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Economics Production of Major Crops in Vijayapur District of Karnataka

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ABSTRACT

Cost of cultivation is taken into consideration as a critical economic indicator for decisions on monetary policies made through the Government of India. Early to 1970's farmers used farm produced inputs best for cultivation of crops representative estimates on cost of cultivation of agricultural crops were obvious to formulate an appropriate strategy for planned agricultural development. The present study was under taken in Vijayapur district of Karnataka. A total of 60 sample farmers were selected through multistage random sampling technique for the study. Tabular analysis and budgeting techniques were used. The study revealed that farmers in the study area used more seed rate than recommended in the case of maize (20.18 kg/ha), redgram (13.25 kg/ha), greengram (12.89 kg/ha), jowar (12.83 kg/ha) and onion (5.39 kg/ha). The cost of cultivation of major selected crops under irrigation was found to be Rs. 138210, Rs. 78570, Rs. 66922, Rs. 59756, Rs. 45458 and Rs. 36477 for sugarcane, onion, maize, redgram greengram and jowar respectively. The net profits were found highest in sugarcane (Rs. 65905) followed by onion (Rs. 38136). Based on B:C ratio, it is more profitable to grow redgram (1.53), onion (1.49), sugarcane (1.48) and maize (1.19).

Key words: Gross return, Net return, B:C ratio, Fixed capital, Total fixed cost, Total variable cost, Working capital

Agriculture in India remains the most important primary sectors of the economy. Agriculture accounting for 13.45 per cent of Indian GDP during 2018. However, its proportion has been steadily declining over the years. Main purpose for deceleration in agricultural increase is declining investment mainly public funding in agricultural studies and development, irrigation mixed with inefficiency of institutions that provide inputs and offerings including rural credit and extension and post-harvest losses of food grains at 10 per cent of the overall production. Other factors together with land fragmentation, current tenancy laws, lack of contemporary market place, rural infrastructure and irrelevant input pricing policies, and so on. had been responsible for agrarian and ecological crisis within the

United States. The crux of the problem in agricultural production now's to growth the output in step with unit of enters applied in agricultural production [1].

The cost of cultivation is an important financial indicator being taken into consideration for framing the economic regulations with the aid of Government of India. Cost of cultivation of a commodity is the full expenditure incurred on various inputs which might be utilized in the production of the commodity. Traditionally agriculture turned into performed with the aid of the conventional practices, the use of farm produced inputs. But modern-day agriculture is characterized with the aid of new practices and current implements and machinery that require huge parched inputs. Till 1970's, there was less use of parched inputs in cultivation of plants. Indigenous sorts of seeds had been used which had been purchased from the market place. It turned into after 1970 with the advent of green revolution, agriculture practices became greater capital intensive and pricey due to usage of all inputs crucial for the increase of agricultural production in India. The cumulative impact of the input intensive technology and the domestic reforms in agriculture has been visible in the shape of an boom inside the value of cultivation of plants. The withdrawal, of subsidies from important spheres and multinationals participation to manufacture and distribute inputs has in addition multiplied enlargement of the farming community. The ploughing, coaching for seed bed, irrigation, intake of seed, hoeing and weeding, fertilizer, pesticides and

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pesticides were the major input prices that have affected the income of the farmers. These huge costs on inputs and different overhead charges have adversely affected the earnings of the farmers [2].

The Kharif crop is the summer crop or monsoon crop in India. Kharif crops are usually sown with the beginning of the first rains in July, The Rabi crop is the spring harvest or winter crop in India. It is sown in October last and harvested in March April every year. Major Rabi crops in India include Wheat, Barley, Mustard, Sesame, Peas etc. Rice is predominantly a Kharif or crop. It covers one third of total cultivated area of India. It provides food to more than half of the Indian population. Rice is produced in almost all states. Top three producer states are West Bengal, Punjab and Uttar Pradesh. Other rice growing states include Tamil Nadu, Andhra Pradesh, Bihar, Jharkhand, Uttarakhand, Chhattisgarh, Odisha, Uttar Pradesh, Karnataka, Assam and Maharashtra. It is also grown in Haryana, Madhya Pradesh, Kerala, Gujarat and Kashmir Valley. Wheat is the second most important crop of India after Rice. It's a Rabi Crop. It is the staple food in north and north western India. It is the staple food in north and north western India. It's a winter crop and needs low temperature. Ideal temperature for wheat cultivation is between 10-15°C at the time of sowing and 21-26°C at the time of harvesting. Wheat thrives well in less than 100 cm and more than 75 cm rainfall. The most suitable soil for cultivation of wheat is well drained fertile loamy soil and clayey soil. Plain areas are most suitable. The wheat crop is highly mechanization oriented and may need less labour. Top three states producing Wheat are Uttar Pradesh, Punjab and Haryana.

