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## Consequence of agricultural labour scarcity on cropping pattern in North Eastern Karnataka

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**Abstract**

India has the second largest man power in the world, all sectors of the economy have been affected by the scarcity of labour, and the impact is being felt more in the field of agricultural sector. Laborers constitute a very fundamental input in agricultural production, but they are migrating to different parts of the country for earning better revenue, adding to the existing threat to the labour shortage. Hence present study analyzed the impact of labour scarcity on the cropping pattern of the selected district of the state. In order to study the cropping pattern shift, secondary data pertaining to area under the crops over the years was collected and analyzed by using Markov Chain analysis. It is interesting to note that, farmers were shifting from high labour intensive crops to low labour intensive crops over the years. Due to higher requirement of laborers for cultivating agricultural crops, farmers are taking interest in cultivating high value horticulture crops than food crops.

**Keywords:** cropping pattern, labour scarcity, labour classification, markov chain analysis

**Introduction**

Agriculture plays a very vital role in the country's economy. More than 60 percent of the rural populations depend on agriculture. Agriculture is a significant sector of Indian economy as it contributes about 13 percent to the total GDP and provides employment to over 60 percent of the population. At present Indian agriculture plagued several problems. Among the major problems lack of mechanization is very crucial. Most of the agricultural operations in larger parts are carried on by human hand using simple and conventional tools and implements like wooden plough, sickle, etc. Little or no use of machines is made in ploughing, sowing, irrigating, thinning and pruning, weeding, harvesting threshing and transporting the crops. This is specially the case with small and marginal farmers. It results in huge wastage of human labour and in low yields per capita labour force as well as shift in the cropping pattern from high labour intensive crops to low labour intensive crops. Due to shift in cropping pattern, area under food crops has been replaced by many horticultural crops.

**Agriculture labour scarcity in India**

Agricultural workers constitute the most neglected class in Indian rural structure. Often they are not in a position to earn just enough to keep their body and soul together and are frequently exposed to the hazards of unemployment and irregular employment and have neither private nor social security. Being unorganized, they do not have the most needed muscle to seek better living and working condition. Their income is low and employment irregular. Since they possess no skill or training, they have no alternative employment opportunities either (Padhi, 2007) [6].

Even though India has the second largest man power in the world, all sectors of the economy have been affected by the scarcity of labour, and the impact being felt more in the field of agricultural sector. Laborers constitute a very fundamental input in agricultural production, but they are migrating to different parts of the country for earning a better source of revenue, adding to the existing imbalance between labour demand and supply. (Deshingkar and Start 2003) [4].

According to Census of India there are about 402.5 million rural workers of which 127.6 million are cultivators and 107.5 million are agricultural labourers. In other words, pure agricultural workers constitute nearly 58.4 percent of the total rural workers, of which 31.7 percent are owner cultivators and 26.7 percent are mainly agricultural wage earners.

There is an acute shortage of labour in every sector in India. However, in the name of welfare measures, government of India and the state governments are taking away a lot of people from workforce, thereby enhancing shortage of labour and curtailing growth in GDP. In India, particularly in the southern states, there is an acute shortage of skilled and unskilled manpower

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in every sector of the economy. Labourers constitute a vital input in agricultural production, but they are Migrating from one place to another, implementation of MGNREGA program during peak agricultural season and urbanization are the major problems which leads to shortage of agricultural laborers. (Deshingkar and Start, 2003) [4].

Scarcity of farm labourers is a grave concern for the farmers, who may not even hesitate to abandon farming. The acute shortage of agricultural labourers in the state has led the delay in crop establishment, poor crop growth, no or untimely weeding, irrational use of fertilizers, insufficient irrigation to crops etc. this has pressed Indian farmers to shift from farming to non-farm activities. There are evidences of shift in cropping patterns in irrigated and rainfed agriculture due to increased labour scarcity (Baba *et al.*, 2011) [3].

Over the past couple of decades, there is a growing concern that the farm labour had been decreasing which has been caused by occupational changes, people's mindset, Government policies and reforms making it imperative to investigate into the dynamics or scarcity of agricultural labour and its effect on agricultural economy.

