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Socio Economic Status of Groundnut Farmers in Central Dry Zone Regions of Karnataka, India

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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

In the current days, cost of cultivation for groundnut operation is increased due to high wages paid to labourers, during cultivation season and also due to labour scarcity in the villages. A large number of farmers are migrating to urban places for better economic growth. Groundnut cultivation is a labour intensive crop and the availability of mechanized machinery is very low. As a part of the research work the sample data was collected and analyzed using the chi-square method. Karl Pearson's chi-square test method were used to predict the relative values that was either accepted or rejected based on standard hypothesis values. Based on the assumptions of statistical analysis and experimental data, the Chi-square value is calculated using traditional tools. The probability values obtained are observed for the expected frequency. The degrees of freedom and level of significance from chi square value table are found to be $\alpha > 0.05$. Modern tools and

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equipments used by different levels of farmers were analyzed. The Likert scale is used to evaluate the facilities, like labour availability, machinery and wages paid during cultivation season is analyzed.

Keywords: Chi-square statistics; groundnut cultivation; mechanization; agricultural mechanization; farm mechanization.

1. INTRODUCTION

India, with a vast land area of 297 million hectares, utilizes approximately 160 million hectares for cultivation purposes. Of this, around 61 million hectares are irrigated, with 22 million hectares relying on canals and 39 million hectares utilizing ground water and wells. The remaining land is dependent on rainfall for cultivation [1]. Groundnut is one of the most important cash crops and also provides edible oil. India stands in second position next to China in the production of groundnut. These seeds contain 47-53% of oil and 25-36% protein. India exports the peanut to more than 75 countries. This crop is grown in all the seasons' i.e. Kharif, rabi and summer. But maximum yield is obtained during Kharif season i.e., between June to October. Karnataka is also the largest producers of groundnut. About 8.5 lakh hectares of land had grown groundnut during 2010-11, the productivity was about 6.0 lakh tones of groundnut [2]. Today, more than 50% of farmers still rely on traditional farming methods. These methods include land cultivation, crop plantation and transplantation, harvesting, post-harvest activities such as seed sowing, and the use of fertilizers and pesticides [3]. In the past, hand tools were crafted in villages with the assistance of skilled blacksmiths and carpenters. Today, these traditional methods are still employed by many blacksmiths, while some tools are also manufactured by small-scale industries [4].

Groundnut is typically propagated by directly sowing seeds into the soil. In developed countries like the United States and Australia, a tractor-operated seed drill is commonly utilized for this purpose. On the other hand, in developing countries, manual sowing or the use of animal-drawn seed drills is more prevalent [5]. The average size of farms in India is significantly smaller compared to other countries. For instance, the United States has an average farm size of 170 hectares, while the European Union has an average of 14 hectares [6]. Over the years, the average farm size in India has been on a declining trend. In 1971, the average size was 2.28 hectares, which decreased to 1.57 hectares in 1991. By 2001, it further reduced to 1.33 hectares, and in 2011, it reached 1.16 hectares. Many rural areas in India rely on rainwater for agriculture and are currently experiencing significant challenges due to unpredictable rainfall patterns. In the case of groundnut cultivation, farmers often depend on labourers for various tasks such as seed planting, weed removal, ground harvesting, and post-harvest activities like pod removal. Unfortunately, this heavy reliance on labour has resulted in lower productivity and decreased profitability for these farmers. In recent days many machines have been developed for agricultural activity, but they are not suitable for groundnut production. Since the machinery cost is higher low income farmers are not able to afford such huge machinery. Small and marginal farmers are increasing day by day due to defragmentation and land developers are converting agricultural land into residential plots. The migration of farm workers to jobs provided by the MGNREG Act, 2005 has led to a scarcity of labour for labour-intensive crops [7]. Lower income in the agricultural field is drawing the attention of the youth farmers to move towards urban areas for better economic growth, this has led to the scarcity of farmer labours. But, Youths in the farmer's family are not interested in agricultural work due to lower income. If low cost automated machineries' are developed, then it would be beneficial for small and marginal farmers.