Coarse Cereals and Millets are the short duration warm weather (Kharif) crops used both as food and fodder. Important millets are Jawar, Bajra, Ragi etc. The areas under these crops have fallen drastically in recent years in India. The coarse cereals and millets are grown in areas with high temperature and are called dryland crops because can be grown in areas with 50-100 cm rainfall. The coarse cereal crops are less sensitive to soil deficiencies. They can be grown in inferior alluvial or loamy soil. Top three states with maximum production of total coarse cereals are Maharashtra, Karnataka, and Rajasthan. Maize, being an American crop, is a relatively new entrant and is gaining popularity because of its high yields and its easy adaptability to various soils and climatic conditions. It is rich in protein and requires moderate rainfall. Sugarcane belongs to bamboo family of plants and is indigenous to South Asia. In India, it is one of the most important Kharif crops. India is known as the original land of sugarcane. It is sown before kharif season and harvested in winter. It requires about 100 cm of rain. Many new varieties of sugar such as Gur and Khandsari are produced from sugarcane [3].

India is one of the leading producers of oilseeds in the world. They are the main source of edible oils. Some of them are used for preparing paints, varnishes, perfumes, medicines, soap etc. The main oilseeds are groundnut (kharif crop in peninsular India), rapeseed and mustard (rabi crops in wheat belt). Other oilseeds are sesamum (Orissa, Rajasthan, West Bengal, Tamil Nadu, Maharashtra), Linseed (Madhya Pradesh, Uttar Pradesh and Maharashtra), Castor-seed (Gujarat) and Cotton Seed (Gujarat, Maharashtra and Punjab). Groundnut is most important oil seeds of India. Grown as both as kharif and Rabi crop but 90-95 per cent of the total area is devoted to kharif crop. Groundnut thrives best in the tropical climate and requires 20°C to 30°C

temperature. 50-75 cm rainfall is favourable for groundnut cultivation. Ground nit accounts for half of the major oilseeds produced in India. India is the second largest producer of groundnut (After China). Top three states producing ground nut are Gujarat, Andhra Pradesh and Tamil Nadu.

Therefore, studies on price of manufacturing of agricultural commodities have taken hold of the hobby of studies workers and coverage-makers. The want for reliable and representative estimates on manufacturing of agricultural vegetation is obvious to formulate the ideal strategy for planned agricultural development. So, the examine turned into conducted to analyse enter utilization sample and value and returns in cultivation of principal crops in Belagavi district of Karnataka state.

MATERIALS AND METHODS

The study was conducted in Belagavi district. Multistage random sampling technique was used for the selection of sample farmers. In the first stage, Belagavi district was purposively selected. In the second stage, all the 2 taluks were involved in order to study the cost of cultivation of major crops of the district. In the third stage, from each taluk, two villages were selected based on highest area under cultivation of the selected crops. At the final stage, 15 farmers from each village were selected making the total sample size to 60 farmers. The sample farmers were interviewed personally with help of pre-tested schedule and tabular analysis method was used to work out the cost and returns of major crops in Belagavi district.

It includes operational costs, material costs and other costs in crop production. In operational costs, the cost of hiring human labour, machine power, bullock charges have been estimated by prevailing the rate at that particular period of time in the study area. Hired labour charge at the actual wage paid in cash and other kind of payments were also converted into monetary terms at the prevailing price. Imputed value of the family labour was also calculated using the prevailing wage rate in the study area. In case of bullock, tractor and other machinery and hiring charges were applied to these as the cost for those who don't own them, whereas the cost of fuel, repairing and maintenance cost were calculated for those who own them.

