

ECONOMICS OF PROCESSING OF REDGRAM (*CAJANUS CAJAN L.*) IN NORTH KARNATAKA

Srividyarani S. Sajjan*, Balachandra. K. Naik¹, Vilas S. Kulkarni², Chandranath H.T.³ and Suma Hasalkar⁴

Department of Agribusiness Management, University of Agricultural Sciences, Dharwad, Karnataka, India

¹*Department of Agricultural Economics, Project planning and monitoring cell, the Vice-Chancellor office, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India.*

²*Department of Agribusiness Management, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India*

³*Department of Agronomy, College of Agriculture, University of Agricultural Sciences, Dharwad, Karnataka, India*

⁴*Department Family Resource Management, Rural Homescience College, University of Agricultural Sciences, Dharwad, Karnataka, India.*

Email: sajjanvidyarani@gmail.com

Received-05.06.2021, Revised-18.06.2021, Accepted-27.06.2021

Abstract: Redgram is largely grown in northern part of the state especially in Kalaburgi district, which is called as “pulse bowl” of Karnataka. Based on the highest production of redgram, Kalaburgi and Vijayapura districts were selected and proportionate sampling procedure was followed to select the processing units. From both the districts 22 processing units were selected for the study. Total quantity of raw materials procured by redgram processing units was around 1,054 quintals of redgram and 6.39 quintals of oil with the each time procurement of 28 to 30 times per year. Everyday minimum 25 persons were required to run the redgram processing units. Redgram processing units had processed 31,636 quintals of redgram annually and total capacity utilization was 55.62 per cent. The total cost of processing of redgram to one quintal of dal was ₹ 6174, out of which the total variable cost was ₹ 6,125 per quintal and total fixed cost was ₹ 49 per quintal. The major problems faced by processors in production of tur dal were high price of raw materials, high transportation cost, lack of availability of sufficient raw materials, high moisture content of the raw material and improper quality of raw materials.

Keywords: Procurement, Human resource management, Capacity utilization, Cost of processing, Redgram

INTRODUCTION

Redgram (*Cajanus cajan*), belongs to the family Fabaceae. Red gram also known as pigeon pea, redgram and tur. Red gram it is originated in India. Red gram it is both a food crop and forage crop. Red gram is enriched with carbohydrates, protein, choline, vitamins A, B-6, C and D, minerals like potassium, phosphorus, calcium, magnesium and iron etc. Red gram is mainly used as a Dal, while the tender green seeds are consumed as vegetable, crushed dry seeds as animal feed and green leaves as fodder. The stems are used as fuel wood and to make butts, baskets, etc. The leaves can be used to feed silkworms and plants are used to culture the lac producing insects. Red gram occupies the 7th position among all food grains area in the country accounting for 3.21 per cent of total food grains area and 1.01 per cent total food grain production. In India, Karnataka state stands first with respect to both area and production of red gram with about 14.82 lakh hectares and 9.47 lakh tons, respectively. Red gram is largely grown in northern part of the state especially in Kalaburgi district, which is called as “pulse bowl” of Karnataka. Kalaburgi and Vijayapura are the leading districts in North Karnataka with respect to both area

and production of redgram. The total area of redgram in Kalaburgi and Vijayapura district was 5,96,689 and 5,20,937 hectares which accounted nearly 38.66 and 33.75 per cent respectively. The total production of redgram in Kalaburgi and Vijayapura was 5,69,078 and 1,67,273 tons which accounted 60.10 and 17.68 per cent, respectively during 2018-19.

In India, split of pulses are prepared called as “Dal” or “Dhal” are used as a food material. Commonly, it is prepared at processing units called as dal mills. Dal mills industry is originated as a house hold process and has been practiced not only as cottage industry but also as a commercial milling operation. Processing and value addition of pulses have boosted agro-processing industry in the rural area, which can generate large employment opportunities. The processing is generally done in two steps, loosening of husk by wet or dry method and dehusking and splitting using suitable machines. Milling of pulses means removal of husk and splitting the grains into two equal halves.

METHODOLOGY

Based on the highest production of red gram in the state, two districts, Kalaburgi and Vijayapura, were

*Corresponding Author

selected for the study. Based on the number of processing units involved in production of tur dal, proportionate sampling procedure was followed to select the production units in the study area. Kalaburgi is known for production of the country's best quality tur dal. From both the districts 22 processing units were selected for the study. The primary data related to procurement of raw materials, procurement rates, human resource management, cost of processing, storage costs and problems faced during value addition processes etc., were obtained from the processing units. For evaluating the objective of the study, the required data were collected through personal interview method using well-structured and pre-tested schedule. The secondary data relating to costs and returns involved in production of value added products were obtained from processing units. These data were collected from the respective processing units situated in the study area from the books of accounts of those processing units.