2. MATERIALS AND METHODS

2.1 Study Area and Collection of Data

In dry zones, less rainfall was received and low income farmers are huge in study area. The data from Chitradurga and Tumkur districts were collected. which are located in central dry zone of Karnataka. Which is located between 760 34'49.86"E to 760 51' 32.13"E and 140 14'13.63"N to 140 30'28.30" The average temperature in these areas are 17^0C to 43^0C and the rain fall ranges between 453.5 to 717.7 mm. It rains maximum during the Kharif season. The soil is sandy loam and red in major areas and remaining areas are deep black. The main crops grown in these areas are Groundnut, Ragi, Jowar and vegetables.

2.2 Statistical Analysis of Data

The research data collected is analysed and evaluated using Chi-square method. In 1900, Karl Pearson developed chi square test and applied it to the goodness fit for the frequency curve (Stigler1999). Hypothesis test results were predicted using the Chi-square method [8]. The data were collected through field survey. The relative values were either accepted or rejected based on the standard values of hypothesis [9]. The relative value commonly used in research was α > 0.05 i.e., probability of deviation derived from observed and expected values. If α > 0.05 then the deviation in probability value would be found to have more than 5% error [10, 11].

The chi square value can be calculated using the equation (1).

$$(x)^2 = \sum \frac{(O_i - E_i)^2}{E_i} \quad (1)$$

x^2 = Chi squared value
O_i = Observed Value
E_i= Expected value

The values obtained are analysed

3. RESULTS AND DISCUSSION

Groundnut is the most suitable crops for the central dry zone of Karnataka in terms of soil and water source, which is grown maximum during kharif season. As a part of the research work set of questionaries were prepared and collected data from sample of 300 farmers, in different parts of the central dry zone of Karnataka. As per the government guidelines, the research data was categorized into five categories such as marginal, small, semi medium, medium and large farmers based on land holding size.

From the Table 1 it was observed that about 36% of farmers belongs to marginal and 35% to small farmers group. It is evident that only 2% lies in the large farmer's category. Due to not development in economic structure of farmer's, large and medium farmers can be converted into small in future.

3.1 Land Holding Details

Due to poor water availability and low monsoon, yields are low in central dry zone of Karnataka as compare to other parts of the state.

The land holdings of various categories of farmers were analysed and presented in Table 2. It was observed that marginal farmers have an average land holdings of 0.62 hectares, small farmers 1.35 hectares, semi medium farmers 2.44 hectares, medium farmers 5.55 hectares and large farmers 13.55 hectare of land. The land holding capacity of marginal and small farmers were very less as compare to large farmers

Table 1 Percentage of category of farmers

Sl. No.	Name of the category	Frequency (N=300)	Percentage (%)
1	Marginal	107	36
2	Small	104	35
3	Semi Medium	45	15
4	Medium	37	12
5	Large	6	2

Table 2. Land holding status various categories of farmers

Type of farmers	Frequency	% of land	Average land (in Hectare)
Marginal	108	11.07	0.62
Small	104	23.13	1.35
Semi medium	45	18.23	2.44
Medium	37	34.08	5.55
Large	6	13.50	13.55

3.2 Livestock Position of Various Categories of Farmers

Per head livestock position as shown in Table 3, the marginal farmers having 0.86 followed by small farmers (1.32), semi medium farmers (0.82), medium farmers (1.19) and large farmers having1.67 livestock per head. But for agricultural activities only draught animals like bullock and donkey were used. The other animals are used as a means to improve their economy. It was observed that marginal and other farmers have less cattle and livestock as compare to large farmers due to the less availability of resources in study area.

3.3 Traditional Methods of Agronomic Practices

It was clear from Table 4 that all categories of farmers were doing various agronomic practices with traditional tools and equipments. The traditional tools like plough, land leveller, seed drills, plough Iron, seed cum fertilizers and other tools. But in recent years due to labour scarcity and time saving, farmers were slowly adopting modern tools and equipments.