Modeling

To fulfil this objective, the cost of production and returns were worked out on per hectare basis for different major crops in each category for the farmers. Return from the crop was estimated by calculating the gross return from each selected crop. While formulating the price policy, the Commission considers the weighed average Cost of Production of different crops. If the costs are to be normally distributed, about 50% of production of a particular commodity will have the Cost of Production less than the weighed average, while the other half will have cost higher than this weighed average (CACP Dept. of Agriculture and cooperation, 2011-12).

$$GR_j = MP_j \times MPP_j + BP_j \times BPP_j \\ NR_j^* = GR_j - COP_j^*$$

Where,

GR_j = Gross returns from j^{th} crop (Rs./Qt).

MP_j = Main products of j^{th} crop (Qt/ha).

BP_j = By products of j^{th} crop (Qt/ha).

MPPj = Price of main product of jth crop (Rs./Qt).
BPPj = Price of by-product of jth crop (Rs./Qt).
NRj = Net returns from jth crop (Rs./Qt).
COPj = Cost of production of jth crop.
j = Selected crop (1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11)

Cost of cultivation

In case of material costs; cost of seeds, manure, chemicals, fertilizers irrigation charges were calculated at prevailing price at the time of application per hectare basis for different categories of farmers. Owned seed was priced as the prevailing seed price in the study area. Other costs includes land revenue, interests on fixed assets, interest on working capital, depreciation and rental value of the land. Simple interest was calculated on the working capital at a flat rate of 8% per annum as it prevailed at the time of investigation. Rental value of the land prevailed in the study area during study period was taken. Depreciation on the fixed asset per hectare was calculated on the basis of hours used for the crop.

RESULTS AND DISCUSSION

Inputs used per hectare in cultivation of major crops in the study area revealed that the utilization of average seed rate per hectare of green gram respondent were using slightly higher seed rate than the recommended. It is due to the reason that some of the respondent was using their own

seeds for sowing. While, the remaining crops like sugarcane, red gram, onion, maize, jowar, grapes and pomegranate sample respondent were using less than recommended due to were using purchased seeds. The average per hectare utilization of human labour was the highest (378.15 man days) in grapes farmers followed by pomegranate (245.65 man days), sugarcane (168.42 man days) and onion (142.36 man days) because most of the operations such as weeding, harvesting/picking were human labour intensive. While, comparatively less human labour was used in maize, green gram, red gram and jowar [4].

The average per hectare utilization of bullock labour were found highest (7.75 pair days/ha) in sugarcane followed by red gram (5.32 pair days/ha), pomegranate (4.52 pair days/ha), grapes (4.22 pair days/ha), jowar (3.62 pair days/ha), onion (3.18 pair days/ha) and green gram (3.12 pair days/ha) due to most of the farmers used bullock labour because use of bullock labour worked out to be cheaper than machine hour and these crops requires multiple inter-cultivation. The average utilization of machine hour was found highest in pomegranate (12.45 hr/ha), grapes (11.25 hr/ha), red gram (6.85 hr/ha), maize (6.82 hr/ha), jowar (6.35 hr/ha) and sugarcane (6.12 hr/ha) this may be attributable to accomplishment of quick work and time constraint to cover larger area. While the crops like onion (2.12 hr/ha) and green gram (3.22 hr/ha) required less hours of machine hour. The machine hour was used by sample respondents only for sowing and harvesting purpose.

Table 1 Inputs utilization pattern in cultivation of major crops in Vijayapur district by the sample farmer (Per ha)

Particulars	Units	Sugarcane	Red gram	Onion	Green gram	Maize	Jowar
Seed/Seedlings	Kg	5150	13.25	5.39	12.89	20.18	12.83
Human labour	Man days	168.42	64.28	142.36	64.81	84.18	23.83
Bullock labour	Bullock pair	7.75	5.32	3.18	3.12	4.22	3.62
Machine labour	Hour	6.12	6.85	2.12	3.22	6.82	6.35
Fertilizer	Kg	450.12	78.65	138.42	34.18	228.39	41.53
FYM	Tonnes	6.12	3.42	3.12	3.72	2.44	0.56
PPC	Litter	16.15	6.28	2.85	2.5	4.11	0.76
Irrigation charges	Rs.	12450	2846	2687	1650	2123	1352