Analytical Techniques Employed

Tabular analysis

Tabular analysis was followed to analyze the capacity utilization, raw materials procurement management, inventory management, human resource management, processing management, storage costs, and economics of processing of tur dal in the study area. The data collected were presented in tabular form to facilitate easy comparisons with the help of averages and percentages.

Production function analysis

The Cobb – Douglas type of production function was used to study the effect of various inputs on tur dal output. So they are presented in the tabular form. On account of its well – known property of its computational simplicity, justifies its wide application in analyzing production relations (Handerson and Quandt, 1971). It being a homogeneous function, provide a scale factor enabling one to measure the returns to scale. The estimated regression coefficients represented the production elasticities.

The form of Cobb – Douglas type of production function used in the present study is as follows.

$$Y = a X_0^{b_0} X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} X_9^{b_9} X_{10}^{b_{10}} X_{11}^{b_{11}} X_{12}^{b_{12}} e^u \text{ (1)}$$

Where,

Y = Gross Yield (quintals)

a = Intercept term

X₁ = Cost of raw material (₹/qtl)

X₂ = Cost of gunny bags

X₃ = Electricity and fuel charges (₹/qtl)

X₄ = Loading and unloading charges (₹/qtl)

X₅ = Transportation charges (₹/qtl)

X₆ = Wages to labour (hours)

X₇ = Telephone and Miscellaneous charges

X₈ = Market fee and commission

X₉ = Repair and maintenance

X₁₀ = Cost of oil (₹/qtl)

e^u = Error term

b_i's = Output elasticity's of respective factor inputs, i = 1,2,3..... and

The Cobb – Douglas type of production function was converted into log linear form as given below and parameters (coefficients) were estimated by employing Ordinary Least Square Technique (OLS) as given below.

$$\log Y = \log a + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + b_4 \log X_4 + b_5 \log X_5 + b_6 \log X_6 + b_7 \log X_7 + b_8 \log X_8 + b_9 \log X_9 + b_{10} \log X_{10} + u \log e \text{ (2)}$$

Allocative efficiency

Given the technology, allocative efficiency exists when resources are allocated within the farm according to quantity which implies the proper level of input use in production. To decide whether a particular input is used rationally or irrationally, its marginal value products were computed. If the marginal value product (MVP) of an input just covers its acquisition quantity, it is said that the input is used efficiently.

The MVP was calculated at the geometric mean levels of variables by using the following formula.

$$MVP \text{ } i^{\text{th}} \text{ resource} = b_i * \frac{GM (\bar{Y})}{GM (\bar{X})}$$

Where,

GM (\bar{Y}) = Geometric mean of the output

GM (\bar{X}) = Geometric mean of ith input

b_i = The regression coefficient of the ith input

A ratio of the value of marginal product (MVP) to the factor price (MFC) was compared and if it is more than unity implied that the resources are advantageously employed. If the ratio is less than one, it suggested that the resource was over utilized.

Rank Based Quotient

RBQ technique was adopted for studying the severity of problems faced by the respondents in production of tur dal. The respondents were asked to give ranks for the problems, based on severity. The data thus collected were tabulated and statistically analysed to interpret the results. The processors were asked to list the constraints faced by them in production of tur dal. Later on respondents were asked to rank the constraints individually. These were compiled together and Rank Based Quotient (RBQ) technique was used to quantify the data collected by Preferential Ranking Technique. For calculating the Rank Based Quotient (RBQ), the following formula was used:

$$RBQ = \frac{\sum fi(n + 1 - i)}{N * n}$$

Wherein, *fi* = number of processors and market intermediaries reporting a particular constraint under ith rank

N = number of processors and market intermediaries

n = number of constraints identified

RESULTS AND DISCUSSION

It could be observed from the Table 1 that, the total quantity of raw materials procured by red gram processing units was found to be around 1,054 quintals of red gram each time at the procurement rate of ₹5,193 per quintal, with the periodicity of 30 times per year and 6.39 quintals of oil was procured each time at the procurement rate of ₹8,660 per quintal, with the periodicity of 28 times per year. Farmers and traders were the main source for procurement of raw materials and method of procurement followed in redgram processing units was from open market and purchased on the basis of market prices and condition. The maximum procurement period for procuring red gram was from January to April. As depicted in Table 2, the quantity of red gram stored was around 2,613 quintals and around 36.4 quintals of oil was also stored per year. A decision with regard to replenishment of raw materials, forecasting and planning decision was followed in purchases of raw materials. First come first serve inventory management method was followed in red gram processing units.

