

A Study on Economic Growth of Groundnut Production in Dry Zone of India

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ABSTRACT

Agriculture plays a very important role to build the nation and is the back bone of national economy of developing countries. Agriculture is not only producing the food but also generates employment to the maximum percentage of population of the country. The purpose of this research is to study about groundnut cultivation, economic analysis and production in the central dry zone of Karnataka. Sample data of farmers were analyzed using chi-square method. Based on the assumptions from statistical analysis and experimental data, Chi-square (χ^2) value is calculated to analyze the educational qualification in this area. The probability values are obtained from the observed and expected frequency. The critical value is obtained by referring the degrees of freedom and level of significance of $\alpha > 0.05$. About 92% of the farmer's education is less than graduation and 8% of farmers are graduates. Due to limited availability of machinery in these region, farmers are dependent on labors. Hence the need to reduce the cultivation cost can be achieved by developing small machineries which suits small and medium farmers.

Keywords: Agricultural economics, Chi-square statistics, observed frequency and expected frequency, Groundnut cultivation, Agricultural mechanization.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is grown around the world and grown in more than 100 countries. It is widely grown in the tropics and sub tropics, being important to both small and large commercial producer. Peanuts are considered the fourth largest source of cooking oil in the world and the third largest source of vegetable protein. Groundnut is one of the most important crops cultivated in central dry zone of Karnataka. Indian economy is mainly dependent on agriculture, about two third of employment is generated in this sector. This acquires 15-16% India's GDP. Agricultural sector plays an important role in the growth of Indian socio economic condition. In India, the population is increasing day by day and average income is increasing due to globalisation. At the same time, there is huge demand for nutritious food, quantity, quality and varieties of food in India. The income of farmers is low, when compared to other sectors. In India, food production is low when compared to other developed countries. In central dry zone of Karnataka, India many varieties of cash crops are grown such as paddy, Jowar, sugar cane, groundnut and many vegetables. Groundnut or peanut is called as the 'King' of oilseeds. This is one of the most important food and cash crops of our country [1] and also called as poor man's cashew nut.

Groundnut is grown in all the seasons' i.e., Kharif, rabi and summer. But maximum yield is obtained during Kharif season between June to October. Due to changes and irregularity in the monsoon, farmers are facing a lot of problems and labour scarcity is increasing day by day in rural areas. Groundnut is grown in both rain fed and irrigated areas also. In rain fed areas the average yield is about 10 to 15 quintal per hectare and in irrigated places 15 to 30 quintal per hectare. About 70 to 75% of production is grown in Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka. In India maximum growth is in rain fed areas compared to irrigated areas. In India, about six percent of total production is grown in irrigated area [2]. The government of India has planned to increase the production rate of groundnut from 10.12 to 14.15 million tonnes by 2025-26. (govt records]. During 2020-21, groundnut is grown in 50.89 lakh hectares and the yield is approximately 101.46 lakh tonnes which is more than previous year's production, i.e. 99.52 lakh tonnes were grown during 2019-20, as per the government records in India and even in Karnataka groundnut was grown in 5.27 lakh hectare. The approximate selling cost of groundnut Rs 4000 per quintal to 4500 per quintal. And benefit cost of groundnut 10 to 15 thousand per hectare.

The objectives of this study is to assess the cost and returns of groundnut production in order to find out

productivity and profitability, as well as identify the problems faced by groundnut farmers in this area.

MATERIAL AND METHODS

Study Area

The data was collected from Chitradurga and Tumkur districts of India, which is located in the central dry zone of Karnataka. This is located between 76° 34' 49.86" E to 76° 51' 32.13" E and 14° 14' 13.63" N to 14° 30' 28.30" N. The average temperature in these areas is 17°C to 43°C. The rainfall ranges between 453.5 and 717.7 mm and it rains maximum during 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.

RESULTS AND DISCUSSION

Collection and Statistical Analysis of data

As a part of the research work, set of questionnaires were prepared and about 300 sample data were collected during field visit at different parts of central dry zone of Karnataka, which is the maximum groundnut growing regions. Central dry zone of Karnataka is suitable for groundnut production in terms of fertility of soil and water source. The maximum yield of the groundnut is obtained during kharif season.