The average utilization of fertilizer was more in grapes (452.36 kg/ha) followed by sugarcane (450.12 kg/ha), pomegranate (390.45 kg/ha), maize (228.39 kg/ha), onion (138.42 kg/ha) because of high amount of application of chemical fertilizers in anticipation of good yield. The crops like green gram (34.18 kg/ha), jowar (41.53 kg/h) and red gram (78.65 kg/ha) the farmers were used less quantity of chemical fertilizers. Farmers in the study area used less quantity of FYM, among the various crops, the quantity of FYM applied per hectare was highest in case of pomegranate 7.18 tones/ha followed by sugarcane (6.12 tones/ha) this indicated practice of organic manure application for better crops performance. FYM application was less than the recommended because respondents were not specific about quantity of application instead they were applying whatever quantity available some time they will be applying more and sometime less based on the quantity available.

The PPC used was highest to the extent of 84.59 litters/ha in grapes followed by pomegranate (75.43 litters/ha) and sugarcane (16.15 litters/ha). While, lesser quantity of PPC was used by sample farmers in case of jowar, green gram, onion, maize and red gram. The sample respondent were using higher plant protection chemicals than the recommended dose, it is due to more pest incidence

in the study area. The sample farmers were spent highest irrigation cost on sugarcane, pomegranate and grapes which required more water foe their life cycle. While the crops like jowar, green gram. maize, onion and red gram were required less quantity of water so respondent were less amount on less water intensive crops.

It was observed that the total cost of sugarcane production per hectare was found to be Rs. 1,38,210. The total variable cost incurred in sugarcane production formed major component (Rs. 1,15,887/ha) (83.85%) of the total cost. The expenditure on human labour (26.20%) was major variable cost in sugarcane production. As stated earlier, the number of human labour used was higher in sugarcane production since respondents were using human labour for planting, inter-cultivation, weeding, and cutting/harvesting. There exists more cost per man days of human labour. Hence the cost on this item was found to be higher [5].

Sugarcane

The cost of material inputs included seedlings/sets (Rs. 17,253/ha) and fertilizers (Rs. 15,952/ha) were used maximum share than FYM (Rs. 060/ha) and plant protection chemicals (Rs. 7,671/ha). The major reasons for this phenomenon are most of the respondents have used purchased seed sets and very high application of fertilizer.

The bullock labour (5.33%) and machine hour (5.31%) were used less because sugarcane is less bullock labour and machine hour intensive. The sample respondents were spent around 9.01 per cent of total cost on irrigation because sugarcane is water intensive crop it required more water.

The average yield obtained per hectare was 90.45 tones. The gross return worked out to be higher than total cost of cultivation due to better price. The benefit- cost ratio of 1.55 indicated the profitability of cultivation of sugarcane in the study area.

Table 2 Cost of cultivation of major crops in Vijayapur district (2018-19) (Rs/ha) (N=60)