Table 3. Livestock position among various categories of farmers

Farmers category	Frequency	Total live stock	Per- head
Marginal	108	93	0.86
Small	104	137	1.32
Semi medium	45	37	0.82
Medium	37	44	1.19
Large	6	10	1.67

Table 4 Traditional tools and equipments among different categories of farmers

Farmers category	Frequency	Percentage (Tools)/head
Marginal	108	0.88
Small	104	1.19
Semi medium	45	1.27
Medium	37	1.24
Large	6	1.17

Table 4 shows the tools and equipment's owned by different categories of farmers. About 0.88 of marginal farmers, 1.19 of small farmers, 1.27 of semi medium, 1.24 medium and 1.17 of large farmers uses traditional tools. From this it was observed that marginal and small farmers have less number of equipment's or tools as compare to large farmers.

3.4 Chi-Square and Probability Value of Traditional Tools and Equipments

This study measures the impact of cattle livestock variations with different category of farmers, like marginal, small, medium, semi medium and large farmers in the dry zone of Karnataka and the comparison is drawn between cattle livestock and category of farmers

1. It was assumed that marginal and small farmers are having less cattle live stock
2. It is assumed that medium and semi medium farmers are having more cattle live stock
3. It is assumed that large farmers do not have cattle live stock

3.4.1 Null hypothesis H_0

There is no significant relation between category of farmers and cattle live stock.
Alternative hypothesis H_1: There is a significant relation between category of farmers and cattle live stock.

3.4.2 Probability value

The probability value is calculated using CHISQ TEST (total range and expected range). These values were gathered from the observed values and expected values.

Table 5 shows the relation between utilization of traditional tools and equipments. Thecalculated chi sq. was observed to be 45.98 and a critical value was 31.42. when these two values are compared,it was found that chi square values are greater than critical value (45.98 >31.42). so that to reject the null hypothesis and to accept the alternate hypothesis.

In this case P – value was (0.03759) less than significance alpha value (0.05). Alpha values (0.05<0.03759) shows that sample field data collected was sufficient and research work was observed to moving in the right direction, this makes the further work easier.

The relation between category of farmers and traditional tools and equipments used for groundnut production was also gathered. This data supports to develop the new products for groundnut operation.

3.5 Modern Methods /Equipments

The agricultural farm equipments are helpful to farming activities like ploughing, seed plantation and harvesting.

There is a lot of improvement in the technology in current days; many companies are developing very advanced tools for agricultural products. Even though modern tools and equipments are available, but are not affordable to marginal and small farmers.

Percentage of farmers following traditional method and machinery.

The above Fig. 1 shows that the percentage of farmers using traditional methods and modern equipment for groundnut production is calculated as follows: 83.89%, 81.46%, 80.00%, 80.40%, and 75.00% of marginal, small, semi-medium, medium, and large farmers respectively are using traditional methods. Conversely, 16.11%, 18.54%, 20%, 19.60%, and 25% of farmers are using modern equipment respectively. This indicates that a majority of farmers are still relying on traditional methods when compared to modern equipment. Further, the percentage of

marginal farmers dependent on traditional methods is distributed in a descending order, while the percentage of modern equipment is in an ascending order. This indicates that there is a huge potential to develop new machinery for groundnut production.

3.6 Availability of Labor during Cultivation Season

The Likert scale is a widely used method for analyzing research work and evaluating the performance of facilities in a particular field of research. Developed in 1932 by RensisLikert, this method helps us to understand, interpret, and analyze the data derived from the Likertscale [12]. It is an ordinal scale with 5 or 7 points that rate the degree of an attitude. Likert scales are an effective tool used to evaluate the facility of labor availability. During the cultivation season, labor availability was rated by farmers on a scale of 1 to 5, with 43% of farmers rating it as 'very poor' and 53% rating it as 'poor'. This indicates a significant deficiency in labor availability during the season, as illustrated in Fig. 2.

3.7 Availability of Machinery during Cultivation Season

The availability of machinery during the cultivation season is significantly lower than normal days, as rated by farmers on a scale of 1 to 5. 37% of farmers rated the availability as "Very Poor," 56% rated it as "Poor," and only 6% rated it as "Average." These results, shown in Fig. 3, demonstrate that machinery availability is severely lacking during this season.