The results pertaining to the staffing pattern in the case of redgram processing units is depicted in Table 3. It is evident from the table that everyday minimum 25 persons were required to run the red gram processing units with payment of salary and wages of ₹3,08,273 per month. Similar pattern of labour usage was noticed in red gram processing units indicating higher employment generation in the study conducted by Avinash (2014) in red gram processing units in Gulberga district of Karnataka, since it was handling larger quantity of raw material.

The details of the average capacity utilization in value addition process of red gram processing units are presented in Table 4. It can be observed from the table that, the installed capacity per hour in the case of redgram processing units was 24 quintals, with the working of 273 days in a year. The average working hours per day was found to be 8.6 hours per day. Annual installed capacity in red gram processing units was 56,871 quintals and total quantity processed per day was found to be 116 quintals. Red gram processing unit had processed 31,636 quintals annually. Total capacity utilization was 55.62 per cent.

The details of cost of processing of red gram into one quintal of dal are presented in Table 5. Table reveals that the average total cost of processing of red gram to one quintal of dal was ₹6174. The total variable cost was ₹6,125 per quintal, which formed a major component (99.21%). The total fixed cost being ₹49, which accounted for only 0.78 per cent of the total cost of processing to yield one quintal of dal. Out of the total variable cost, the cost of raw materials accounted for major share ₹5,193 (83.49%), followed by interest on working capital (9.01%) and market fee and commission (2.73%). The purchases

of raw materials from far places have resulted in higher commission charges and transportation costs. The remaining items, viz., cost of gunny bags, cost of oil, cost of fuel, loading and unloading charges, electricity and water charges, transportation charges, wages for labour, telephone charges, miscellaneous charges, market fee and commission, repair and maintenance altogether accounted for 3.98 per cent of the total cost of processing. The increase in the variable cost was by high cost of raw materials (83.49%). A similar pattern of results was reported by Avinash (2014) and Renuka (2019) in their respective studies.

Out of the total fixed cost (₹49), salaries to permanent employees (0.52%) and depreciation on machinery (0.53%) found to be a major component in the total cost of processing. Even though the dal processing industries are working with huge equipments and modern technologies, human labour are required compulsorily to carry out different manual activities in the units and also the skilled employees are needed to manage the processing activities and supervise the working of labour. These findings were in line with findings of Shwetha (2016) in her study on value chain management in major fruit crops in North Karnataka.

Returns from processing of red gram into dal are presented in the Table 6. The total quantity of main product obtained was found to be 27,050 quintals out of 31,636 quintals of total red gram processed. The total processing cost was observed to be ₹6,339 per quintal. The gross returns realized from processing of one quintal of red gram accounted for ₹6,680 per quintal i.e., ₹6456 per quintal from main product (dal) indicating 85.48 per cent of recovery ₹224 per quintal from byproduct of red gram indicating 14.50 per cent of recovery and net returns was ₹341 per quintal. The dal produced are of different grades (Grade-1, Grade-2, Grade-3) and are fetching different price. Grade-1 is relatively fetching more price (₹79.61/kg) than that of Grade-2 (₹71.47/kg) and Grade-3 (₹58.24/kg). The recovery percentage was found to be highest in Grade-1 with 62.31 per cent and lowest in Grade-3 with 12 per cent. Similar results were obtained by Avinash (2014). He observed that Grade-1 recovery percentage is more as compared to Grade-2 and Grade-3. The higher returns in dal mills were mainly due to up gradation in the machinery and equipments and technological intervention.

It could be seen from the Table 7, that in tur dal production, the regression coefficient of cost of raw materials (0.196), cost of oil (0.825), electricity and fuel charges (0.038), telephone and miscellaneous charges (0.028), market fee and commission charges (0.157) were positive but non-significant at one, five and ten per cent level of significance. Cost of gunny bag (-0.024), wages to labour (-0.015), transportation charges (-0.087), loading and unloading charges (-0.033), repair and maintenance (-0.047) were negative

and non-significant at one, five and ten per cent level of significance. The coefficient of multiple determination (R^2) in tur dal production was 0.99, which indicated that 99 per cent of variation in total returns was explained by the independent variables included in the model, remaining 1 per cent of variation was explained by error term.

