet	6.38	12.77	19.15	7.98	23.94	31.91	51.06	9.57	13.28	22.85	34.67	32.89	528.85
	Green gram	12.37	14.92	27.28	0.00	6.09	6.09	33.38	7.17	8.60	15.77	0.00	33.09	600.00
	<i>Kharif</i> Average	7.02	12.99	20.01	7.13	22.04	29.17	49.19	9.32	12.78	22.10	34.67	32.89	533.93
2	<i>Rabi</i> season													
	Wheat	7.61	16.74	24.35	3.80	26.63	30.43	54.78	127.81	8.03	135.85	36.40	34.29	750.00
	Rapeseed & Mustard	5.45	11.67	17.12	1.37	14.01	15.38	32.50	60.06	9.50	69.56	37.50	35.78	605.00
	Chickpea	6.52	9.78	16.30	0.00	8.15	8.15	24.45	6.52	9.13	15.65	0.00	31.20	600.00
	<i>Rabi</i> Average	6.81	13.81	20.62	2.29	19.06	21.35	41.97	81.92	8.66	90.59	36.56	34.24	707.82
	Annual average	6.90	13.44	20.34	4.47	20.40	24.87	45.21	49.25	10.52	59.77	35.20	33.59	596.71

M= Men, W= Women

The annual average of machine labour absorption on large farms was 59.77 hours per hectare (Table 5). The per hectare average machine labour absorption in *kharif* season was 22.10 hours and in *rabi* season it was 90.59 hours. It was observed that in *kharif* season the total machine labour absorption was more in pearl millet (22.85 hr/ha) than green gram (15.77 hr/ha) while in *rabi* season it was the highest in wheat (135.85 hr/ha) and lowest in chickpea (15.65 hr/ha). The annual average wage rate for man, woman and machine labour were ₹35.20 per hours, ₹33.59 per hours and ₹596.71 per hours, respectively.

Thus, it can be concluded that the human labour was more used in *kharif* season (49.19 man-days/ha) than *rabi* season (41.97 man-days/ha) while the absorption of machine labour was found more in *rabi* season (90.59 hr/ha) than *kharif* season (22.10 hr/ha).

The average hired labour was more (29.17 man-days/ha) used in *kharif* season than *rabi* season (21.35 man-days/ha) as well as it was more than the family labour in both the seasons. These results were in conformity with Singh [2,10], [3], Devi *et al.* [4] Basu and Nandi [5], [6,11] The female labour absorption (family and hired) was more in both the seasons i.e. *kharif* and *rabi* than the male labour. The similar results were reported by Das [7], Kispotta *et al.* [8] and Singariya *et al.* [9].

4. CONCLUSION

Labour use varies extensively from crop to crop in this region. The main reasons are the individual characteristics of each crop, differences in farming systems and the levels of development. The absorption of human labour was found more in *kharif* season than *rabi* season while machine labour absorption was found more in *rabi* season than *kharif* season in all five size group of farms in this region. The wage rate for men was higher than women in all farm size groups in this region.

The average human labour absorption was 61.04 man-days per hectare and average machine labour absorption was 48.69 hours per hectare on marginal farms.

On small farms, the average human labour absorption was found 57.16 man-days per hectare and average machine labour absorption was 45.05 hours per hectare.

The average human labour absorption on semi-medium farms was found 51.52 man-days per hectare and average machine labour absorption was 57.29 hours per hectare.

On medium farms, it was observed that the average human labour and machine labour absorption was found 45.84 man-days per hectare and 52.87 hours per hectare, respectively.

The average human labour and machine labour absorption was found on large farms size 45.21 man-days per hectare and 59.77 hours per hectare, respectively.

5. POLICY IMPLICATIONS

1. In Rajasthan over 70 per cent area is rainfed, availability of irrigation affects nature of crop mix cultivated and cropping intensity. Thus, availability of irrigation is the most important decision factor for employment of labour. To increase labour absorption in agriculture, there is need of developing irrigation infrastructure in the state as well as creating awareness among the farmers for use of water conservation techniques like micro irrigation, mulching & other in-situ and ex-situ water conservation technology.
2. Due to mechanization, labour absorption is being reduced and surplus labour is enormous in the state. Therefore, more activities should be initiated to absorb this surplus labour and this can be created through developing agricultural services, small scale industries, establishment of agri-business units to make them atmanirbhar.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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