Items	Kharif					Rabi
	Sugarcane	Red gram	Onion	Green gram	Maize	Jowar
I. Operational cost						
Seed/Seedlings	17253 (12.48)	3246 (5.43)	12312 (15.67)	1553 (3.42)	4442 (6.64)	596 (1.63)
Human labour	36210 (26.20)	13820 (23.13)	30607 (38.96)	13934 (30.65)	18099 (27.04)	5123 (14.05)
Bullock labour	7363 (5.33)	5054 (8.46)	3021 (3.84)	2964 (6.52)	4009 (5.99)	3439 (9.43)
Machine labour	7344 (5.31)	8220 (13.76)	2641 (3.36)	3864 (8.50)	8184 (12.23)	7620 (20.86)
Fertilizer	15952 (11.54)	2787 (4.66)	4906 (6.24)	1211 (2.66)	8094 (12.09)	1472 (4.03)
FYM	3060 (2.21)	1710 (2.86)	1560 (1.99)	1860 (4.09)	1220 (1.82)	280 (0.77)
PPC	7671 (5.55)	3297 (5.52)	1268 (1.61)	1313 (2.89)	2162 (3.23)	494 (1.35)
Irrigation charges	12450 (9.01)	2846 (4.76)	2687 (3.42)	1650 (3.63)	2123 (3.17)	1352 (3.71)
Interest on working capital (8%)	8584 (6.21)	3278 (5.49)	4720 (6.01)	2268 (4.99)	3867 (5.75)	1630 (4.47)
Total variable cost	115887 (83.85)	44259 (74.07)	63723 (81.10)	30616 (67.35)	52199 (78.00)	22006 (60.33)
II. Fixed cost						
Rental value of land	18750 (13.57)	12500 (20.92)	12500 (15.91)	12500 (27.50)	12500 (18.68)	12500 (34.27)
Land revenue	121 (0.09)	121 (0.20)	121 (0.15)	121 (0.27)	121 (0.18)	121 (0.33)
Depreciation	1240 (0.90)	1340 (2.24)	755 (0.96)	750 (1.65)	642 (0.96)	416 (1.14)
Interest on fixed capital (11%)	1525 (1.60)	1536 (2.57)	1471 (1.87)	1471 (3.24)	1459 (2.18)	1434 (3.93)
Total fixed cost	22323 (16.15)	15497 (25.93)	14847 (18.90)	14842 (32.65)	14722 (22.00)	14471 (39.67)
Total cost (I+II)	138210 (100)	59756 (100)	78570 (100)	45458 (100)	66922 (100)	36477 (100)

Figures in the parentheses indicate percentage to total

Redgram

It was observed that the total cost of red gram production per ha was found to be Rs. 59,756. The total variable cost incurred in red gram production formed major component (74.07%) of the total cost. Among the variable costs, human labour cost (23.13%), which accounted for maximum share, as it included labour intensive operations like weeding, inter-cultivation, harvesting and threshing and operational cost of human labour was more in the study area. The share of bullock labour (8.46%) and machine hour (13.76%) was utilized more than the recommended. The cost of material inputs included seeds (Rs. 3,246), fertilizer (Rs. 2,787), farm yard manure (Rs. 1,710) and plant protection chemicals (Rs. 3,297). Among material cost, the cost of redgram was more during previous decades, most of the farmers have been taking up plant protection measures, which in turn due to improper use of chemicals, many of the crop pests have become resistant, necessitating the application of more and more chemicals. This ultimately has led to rise in the material cost. The gross return worked out Rs. 91,710 which were higher than the total cost of cultivation (Rs. 59,756). The benefit- cost ratio of 1.53 indicated the cultivation of redgram was marginally profitable [6].

Onion

The total cost of cultivation of onion worked out to be Rs. 78,570 per hectare, of which the fixed cost accounted for the lesser proportion (18.90%). The variable cost which accounted maximum proportion of total cost (81.10%). Variable cost was increasing due to cost of human labour, machine hour, fertilizers etc. However, of the variable cost, major proportion was accounted for the human labour (38.96%) cost due to various labour intensive operations like

weeding, harvesting and post harvesting operations situation. The material inputs included seeds, fertilizer, farm yard manure and plant protection chemicals together accounted for 25.51 percent of the total cost of cultivation. Among material cost, the cost of seeds (15.67%) was more due to sample farmers were purchased good quality seeds. Now-a-days, due to increase in irrigated area and introduction of high yielding varieties of commercial crops, most of the farmer in the study area has been using fertilizers on larger scale. Similarly in irrigated situation pest incidence was comparatively more so respondents were using more plant protection chemicals. The sample respondents were using less quantity of FYM due to non-availability in the study area. The cost of irrigation was high due to multiple times irrigation of onion crop. The gross returns from onion cultivation worked out to be Rs. 97,710. This was more than sufficient to cover the cost of cultivation (Rs. 59,756). However, the benefit- cost ratio of 1.53 indicated its feasibility of cultivation under these situations.