As per the government of India guidelines, the research data was categorized into five such as marginal, small, semi medium, medium and large farmers based on land holdings.

Table 1.1 Percentage of category of farmers (N= 300)

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

From the table 1.1, it was observed that about 71% are small farmers group. Semi medium and medium farmers are about 15% and 12%. It is evident that only 2% of the total farmers lies in the large farmers group. In future, due to fragmentation of land even the large and medium farmers will be transformed into small farmers.

The research data is analysed using the Chi-square method. In 1900, Karl Pearson developed chi square test and applied it to the goodness fit for frequency curve and later in 1904 he derived that the relation between rows and columns were independent of each other (Stigler 1999). Hypothesis test results are predicted using chi-square method. The relative values are either accepted or rejected using the standard values of hypothesis. The relative value commonly used in research is $\alpha > 0.05$. The probability of deviation is derived from observed and expected values. If $\alpha > 0.05$ then the deviation in probability value is more than 5% error.

Statistical hypothesis test (chi square test)

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

x^2 = Chi squared value

O_i = Observed Value

E_i = Expected value

Educational level of farmers in central dry zone of Karnataka

The purpose of the research work is to study the educational level of farmers to draw a relation between educational level and income of farmers at central dry zone regions of Karnataka. Based on the survey done at dry zone, the following details were obtained. The educational level of farmers were characterized into five divisions: illiterate, primary, secondary, higher secondary and graduate. It was observed that illiterate were 26%, with primary education 21%, secondary schooling 18%, higher secondary education 27% and graduate studies were 8%. The education level of those farmers involved in agricultural work were observed to have very low education status. About 92 percent of farmer's education level is below graduation, only 8% of farmers are graduates. The job openings are very less for graduate people in rural areas hence the graduate farmers are moving to urban places for their better growth.

Probability value:

The probability value is calculated from MS excel CHISQ TEST (total range, expected range). These values are selected from the observed values and expected values.

Table 1.2 Chi square and probability value of educational level farmers

SI No	Farmers category	Sample farmers (N=300)	Significance value-0.05 (α = 0.05)	Statistical inference at (alpha = 0.05) 5% level of significance			
				Chi square value	Critical Value	Degree of freedom	p-value (Probability value)
1	Marginal	108	0.05	29.805	26.30	16	0.019034466
2	Small	104					
3	Semi medium	45					
4	Medium	37					
5	Large	6					

From the table 1.2, the chi square value of 29.805 and critical value is 26.30 is calculated. By comparing these two values, it was found that chi square value is greater than critical value (29.805>26.30). So that the null hypothesis can be rejected and the alternate hypothesis can be accepted.

In this case it was observed to have Probability value of 0.019034466 which is less than significance of alpha value of 0.05. So there is strong evidence that to reject the null hypothesis and to accept the alternate hypothesis. Therefore, it is inferred that there is a significance association between the category of farmers and farmers level of education.

Economic analysis of groundnut production

The cost of expenditure and benefits of groundnut production in central dry zone of Karnataka is analyzed based on availability of labors in these areas. In present situation labor availability is very less and farmers are facing a lot of problems during cultivation season. The Younger generation farmers are not showing interest towards agricultural work. For the groundnut operation, farmers are mainly depending on women labors, because the wages paid to them is less when compared to men labors. The cost incurred in farming using traditional method and mechanized method is done. For both the methods the labor ratio of 2:3 for men and women is considered for study.

Cost calculation for traditional method

Table 1.3 Groundnut operation labor requirement traditional method and expenditure calculated for rain dependent area.