Taking into consideration this pressing problems existing in agricultural economy and unmanageable situations, it was perceived to undertake a study. The causes of labour scarcity and alternative solutions being region-specific, the study would be restricted to North Karnataka, where labour scarcity is being felt as a persistent disturbance by most of the farmers. Keeping the above said facts in view, present study aims at analyzing the influence of labour scarcity on the cropping pattern as the major objective. The study will be highlighting on the existing labour scarcity issue and its influence on the agricultural cropping pattern with special focus on getting general idea about labour employment situation in agriculture.

### Methodology

The study was undertaken in Raichur, Koppal and Kalaburagi districts of Karnataka during the year 2016-17 and the primary data collected pertained to the previous year. The stratified random sampling technique was used for the selection of respondents and agricultural labourers. Two taluks from each district and two villages from each taluk were selected for the study. The village with highest net area under cultivation was selected purposively from each taluk. The sample size was restricted to 180 farmers and 60 agricultural labourers at the rate of 15 farmers and 5 agricultural labourers from each village.

To fulfill the specific objective of the study, based on the nature and extent of data, Markov chain analysis was employed. The Markov chain analysis is an application of dynamic programming to the solution of a stochastic decision process that can be described by a finite number of states. The Markov process was used to study the shifts in the shares of crops thereby gain in understanding about the dynamics of the changes. The data for the study are the proportion of area under different crops. It is assumed that the proportions changes from year as a result of differences in the proportion of labour availability.

## Results and Discussion

### Classification of crops based on their labour requirement

The farm labour requirement varies from crop to crop. The data regarding the season wise labour requirement for the major crops in the study area were collected by personal interview method from the farmers. This information has been used to classify the crops into High Labour Intensive (HLI), Medium Labour Intensive (MLI) and Low Labour Intensive (LLI) crops. The major crops grown in the area and their labour requirement details are presented in

Table-1. Among the major crops cultivated in the area, the labour requirement per hectare per crop season was highest for commercial crop like cotton (140 mandays/ha) and sugarcane (116 mandays/ha). Paddy required 126 mandays/ha, the highest among the cereals in terms of labour requirement. The major oil seed crops like sunflower, groundnut, and safflower required on an average 106, 86 and 84 mandays per hectare per crop season respectively. Among the cereal crops and pulses, the labour requirement for jowar was 80 mandays per hectare, redgram was around 90 mandays per hectare and bengalgram, greengram and blackgram required an average of 70-80 mandays per hectare.

**Table 1:** Classification of the major crops in the study area into the groups based on their labour requirement

SN	Categories	Human Labour requirement (Mandays/ha)
I	High labour intensive crops (HLI)	
1	Paddy	126
2	Sunflower	106
3	Cotton	140
4	Sugarcane	116
II	Medium labour intensive crops (MLI)	
1	Maize	91
2	Redgram	90
3	Safflower	86
4	Groundnut	84
5	Jowar	80
III	Low labour intensive crops (LLI)	
1	Bengalgram	68
2	Wheat	79
3	Greengram	70
4	Blackgram	70

On the basis of the total labour requirement per crop season, a broad grouping of the crops was attempted and is given in Table-2. The crops requiring more than 100 man-days per hectare per season were grouped under High Labour Intensive (HLI) crop group. Similarly those crops with per season labour requirement of 80-100 mandays per hectare were included in the Medium Labour Intensive (MLI) crop group, and those with per season labour requirement of less than 80 manday per hectare was classified as Less Labour Intensive (LLI) crops.

**Table 2:** Grouping of crops based on labour requirement

SN	Groups	Total labour requirement in one crop season (mandays/ha)
1	High labour intensive crops	>100 mandays/ha
2	Medium labour intensive crops	80-100 mandays/ha
3	Low labour intensive crops	<80 mandays/ha

**Impact of agricultural labour scarcity on cropping pattern**

For understanding, the different principal crops grown in the area were categorized into different groups based on their agronomical characters as well as based on their labour intensity. The crop groups considered based on the agronomical characters were cereals, pulses, oilseeds, commercial crops, fruits and vegetables and plantation crops.

