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Economics of production of Maize (*Zea mays* L.) in North Karnataka

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Abstract

Economics of production of maize has been studied using the randomly selected maize growers and primary data was collected from sample farmers by personal interview method with the help of pre-tested schedule. The data have been analyzed using simple tabular analysis. The results have revealed that the maize and cotton are the main crops in Kharif season and maize also grown in summer season. The findings of the study showed that among variable cost, the farm yard manure was highest per acre followed by human labour and machine labour were 22.03 per cent, 15.71 and 7.44 per cent respectively. In case of fixed cost, rental value on land was the highest cost incurred per acre of about 22.67 per cent. The cost of cultivation of maize was Rs.22165 per acre. The average yield obtained per acre of maize was found to be (22.84 q/acre) and that of by-product was (3.65t/acre) and value obtained from maize and its by-product worth ₹ 26,191.31 and ₹ 5,422 per acre, respectively. The gross returns and net returns obtained by the farmer was ₹ 31,613 and ₹ 9,447.98 per acre of maize cultivation and a return per rupee of expenditure was found to be 1.43 indicated that maize is a profitable crop enterprise.

Keywords: Economics, maize, cropping pattern, cost and gross income

Introduction

Maize (*Zea mays* L.) is one of the most important cereal crops in the world's agricultural economy. Among the cereal crops, maize ranks first in production in the world. It assumes an important role next to rice and wheat in the farming sector and macro-economy of the agrarian countries. It ranks third next to wheat and rice in the world with respect to area, while its productivity surpasses all other cereal crops. Maize crop is grown in warm weather condition and it is grown in wide range of climatic conditions. Maize grain contains about 10 per cent protein, 4 per cent oil, 70 per cent carbohydrates, 2.3 per cent crude fibre, 10.4 per cent albuminoids and 1.4 per cent ash. Maize grain has significant quantities of vitamin A, nicotinic acid, riboflavin and vitamin E. It provides nutrients for humans and animals and also serves as a basic raw material for the production of starch, oil, protein, alcoholic beverages and food sweeteners. It is grown in more than 70 countries of the world. The importance of maize or corn lies in its wide variety of applications besides serving as human food and animal feed. It is a source for a large number of industrial products-maize corn, corn starch, corn oil, baby corn, popcorn, dairy feed, poultry feed, piggery, agro-industries, and so on. The huge potential for exports has added to the demand for maize all over world. It is being used for manufacturing industrial products like starch, syrup, alcohol and acids, etc. It is rich source of Starch (60-80%), protein (8-12%), fat (3-5%), and minerals (1-2%) (Naveenkumar 2011) [7]. Maize stand on second place among all the kharif crops after rice, and on third place after rice and wheat among the food grown crops. Seeing the importance of the crop (Choudhri *et al.*, 2018) [1]. More maize is cultivated every year than any other cereal crops. About 50 species of maize exist and consist of different shapes, colours, textures, and sizes. Yellow, white, and red maize are cultivated and consumed by most people. Though it is a grain, it is consumed as a vegetable. The grains of this crop are rich in vitamins A, C, E, carbohydrate, essential minerals, dietary fiber and protein (Mohammad *et al.*, 2014) [3]. Maize constitutes the major ingredient of animal feed. Also, ethanol used as bio-fuel and for medical purposes could be produced from maize grains (Monsanto, 2014) [4]. Maize provides about 15 and 19 percent of the world's protein and calories, respectively (Surinder, 2011).

Material and Methods

Haveri was selected for the study as it is a major maize growing district (13.99% of total maize area) of Karnataka. In Karnataka, the area under maize cultivation during 2015-16 was 1.22 million ha and in Haveri district the area was 1,70,696 hectares. The total sample size of farmers was 60. For evaluating the specific objective of the study, primary data was collected from sample farmers by personal interview method with the help of pre-tested schedule. It includes, cropping pattern followed, inputs used, input prices, output obtained of maize in the study area. To analyse cost and returns of maize production used tabular method and cost concepts which includes variable cost and fixed cost. Variable cost is the cost incurred by the farmers for the cultivation of maize. Broadly these are the actual costs along with incidental charges incurred towards seeds, manures and fertilizers, plant protection chemicals, labour and miscellaneous charges. The fixed cost includes depreciation on farm implements and machinery, interest on fixed capital, land revenue and rental value of land. Hence, the total cost included the cost of human labour, bullock labour, tractor power, FYM, fertilizers, plant protection chemicals, seeds and other fixed cost. Therefore, cost actually paid by the selected farmers was considered and analyzed.

Gross income were computed on the basis of actual prices at which individual farmers sold their main products and by-products, i.e. value of main product plus by-product is called gross income. Benefit cost ratio is the ratio of total cost of cultivation to the gross returns multiplied by 100 i.e. returns per rupee of expenditure. Cropping intensity was computed as the ratio of the gross cropped area to the net sown area and expressed in percentage. Total cost of cultivation and gross income per hectare were positively related with the size of the farms (Choudhri *et al.*, 2018) [1]. Economic analysis is most important consideration in agriculture; it may be in the form of such as (human labour, bullock labour and machine labour), seeds, organic manure, inorganic fertilizer (Nagaraj 1993) [6]. Many studies have been done to evaluate the cost economics viz., Madalia and Charan studies costs and returns in H-4 cotton seed production in Gujarat and reported that average cost of seed production was Rs. 44,688.80 per hectare.