SL No	Type of Groundnut operation	Type of Labour for each operation per Hectare	Labour requirement Traditional method /hectare	Expenditure for each operation (Rs)
1	Ploughing	2times ploughing (2 pair of bullock) (750 Per day)	6 days	4500
2	Manure spreading before seed plantation	One time	1 No.	300

	Seed plantation	1 time ploughing and cover the soil	3days	2250
3	Seed plantation labour	Men and Women days (2:3)	(2+3)=5	1200
4	Weed removal			4800
5	Manure spreading during flowering time	Man and women days (2:3)	(8+12)=20	300
6	Chemical spraying	Man days	1	300
7	Primary harvesting (from ground)	Man and women days (2:3)	(8+12)=20	4800
8	Secondary harvesting (remove the pod from plant)	Man and women days (2:3)	(6+9)=15	3600
9	Seed Cost (Rs 60 to 80)	62kg per Hectare	Rs 60	3720
10	Fertilizer Cost	900 /bag	5	4500
11	Plant Protection (Chemical)	1 Littrre	1 Litter	865
Total amount in Rs				31,135/-

For groundnut cultivation, some farmers follow traditional methods for ploughing, seed plantation by using bullock and women labor for cultivation. For traditional method of cultivation, expenditure for one hectare of land is around rupees 31,135/- and it would increase by 10 to 15% during cultivation season. The expenditure for wet land is higher when compared to rain dependent zones for cost of seeds, manure and labors. But the yield is also observed to be very high in these zones.

Combination of traditional and mechanized method

The table 1.4 refers the mechanized method for ploughing and seed plantation and harvesting, expenditures for each operations.

Table 1.4 Combination of traditional and mechanized method and men and women labor ratio of 2:3

SL No.	Type of Groundnut operation	Type of labour for each operation per Hectare	Labour requirement Traditional, machinery and men and women /hectare	Expenditure for each operation (Rs)
Traditional (Labour requirement)				
2	Manure spreading before seed plantation	Man days for fertilizer	1	300
4	Weed removal	Men days	8	2400
		Women days	12	2400
5	Manure spreading during flowering time	Man days	1	300
6	Chemical spraying	Man days	1	300
7	Primary harvesting (From ground)	Men days	8	2400
		Women days	12	2400
	Secondary harvesting (remove the pod from plant)	Men days	2	600
		Women days	4	800
	Segregating the pod from	Men days	2	600

	plant (left over pod after harvesting from machinery)	Women days	3	600
9	Seed Cost (Rs 60 to 80)	62kg per Hectare	Rs 60	3720
10	Fertilizer Cost	Rs 900 per bag	5	4500
11	Plant Protection (Chemical)	1 Litre	1 Litter	865
Machinery used				
1	Ploughing	2times ploughing using tractor- (1hr-Rs 600) (0.5h/hr)	4 hrs	2400
2	Seed plantation	For 25 kg seed plantation RS 1200	Approx-62 kg per hectare	3000
3	Secondary harvesting (remove the pod from plant)	Machinery rent	Per hectare	2000
Total amount in Rs				29,585

For groundnut cultivation majority of the farmers follow combination of traditional and mechanized method, and also combination of men and women labourers. For ploughing and seed plantation, machinery is used and for other cultivation combination of men and women labour ratio of 2:3 is used.

The expenditure incurred during the production of groundnut was calculated for central dry zone of Karnataka. It was observed that, for traditional method the cost incurred is 31,135/- per hectare and mechanized method cost is around 29,585/- per hectare. It is noticed that the cost incurred using traditional method is higher than the mechanized method. It depicts that in future the development of the machines which suits groundnut cultivation helps in reduction of the labour cost and increase in the profit margin.

The expenditure for each operations during groundnut cultivation is indicated in the figure 1.1. From this it is observed that weed removal cost is very high about 18%, harvesting from ground is 17%, seed plantation and ploughing cost is 13% and post harvesting cost is about 8%. From this inferred that the cost of groundnut cultivation can be minimized using mechanized machines.