Table 5. Chi-square and probability value of traditional tools and equipment's

			Statistical inference at (alpha = 0.05) 5% level of significance(N=300)				
Sl. No	Farmers category	Sample farmers	Significance value-0.05 (α = 0.05)	Chi square value	Critical Value	Degree of freedom	p-value (Probability value)
1	Marginal	108	0.05	45.98	31.42	20	0.03759
2	Small	104					
3	Semi medium	45					
4	Medium	37					
5	Large	6					

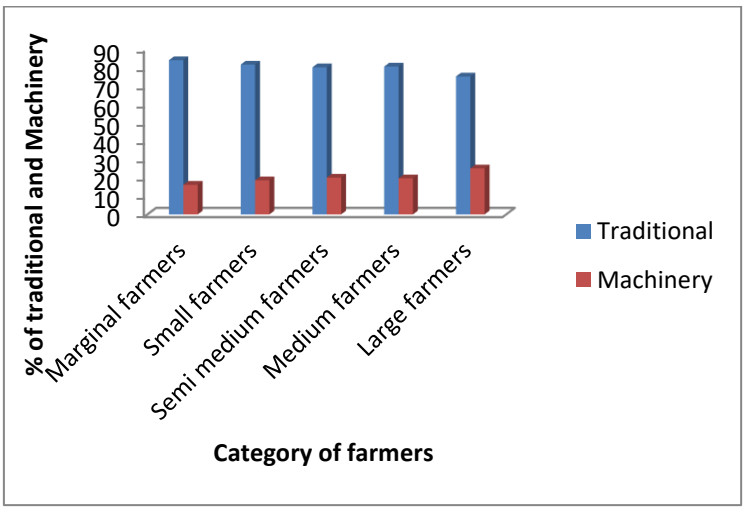

Fig. 1. Percentage of farmers following traditional and machinery

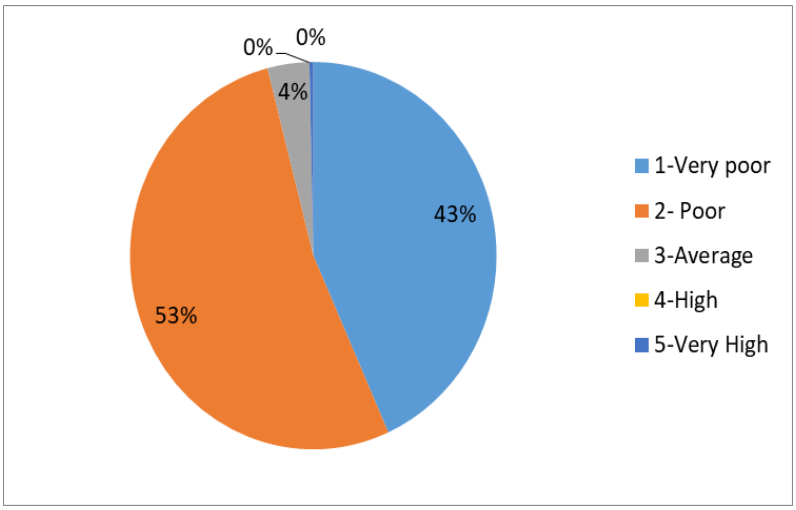

Fig. 2. Availability of Labor during cultivation season

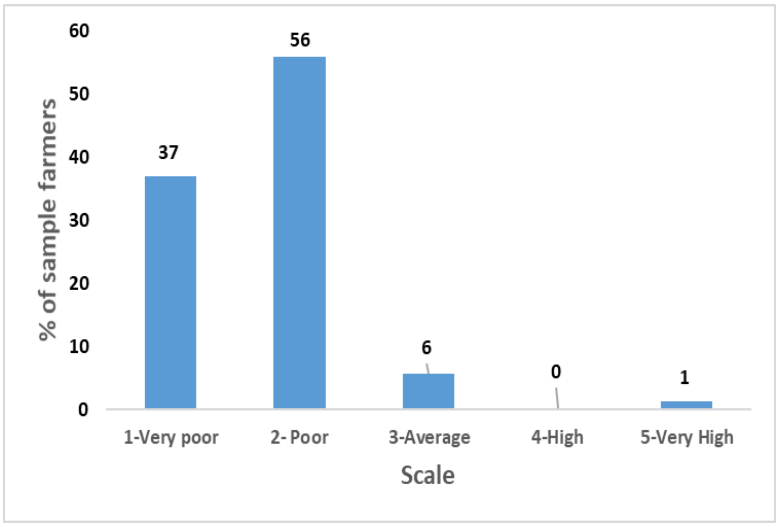

Fig. 3. Availability of machinery during cultivation season

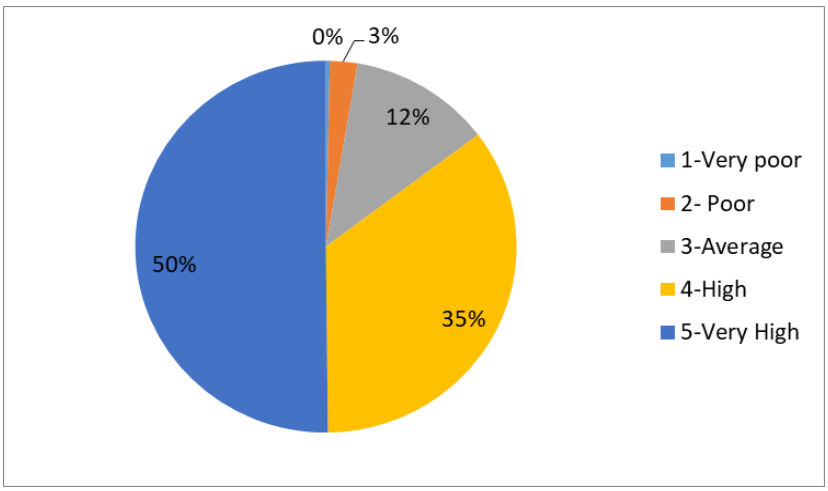

Fig. 4. The wages paid during cultivation season for labor

3.8 The Wages Paid during Cultivation Season for Labor

The amount paid during the season is significantly higher than during normal days, as evidenced by farmers who rated it on a scale of 1 to 5. An impressive 35% of the farmers rated it highly, and 50% rated it very highly, with an average score of 12%. The Fig. 4 clearly shows the high amount of payment during the season.

4. CONCLUSION

The population in India is rapidly increasing while the availability of farming land is decreasing. This alarming trend is projected to result in an average land size of less than one hectare. The fragmentation of land has led to a rise in marginal and small farmers, while urban areas have seen the conversion of agricultural land into real estate. Furthermore, there is a noticeable decline in the availability of agricultural tools and equipment, with large farmers possessing a greater number of traditional tools compared to their smaller counterparts. The scarcity of resources has also impacted livestock numbers, leading to a significant decrease. As a result, many small farmers have been forced to become labourers due to the declining income from their land. When it comes to agricultural mechanization, India lags far behind advanced countries. Currently, the country has only achieved 40 percent mechanization, highlighting the urgent need for improvement. The increasing cost of labour, coupled with a scarcity of workers, has prompted small and marginal farm holders to migrate from rural to urban areas in search of better financial opportunities. In villages, farmers are losing interest in agricultural work due to the changing patterns of the monsoon. It is crucial to address these challenges and take proactive measures to revive and sustain the agricultural sector in India.

Research data indicates that the availability of labour and machinery during the cultivation season is significantly limited. Currently, farmers rely on traditional methods rather than utilizing machinery for groundnut production, resulting in higher expenses during the cultivation season compared to regular days. Based on this research, it is recommended that low-cost machines be adopted by marginal, small, and medium-scale farmers. In the near future, there is immense potential to incorporate automation equipment into groundnut cultivation, which will enhance yield and contribute to financial stability.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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