The prevailing acute labour scarcity might have impacts on the cropping pattern of the district in the long-run. It is therefore imperative to probe into the type of transition that has taken place or would take place in future.

**Impact of agricultural labour scarcity on cropping pattern in Raichur district**

Further the study revealed that, the transition probability matrix for major crop groups grown for the period from

**Table 3:** Transition probability matrix of major crop groups in Raichur district

Crops	Cereals	Pulses	Oilseeds	Commercial Crops
Cereals	0.37000	0.02000	0.28000	0.33000
Pulses	0.00000	0.58000	0.19000	0.23000
Oilseeds	0.28000	0.46000	0.26000	0.00000
Commercial Crops	0.35000	0.27000	0.33600	0.04600

Further for the purpose of analyzing the shift in the area of crops with regard to the labour scarcity the shift in the area of the major crops categorized into different groups was analyzed using Markov chain analysis. From the Table-4 it can be seen that the percentage area retained by MLI & LLI crops was highest (76%), followed by the HLI crop cotton (52%). The area retained by the other HLI crops sunflower and paddy was found to be slightly higher i.e., 18 and 14

2003-04 to 2014-15 has been presented in Table-3. It is evident from the table that pulses has been the most stable crop among the major crop groups as reflected by the higher probability of retention of 0.58000 i.e., the probability with which pulses had retained its area share is 58 percent over the study period. Thus, pulse crop was the most reliable and loyal crop group in Raichur district. Cereals have shown probability retention of 0.37 which has retained its share of 37 percent. Oilseeds have shown the retention probability of 0.26 which has retained 26 percent of its share in area. Commercial crop has shown the least probability retention of 0.046 which has retained only 4.6 percent of its share in area. It can be further seen from the figure that oilseeds has lost 46 percent of its area to pulses, whereas it has gained 28 percent area from the cereals.

percent respectively. When the area lost by the HLI crops over the years was analysed, it was found that highest share of area lost by sugarcane was to the MLI & LLI crops (48%), followed by sunflower (37%), cotton (25%) and paddy (16%). Paddy crop has lost its 26 percent share of area to cotton and sugarcane each. The gain in the area by paddy was highest from sugarcane (52%).

**Table 4:** Transition probability matrix of major crops in Raichur district

Crops	Paddy	Sunflower	Cotton	Sugarcane	Others (MLI+LLI)
Paddy	0.1400	0.2600	0.2600	0.1800	0.1600
Sunflower	0.2300	0.1800	0.2200	0.0085	0.3700
Cotton	0.0030	0.2300	0.5200	0.0000	0.2500
Sugarcane	0.5200	0.0000	0.0000	0.0000	0.4800
Others (MLI+LLI)	0.0000	0.0640	0.0670	0.1100	0.7600

**Impact of agricultural labour scarcity on cropping pattern in Koppal district**

The transition probability matrix for the major crop groups grown for the period from 2003-04 to 2014-15, presented in the Table-5 revealed that cereals, pulses, oilseeds, commercial crops, fruits and vegetables and plantation crops had shown

instability in the retention of area in Koppal district over the past ten years under study. Plantation crops had retained 70 percent of its previous year's share of area, and it gained around 37 and 32 percent from fruits and vegetables crops and commercial crops respectively.

**Table 5:** Transition probability matrix of major crop groups in Koppal district

Crops	Cereals	Pulses	Oil seeds	Commercial crops	Fruits & Vegetables	Plantation crops
Cereals	0.3741	0.2199	0.0323	0.0162	0.3576	0.0000
Pulses	0.0709	0.7268	0.1348	0.0674	0.0000	0.0000
Oil seeds	0.0982	0.2160	0.6845	0.0000	0.0020	0.0000
Commercial crops	0.0550	0.0000	0.0000	0.4600	0.1650	0.3200
Fruits & Vegetables	0.0000	0.0000	0.0000	0.1122	0.5111	0.3768
Plantation crops	0.0000	0.3000	0.0000	0.0000	0.0000	0.7000

Pulses crops retained 72.68 percent, highest retention among all crop groups over the previous year's share; however it lost 13.48 percent to oilseeds, 7 percent to cereals and 6.7 percent to commercial crops. The gained area over the years can be attributed from plantation crops (30%), cereals (29.99%) and oilseeds (21.60%).