Result and Discussion

cropping pattern of sample farmers represents the allocation of the area under various crops at a point of time (kharif, rabi and summer). The cropping pattern of sample farmers in the study area was presented in Table 1. It revealed that, out of total gross cropped area, about 63.67 per cent, 33.29 per cent and 3.03 per cent of area was utilized during *kharif*, *rabi* and summer season, respectively. The crops like maize (38.01%), cotton (16.27%), onion (2.11%), groundnut (1.83%), soybean (3.03%), chilli (1.10%) and red gram (1.01%) were grown during *kharif* season. In *rabi* season, the crops like sorghum (21.42%), wheat (3.95%), cowpea (3.12%), and tomato (4.78%) were grown. About 3.03 per cent of area was under

the summer crop and grown maize crop. Gross cropped area and net cropped area was 10.87 acres and 6.92 acres respectively. Cropping intensity of sample farmers was worked out to be 157.05 per cent.

The details of variable cost, fixed cost and total cost incurred per acre in maize cultivation were calculated and presented in the Table 2. It was observed that the total cost of cultivation was ₹22,165 per acre, out of which 73.91 per cent was variable cost and remaining 26.09 per cent was fixed cost. The distribution pattern of variable cost on various inputs revealed that human labour cost shared the highest and was 22.03 per cent of the total cost followed by FYM cost which was 15.71 per cent and chemical fertilizers were accounted 9.77 per cent. The share of machine labour, bullock labour, seeds and plant protection chemicals were 7.44, 6.55, 5.83 and 1.11 per cent, respectively and interest on working capital was ₹1,213 accounted for about 5.48 per cent of the total cost.

On the other hand, the items included under fixed cost namely, rental value of land, land revenue, depreciation and the interest on fixed capital shares in the total cost of cultivation amounted to 22.67, 0.10, 0.63 and 2.69 per cent, respectively. The average yield obtained per acre of maize was found to be (22.84 q/acre) and that of by-product was (3.65t/acre) and value obtained from maize and its by-product worth ₹26,191.31 and ₹5,422 per acre, respectively. The gross returns and net returns obtained by the farmer was ₹31,613 and ₹9,447.98 per acre of maize cultivation and a return per rupee of expenditure was found to be 1.43. This result was supported by a research on cost and return structure of maize production in Dharwad and Haveri districts in that maize production in the study area found to be profitable as also supported by B: C ratio of 1.42 to 1.50 among different categories of farmers (Murthy *et al.*, 2015) [5].

Table 1: Cropping pattern of sample farmers

Sl. No.	Season	Crops	Area (acre)	Per cent
1	Kharif	Maize	4.13	38.01
		Cotton	1.77	16.27
		Onion	0.23	2.11
		G.nut	0.2	1.83
		G.gram	0.03	0.27
		Chilli	0.12	1.10
		Soybean	0.33	3.03
		Paddy	0.11	1.01
		Sub total	6.92	63.67
2	Rabi	Jowar	2.33	21.42
		Wheat	0.43	3.95
		Cowpea	0.34	3.12
		Tomato	0.52	4.78
			Sub total	3.62
3	Summer	Maize	0.33	3.03
			Sub total	0.33
Gross cropped area			10.87	100
Net cropped area			6.92	
Cropping intensity			157.05	

Table 2: Costs and returns structure in maize cultivation (per acre)

Sl. No.	Particulars	Unit	Cost	Per cent
I	Variable cost			
	Seed	kg	1291	5.83
	Farm Yard Manure (FYM)	Ton	4882	22.03
	Fertilizer	Kg	2166	9.77
	Plant protection chemicals	Ltrs	245	1.11
	Human labour	Md	3483	15.71

	Bullock labour	Pd	1452	6.55
	Machine labour	Hrs	1650	7.44
	Interest on working capital (8%)		1213	5.48
	Total variable cost		16383	73.91
II	Fixed cost			
	Land revenue		22	0.10
	Depreciation		139	0.63
	Rental value on land		5024	22.67
	Interest on fixed capital (11.5%)		596.	2.69
	Total fixed cost		5782	26.09
III	Total cost of cultivation		22165	100
IV	Returns			
	Main product (q)	Quintals	22.84	
	By product (t)	Tonnes	3.65	
	Value of main product (Rs.)		26191.31	82.85
	Value of by product (Rs.)		5422	17.15
	Gross returns (Rs.)		31613.31	100
	Net returns (Rs.)		9447.98	
V	B:C ratio		1.43	

Conclusion

The results conclude from the study were: cropping pattern in the study area indicates that, the area under maize was 38.01 per cent during kharif season. The cost of cultivation of maize was Rs.22165 and output received was 22.84 quintals per acre and net income was Rs.9447.98 per acre. The Benefit- Cost Ratio was Rs.1.43 per acre and it shows the returns per rupee of expenditure. The estimates of the economics of the maize indicated that, farm yard manure, human labour, machine labour are the important resource variables responsible for increasing the yield. The use of these variables has to be carefully extended by the maize growers to increase the yield.

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