Green gram

Per hectare cost of cultivation of green gram worked out to be Rs. 45,458, it included fixed cost (Rs. 14,842) and variable costs (Rs. 30,616). Among the variable costs, human labour cost (Rs. 13,934/ha), which accounted for maximum share, as it included labour intensive operations like weeding, inter cultivation, harvesting and threshing and operational cost of human labour was more in the study area. The cost of material inputs included seeds (3.42%), fertilizer (2.66%), farm yard manure (4.09%) and plant protection chemicals (2.89%). Among material cost, the cost of FYM was more due to sample farmers were purchased maximum number of tractor loads. In overall, the cost of material input worked out to be less. The gross return

worked out Rs.52,355 which were higher than the total cost of cultivation (Rs. 45,458). The benefit- cost ratio of 1.15 indicated the cultivation of green gram was marginally profitable.

Table 3 Yield and returns from major crops in Vijayapur districts (Rs./ha) (N=60)

S. No.	Particulars	Sugarcane	Redgram	Onion	Greengram	Maize	Jowar
I	Yield obtained (Qtl)	90.45	12.01	48.41	6.75	33.15	15.00
II	Return realized (Rs./ ha)						
	a. Main product (Rs./ ha)	198990	78960	113764	50490	72930	39000
	b. By-product (Rs./ ha)	5125	12750	2943	1865	6423	3841
III	Gross returns (Main product+ By-product)	204115	91710	116706	52355	79353	42841
IV	Total cost of cultivation (Rs./ha)	138210	59756	78570	45458	66922	36477
V	Net return (Rs./ha)	65905	31954	38136	6897	12431	6363
VI	B:C ratio	1.48	1.53	1.49	1.15	1.19	1.17

Maize

Per hectare cost of cultivation of maize worked out to be Rs. 66,922, it included fixed cost (22%) and variable costs (78%). Fixed cost worked out to be very meager as this doesn't require much of the investment. Among the variable costs, human labour (27.04%) cost accounted for maximum share under both the situations, as it included number of labour intensive operations like manual sowing, inter-culturing, weeding, harvesting and post harvesting operations. Under irrigated situations more labour were employed because of more weed problem and higher yield level. The cost of material inputs included seeds (6.64%), fertilizer (12.09%), farm yard manure (1.82%) and plant protection chemicals (3.23%). Among material cost, the cost of fertilizer was more due to most of the farmer in the study area has been using fertilizers on larger scale. This higher rate of fertilizers has further created demand for it, resulting in an increase in its price, rising material cost upwards. Majority of the farmers were using less FYM due to non-availability in the study area. The gross return worked out Rs. 79,353 which were higher than the total cost of cultivation (Rs. 66,922). The benefit- cost ratio of 1.19 indicated the cultivation of maize was marginally profitable.

Jowar

The total cost of cultivation of jowar per hectare worked out to be Rs. 36,477. It included fixed cost (Rs. 12,500) and variable costs (Rs. 22,006). Among the variable costs, machine hour (20.86%) accounted for lion share, as it included machine intensive operations like land preparation and post harvesting operations and operational cost of

machine hour was more in the study area. The cost of material inputs included seeds (1.63%), fertilizer (4.03%), farm yard manure (0.77%) and PPC (1.35%). In overall, the cost of material input worked out to be less. The major reasons for this phenomenon are most of the respondents have used their own seeds, and very less application of fertilizer and FYM. The gross return worked out Rs. 42,841 which were higher than the total cost of cultivation (Rs. 36,477). The benefit-cost ratio of 1.17 indicated the cultivation of jowar was economically profitable [7].

CONCLUSION

In this study the economic analysis (costs and return) of sugarcane, red gram, Onion, green gram, maize and jowar production systems in Vijayapur district of Karnataka have been investigated. Total costs production in sugarcane, red gram, onion, green gram, maize and jowar were 138210, 59756, 78570, 45458, 66922 and 36477 Rs/ha respectively. The highest share of total costs production in these crops were reported for seeds/seed sets labour cost in sugarcane and onion production systems, and labour input cost in onion and green gram. While, among these crops sugarcane consuming mare water in the production systems. The net return in sugarcane, red gram, onion, green gram, maize and jowar were 65905, 31954, 38136, 6897, 12431 and 6363 respectively. Benefit to cost ratio in red gram, onion, and sugarcane systems were more than other production systems. Finally, minimizing costs production is necessary because in addition to increasing economic benefit as well as increased sustainability of these cropping pattern.

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