Oilseeds retained 68.45 percent area over the previous year's area but lost around 21.60 percent of their area to pulses, 9.8

percent of area to cereals. Area under oilseeds gained 31.48 percent from pulses and 3.2 percent from cereals.

Fruits and vegetables retained 51.11 percent over the previous years and it gained 35.6 percent of its previous year's area from cereals. And it lost 37.68 percent of its area to plantation crops and 11.22 percent to commercial crops.

Commercial crops retained over 46 percent. It lost its area of 32 percent to commercial crops, 16 percent to fruits and

vegetables and 5.5 percent to cereals. However it gained 11.22 percent from fruits and vegetables, 6.7 percent from pulses and 1.6 percent from cereals.

Cereals showed instability in retention and 35.76 percent of the area was lost to fruits and vegetable and 21.99 percent to pulses and gained from 9.8 percent from oilseeds, 7.09 percent from pulses and 5.5 percent from commercial crops.

**Table 6:** Transition probability matrix of major crops in Koppal district

%Crops	Paddy	Sunflower	Cotton	Sugarcane	Others (MLI+LLI)
Paddy	0.18706	0.19969	0.03543	0.01223	0.56558
Sunflower	0.12304	0.11621	0.05210	0.00000	0.70865
Cotton	0.73638	0.00000	0.17919	0.08443	0.00000
Sugarcane	0.00000	0.00000	0.00000	0.13000	0.87000
Others (MLI+LLI)	0.23069	0.00000	0.02121	0.00000	0.74810

### Impact of agricultural labour scarcity on cropping pattern in Kalaburgi district

The change in cropping pattern was studied by estimating the transitional probability matrix using the Markov chain framework. Transitional probabilities are presented in Table-7 and 8, which depicts a broader idea of change in the cropping pattern over a period of 10 years. There were five major crop groups based on agronomical categorisation. The diagonal elements in a transitional probability matrix provide the information on the probability of retention of the area under crop, while the row elements indicate the probability of loss in area of a particular crop on account of competing crops. The column elements indicate the probability of gain in area from other competing crop group. It can be depicted from the Table-7 that, the highest probability retention was observed in area of pulses *i.e.*, around 86 percent of their previous year's area but had lost around 7.3 percent of its area to commercial crops and 4.5 percent to oilseeds. But the percentage gain in the share of area was analysed, it was found the 84 percent of area has been gained by the fruits and vegetables, 54.1 percent from commercial crops and 16 percent from cereals. Cereals had retained around 83.4 percent of previous years share; however it lost its area only to pulse crops in the previous years and gained from oilseeds (30.2%). Oilseed retained 69.8

From Table-6 it can be seen that the highest percentage of area was retained by MLI and LLI crops among all HLI crops *i.e.*, 74.81 percent of its area was retained, however it lost 23 percent of its previous year's share of area to paddy and 2.1 percent to cotton. The gains attributed from sugarcane (87%), sunflower (70.86%) and paddy from (56.55%).

percent of their previous year's area but lost around 30.2 percent of their area to cereals. They gained only 4.5 percent of their area in the previous years from pulses. Commercial crops retained 45.9 percent area over the previous year's share, however lost 54.1 percent of area to pulses. The gained area over the years can be attributed only from pulses (7.3%). Fruits and vegetables had shown instability in the retention in area, had lost considerable proportion of area to pulses (84%). The group gained only 1.6 percent of area over the previous year's share from the same crop group. It could be seen that, redgram is a major monocrop, extensively cultivated in the district. Since redgram is a least labour intensive crop and the labour scarcity in the area haven't affected the area under the crop.

From the transition probability matrix presented in Table-8, it can be seen that 91.53 percent of the area was retained by the other crops which constituted the MLI and LLI crops. Around 30.53 percent of the previous year share of area was retained by sunflower while cotton retained 27.61 percent area, sugarcane retained 20 percent area and cereals retained 18.54 percent of area. Paddy, cotton sugarcane and sunflower crops had lost major share of their area to other crops groups which accounted 81.46 percent, 72.39 percent, 79.92 percent and 69.47 percent respectively.