The ratio marginal value product (MVP) to marginal factor cost (MFC), are presented in the Table 8. In tur dal production, the MVP and MFC ratios for cost of gunny bags (-11.44), wages to labour (-3.55), transportation charges (-10.61), loading and unloading charges (-14.54), repair and maintenance (-25.34) were negative and less than unity indicating that the resources were in excessive use i.e., decrease of the use of these inputs would enhance the gross returns. The MVP and MFC ratios for cost of oil (99.17), electricity and fuel charges (6.70), telephone and miscellaneous charges (246.01), market fee and commission (5.42) were positive and more than unity

indicating that the resources were underutilized, increasing the quantity of these resources would increase the returns and hence maximize their profit in tur dal production. The MVP and MFC ratios for cost of raw materials (0.22) was positive and less than unity indicating that resources were over utilized, increasing the quantity of these resources would decrease the returns and decrease the profit.

Annual quantity of tur dal stored was 2,100 quintals for period of 20 days with a storage cost of ₹22 per quintal (Table 9). The constraints faced by processor in production of tur dal are presented in Table 10. High price of raw materials, high transportation cost, lack of availability of sufficient raw materials, high moisture content of the raw material and improper quality of raw materials were the severe problems faced by processors in production of tur dal. The similar results were witnessed by Amitkumar (2013) and Renuka (2019) in their respective studies.

Table 1. Pattern of procurement of raw materials in value addition processes of red gram processing units

Sl No	Particulars	Tur dal unit	
		Particulars	Rate of procurement (₹/unit)
1	Total quantity of raw materials procured in value addition and quantity procured per time (Qtls)	Redgram (31,636) [1,054.54]	5,193
		Oil (179) [6.39]	8,660
2	Source of procurement	Farmers and Traders	
3	Periodicity of procurement (per year)	Red gram - 30 times Oil - 28 times	
4	Lead time (days)	1	
5	Period of maximum procurement	Jan - April	
6	Method for procurement	Open market	
7	Mode of transportation	Lorry	

Note : 1. Figures in ‘()’ indicate the total quantity procured in a year.

2. Figures in ‘[]’ indicate the quantity procured per time.

Table 2. Inventory management in value addition processes of red gram processing units (per year)

Sl. No.	Particulars	Red gram processing units	
		Tur	Oil
1	Quantity of raw material stored (qtls)	2,613.6	36.4
2	Method of inventory management (%)		
	a. First come First serve	100	100
	b. First come last serve	-	-
3	Decision with regard to replenishment of raw material (%)		
	a. As and when exhausted	-	-
	b. Period Replenishment	-	-
	c. Forecasting and planning the purchases	100	100

Table 3. Human resource management in value addition processes of redgram processing units (per month)

Sl. No	Staff Particulars	Tur dal unit		
		No.	Salaries/ Wages per employee (₹)	Total
1	Manager	01	17,136	17,136
2	Technician	02	11,568	23,136
3	Supervision	01	10,643	10,643
4	Accountant	01	12,571	12,571
5	Purchase	01	13,250	13,250
6	Security guard	01	7,955	7,955
7	Skilled labours (Men)	06	13,413	80,478
8	Skilled labours (women)	02	12,000	24,000
9	Unskilled labours (Men)	07	13,761	96,328
10	Unskilled labours (Women)	03	7,592	22,776
	Total	25	1,19,889	3,08,273

Table 4. Capacity utilization in value addition processes of redgram processing units

Sl. No.	Particulars	Red gram processing unit
		Tur dal unit
1	Installed capacity per hour (Qtls)	24
2	Number of working days/annum	273
3	Number of shifts/day	1
4	Duration of each shift (hours)	8.68
5	Annual installed capacity (Qtls)	56,871
6	Quantity processed/day (Qtls)	115.9
7	Annual quantity processed (Qtls)	31,636
8	Capacity utilization (%)	55.62

Table 5. Cost of processing of red gram into tur dal (₹/qtl)