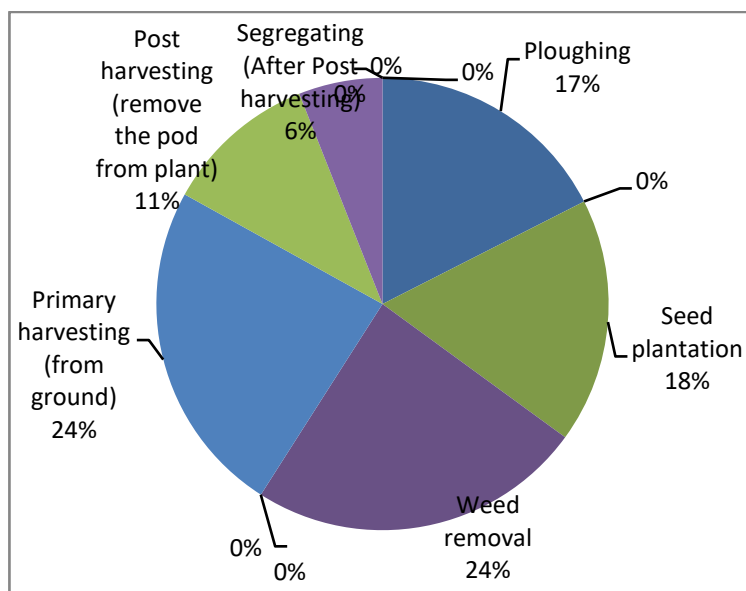


Figure. 1.1 Percentage of expenditure of each operation for groundnut cultivation

Net profit of groundnut production in central dry zone of Karnataka

In groundnut cultivation, the cost for traditional and mechanized method is almost equal. During cultivation season the cost would be increased due to climatic changes in the monsoon. If there is sufficient amount of rainfall is incurred in these zones, then the yield as well as the profit would be more. Based on the survey conducted, sometimes profit margin is very less, only 8-12 quintal per hectare is grown, if there is shortage of rainfall.

Table 1.5 Net profit of groundnut production in central dry zone of Karnataka per hectare

Sl No.	Expenditure	Expenditure/ Hectare (Rs)	Selling price (Rs 4000 /quintal) (10- quintal)	Selling price (Rs 4000 /quintal) (12- quintal)	Selling price (Rs 4000 /quintal) (15- quintal)	Selling price (Rs 4000 /quintal) (20- quintal)
	Total selling cost		40,000/-	48,000/-	40,000/-	80000/-
			Profit (Rs)	Profit (Rs)	Profit (Rs)	Profit (Rs)
1	Total expenditure for traditional men , women labor (2:3)	31,135	8,865	16,865	28,865	48,865
3	Total expenditure for combination of traditional, machinery and men , women labor (2:3)	29,585	10,415	18,415	30,415	50,415

In central dry zone of Karnataka majority of the farmers use machinery, men and women labours for groundnut cultivation. For ploughing and seed plantation only mechanized methods are followed. For other operations such as weed removing, post harvesting farmers follow traditional methods. Total expenditure was analyzed for traditional and mechanized cultivation methods and are indicated in the table 1.5. Mechanized method cost is less when compared to traditional methods.

SCOPE FOR MECHANIZED MACHINES

Agriculture is the largest private sector occupation in India. From the above discussion, it was observed that most of the farmers are following traditional method for groundnut cultivation and depends on women labour rather than men labour. For groundnut cultivation mechanized machines are used for ploughing and seed plantation which suits to around 90% of the total process. For post harvesting only 10 to 15% farmers are using machinery. From the sample survey conducted, about 71% of the farmers belongs to marginal and small farmers and they can't afford present machineries due to high cost. Even expenditure for cultivation is high for traditional method compare to mechanized method. During cultivation season labour demand is high and more labour charges have to be paid. If the mechanized machines are used for the all the groundnut operation reduction in the expenditure and increase the profit can be expected. It can be inferred that there is huge scope to use mechanization farming equipment for groundnut cultivation of land and harvesting in the field of agriculture. This will lead to improved yield and returns allowing the farmers to stay back and find their livelihood in rural areas.

CONCLUSION

From the above discussion, it is found that in central dry zone of Karnataka the education level is very low when compared to other places. The Chi square value is greater than the critical value and Probability value is less than the significance alpha value. Thus the null hypothesis is rejected and alternate hypothesis is accepted. The expenditure and profit margin is analyzed, for each operations of groundnut production. From the sample survey data the expenditure cost of traditional and mechanized methods. Cultivation cost of traditional method is higher than the mechanized method. Farmers are facing so many challenges in these reason such as financial constraints, labours problems, shortage of machinery and irregularity in monsoon, which restrict the yield.

Small and medium farmers are able to access for tractors services during cultivation season. It indicates the need for development of low cost machine for groundnut crop production which suits for small and medium farmers.

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