**Table 7:** Transition probability matrix of major crop groups in Kalaburgi district

Crops	Cereals	Pulses	Oil seeds	Commercial crops	Fruits & Vegetables
Cereals	0.8340	0.1660	0.0000	0.0000	0.0000
Pulses	0.0000	0.8660	0.0450	0.0730	0.0160
Oil seeds	0.3020	0.0000	0.6980	0.0000	0.0000
Commercial crops	0.0000	0.5410	0.0000	0.4590	0.0000
Fruits & Vegetables	0.0000	0.8400	0.0000	0.0000	0.1600

**Table 8:** Transition probability matrix of major crops in Kalaburgi district

Crops	Paddy	Sunflower	Cotton	Sugarcane	Others(MLI+LLI)
Paddy	0.1854	0.0000	0.0000	0.0000	0.8146
Sunflower	0.0000	0.3053	0.0000	0.0000	0.6947
Cotton	0.0000	0.0000	0.2761	0.0000	0.7239
Sugarcane	0.0000	0.0000	0.0000	0.2008	0.7992
Others(MLI+LLI)	0.0187	0.0375	0.0098	0.0188	0.9153

### Conclusion

Markov chain analysis on the changes in cropping pattern in Raichur district indicated that, pulses had been the most stable crop among the major crop groups grown in the district. Further, the percentage area retained by MLI & LLI crops was highest, followed by the HLI crop cotton. The area retained by the other HLI crops sunflower and paddy was found to be slightly higher.

In Koppal district, plantation crops had retained 70 percent of its previous year's share of area, and it gained around 37 and 32 percent from fruits and vegetable crops and commercial crops respectively. Further, highest percentage of area was retained by MLI and LLI crops among all HLI crops *i.e.*, 74.81 percent of its area was retained, however it lost 23 percent of its previous year's share of area to paddy and 2.1 percent to cotton.

In Kalaburagi district, the highest probability retention was observed in area of pulses *i.e.*, around 86 percent of their previous year's area but had lost around 7.3 percent of its area to commercial crops and 4.5 percent to oilseeds. And around 91.53 percent of the area was retained by other crops which constituted the MLI and LLI crops.

Thus, the observations revealed that provided the given labour constraint it was not possible to profitably carry out the cultivation of crops in the absence of adequate number of laborers.

**Based on the above findings the following policy implications emerged**

1. Custom hiring is to be encouraged among farmers for adoption of the highly expensive labour saving technologies/ implements. Agricultural extension system of the districts has to be geared up, to bring farmers out from the conventional methods of cultivation and educate them on adoption of available labour saving implements. And proper training programmes need to be implementing for improving the skill of agricultural labours.
2. The seasonal unemployment of agricultural labourers has negative impact on their income, consumption expenditure and savings. Farmers must be educated regarding crop diversification.

**References**

1. Anonymous. Economic Survey. Ministry of Finance, GOI, 2001.
2. Anonymous. Employment and unemployment situations in India: NSS 66<sup>th</sup> Round. National Sample Survey Office, National Statistical Organisation, Ministry of Statistics and programme implementation, GOI, 2011.
3. Baba SH, Wahi MH, Shaheen FH, Zargar BA, Kubrevi SS. Scarcity of agricultural labour in cold-arid Ladakh: extent, backward bending and coping mechanism. *Agric. Econ. Res. Rev*, 2011; 24(Conference):391-400.
4. Deshingkar P, Start D. Seasonal migration for livelihood, coping, accumulation and exclusion. Working Paper No. 220, Overseas Development Institute, London, 2003.
5. Gayathry Mohan. Impact of labour scarcity on the agricultural economy of Dharwad district. M. Sc. Thesis, Uni. Agric. Sci., Dharwad (India), 2013.
6. Padhi. Agricultural labour in India – A close look. *Orissa Review*, February- March, 2007; 23-27.