Sl. No.	Particulars	Unit	Tur dal		
			Price (₹/unit)	Quantity	Total (Rupees)
A	VARIABLE COST				
1	Cost of raw material	Qtls	5,193.16	1	5,193.16 (84.11)
2	Cost of gunny bags	Rupees	6.94	2	13.87 (0.22)
3	Cost of oil	Kgs	86.6	0.568	49.18 (0.79)
4	Cost of fuel	Kgs	4.3	1.25	5.37 (0.08)
5	Electricity and water charges	Rupees	-	-	30.18 (0.48)
6	Loading and unloading	Rupees	14.09	1	14.09 (0.22)
7	Transportation charges	Rupees	49.10	1	49.10 (0.79)
8	Wages for labour	Rupees	30.88	1	30.88 (0.50)
9	Telephone charges	Rupees	-	-	0.30 (0.004)
10	Market fee and commission	Rupees	-	-	170.42 (2.76)
11	Repair and maintenance	Rupees	-	-	11.50 (0.18)
12	Miscellaneous	Rupees	-	-	0.304 (0.004)
	Interest on working capital@10%	Rupees	-	-	556.84 (9.01)
	TOTAL VARIABLE COST		-	-	6,125.24(99.21)
B	FIXED COST				
1	Depreciation on building	Rupees	-	-	0.98 (0.01)
2	Depreciation on machinery	Rupees	-	-	3.58 (0.05)
3	Insurance and license fee	Rupees	-	-	5.45 (0.088)
4	Salary to permanent employees	Rupees	-	-	32.81 (0.53)

5	Taxes	Rupees	-	-	0.00023 (0.00)
6	Interest on fixed capital@14%	Rupees	-	-	5.99 (0.09)
	TOTAL FIXED COST		-	-	48.84 (0.79)
	Total processing cost (A+B)		-	-	6,174.09 (100.00)

Note: Figures in parentheses indicate percentage to total

Table 6. Returns from value addition of red gram processing units

Sl.No	Particulars	Tur dal		
1	Total quantity of raw material processed (qtl/annum)	31,636.40		
2	Total quantity of main product obtained (qtl/annum)	27,050.45		
	a. Grade – 1	19,684.09		
	b. Grade – 2	34,77.27		
	c. Grade – 3	3,889.09		
3	Total quantity of by product obtained (qtl/annum)			
	a. Chunni + Husk	4,585.91		
4	Total value of main product (₹ lakh/ annum)	2,042.30		
5	Total value of by product (₹ lakh/ annum)	70.90		
6	Total returns (4+5)	2,113.20		
A	Total Processing cost (₹/qtl)	6,339.28		
B	Returns from main product			
	Particulars	Quantity (kgs)*	Price (₹/ kg)	Value (₹)
	a. Grade – 1	62.31	79.61	4,960.50
	b. Grade – 2	11.04	71.47	789.03
	c. Grade – 3	12.13	58.24	706.45
	Sub total	85.48		6,455.98
C	Returns from by product			
	a. Chunni + Bhusa	14.50	15.46	224.18
	Sub total	14.50		224.18
	Total (B + C)	100.00		6,680.15
D	Gross returns (₹/qtl)	6,680.15		
E	Net returns (₹/qtl)	340.88		

Note:* Quantity obtained by processing one quintal of red gram and green gram
Total processing cost includes processing cost, storage cost and marketing cost of processor

Table 7. Resource use efficiency of inputs in tur dal processing units

Sl. No.	Explanatory variables	Parameters	Tur dal
1	Intercept	A	3.110 (3.686)
2	Cost of raw material	b₁	0.196 (0.761)
3	Cost of gunny bags	b₂	-0.024 (0.066)
4	Cost of oil	b₃	0.825 (0.882)
5	Electricity and fuel charges	b₄	0.038 (0.075)
6	Wages to labour	b₅	-0.015 (0.024)

7	Transportation charges	b₆	-0.087 (0.084)
8	Loading and unloading charges	b₇	-0.033 (0.063)
9	Telephone and Miscellaneous charges	b₈	0.028 (0.125)
10	Market fee and commission	b₉	0.157 (0.106)
11	Repair and maintenance	b₁₀	-0.047 (0.032)
12	Coefficient of multiple determination	R ²	0.99
13	Returns to scale	($\sum b_i$)	1.039

Note: Figures in the parentheses indicates their respective standard errors

**Significant at one per cent probability level.

*Significant at five per cent probability level.

@Significant at ten per cent probability level.

Table 8. MVP to MFC ratios of resource in tur dal processing units

Sl. No.	Explanatory variable	Parameters	Tur dal
1	Cost of raw materials	b1	0.22
2	Cost of gunny bags	b2	-11.44
3	Cost of oil	b3	99.17
4	Electricity and fuel charges	b4	6.70
5	Wages to labour	b5	-3.55
6	Transportation charges	b6	-10.61
7	Loading and unloading charges	b7	-14.54
8	Telephone and Miscellaneous charges	b8	246.01
9	Market fee and commission	b9	5.42
10	Repair and maintenance	b10	-25.34

Note: MVP – Marginal Value Product, MFC – Marginal Factor Cost

Table 9. Storage cost of value added products of tur dal processing units

Sl. No.	Particulars	Tur dal
1	Quantity of value added product stored (qtl)	2,100
2	Period of storage (days)	20
3	Storage cost (Rent ₹/qtl)	10.4
4	Cost of stock maintenance (₹/qtl)	11.37
	Total storage cost (3+4)	21.79

Table 10. Constraints faced by processors in production of tur dal

Sl. No.	Particulars	Tur dal	
		RBQ score	Rank
1	High price of raw material	87.25	I
2	Lack of availability of sufficient raw material	77.00	III
3	High transportation cost	80.75	II
4	High moisture content of the raw material	71.75	IV
5	Improper quality of raw material	58.00	V
6	Delay in payments	45.00	VI
7	High market competition	42.50	VII

8	Scarcity of skilled labour	33.75	VIII
9	Lack of availability of labour	27.75	IX
10	Difficulties in handling produce	26.25	X

CONCLUSION

The dal processing industries are working with huge equipments and modern technologies. Human labour are required compulsorily to carry out different manual activities in the units and also the skilled employees are needed to manage the processing activities and supervise the working of labour. High price of raw materials, lack of availability of sufficient raw materials, high moisture content and improper quality of raw materials were the major problems faced by the processors in production of tur dal. The availability of raw materials was less because the production of raw materials in the study area was low. In order to earn more money by showing higher weight the farmers did not maintain the required moisture content in the raw materials which they sold to the processors. To overcome this problem, the processors have to advice the farmers to maintain the minimum required moisture content and assure them that they would get better price. The MVP and MFC ratios for cost of oil, electricity and fuel charges, telephone and miscellaneous charges, market fee and commission were positive and more than unity indicating that the resources were underutilized, increasing the quantity of these resources would increase the returns and hence maximize their profit in tur dal production. The MVP and MFC ratios for cost of raw materials (0.22) was positive and less than unity indicating that resources were over utilized, increasing the quantity of these resources would decrease the returns and decrease the profit.

REFERENCES

Ajith, S., Singh, H.L., Maurya, O. P., Singh, Birpal, S. and Arun, S. (2016). Study on costs and

returns of paddy production in meerut district of western Uttar Pradesh. *J. Plant. Dev. Sci.*, 8(3): 149-153.

Amitkumar (2013). Value addition in Bengal gram – A business management appraisal. *MBA. Thesis*, Univ. Agric. Sci., Dharwad.

Angadi, S. and Patil, B. L. (2017). Resource use efficiency of Greengram in Gadag district of Karnataka. *J. Pharmacognosy Phytochem.*, 6(6): 2444: 2448.

Avinash (2014). Comparative economics of modernized and traditional redgram processing units in Gulberga district, Karnataka. *M, Sc. (Agri.) Thesis*, Univ. Agric. Sci., Raichur.

Bhagwat, K. D. and Shelke, R. D. (2013). Constraints faced by dal mill owners in Marathwada region of Maharashtra state. *Agric. Update.*, 8(2): 35-37.

Gondhali, R. S., Ulemale, D. H. and Sarap, S. M. (2017). Economics analysis of gram in Amravati district. *Int. Res. J. Agric. Eco. Stat.*, 8(1): 31 – 36.

Kausadikar, H. H., Srikanth, B. and Jondhle, R. N. (2018). Marketing of soybean in Parbhani district of Maharashtra, India. *Int. J. Curr. Microbiol. App.Sci.*, 6: 1517 – 1521.

Mahendra, K. D. and Banafar, K. N. S. (2013). Constraints in production and marketing of soybean in Rajnandgaon district of Chhattisgarh. *J. Plant. Dev. Sci.* 5(2): 227-228.

Renuka (2019). Value chain analysis of red gram in Karnataka. *M, Sc. (Agri.) Thesis*, Professor Jayashankar Telangana state Agric. Univ., Hyderabad.

Shweta, M. K. (2016). Value chain management in major fruit crops in North Karnataka. *Ph.D. Thesis*, Univ. Agric. Sci., Dharwad, Karnataka (India).