The Andhra Agric. J 63 (3): 706-710, 2016

Economics of Mechanization in Bengalgram in Prakasam district of Andhra Pradesh

K Lavanya, Y Radha, D Vishnu Sankar Rao and V Srinivasa Rao
Department of Agricultural Economics, Agricultural College, Bapatla 522 101, Andhra Pradesh.

ABSTRACT

A study was conducted to know the impact of mechanization on bengalgram in Prakasam district of Andhra Pradesh during the year 2012-13 by the collection of data from bengalgram farmers on mechanization of bengalgram with pre-structured schedules. A three stage sampling procedure was used for the selection of sample farmers. The collected data was subjected to tabular analysis to estimate cost concepts and various farm income measures. The results revealed that cost of cultivation was more on large farms. Machine labour was the major component of operational costs in bengalgram cultivation which decreased with increasing farm size. All the farm income measures of bengalgram were more on large farms. Yield, gross returns and net returns were more on large farms with mechanization of bengalgram. Cost of production per quintal of bengalgram decreased with increasing the farm size.

Key words : Bengalgram, Cost, Income, Labour, Mechanization, Price, Yield.

Mechanization is a technological improvement in agriculture. It has a great demand in this sector where labour scarcity, increased wage rates and maintenance cost of bullock labour become the major problems that effect the sustainability of agriculture in this modernized economy. Mechanization is needed for timeliness of farm operations and also for good quality of work.

Bengalgram, also known as Chick pea is the important pulse crop of India and predominates other pulses both in area and production. It is a low risk crop which is found suitable to varied agroclimatic conditions of Andhra Pradesh. Bengalgram is the crop in which mechanization has been extensively utilized for most of the farm operations in Prakasam district of Andhra Pradesh, which ranks first in the productivity. Mechanization of farm operations had reduced the cost of cultivation and increased the productivity of several crops (Pradip Banerjee Giri, 2008). Chandola *et al.* (2011) reported that sowing by power tiller operated till planting machine followed by one manual weeding resulted in 19.0 % increase in chickpea yield and 2500 Rs./ha reduction in cost. Mechanized weeding with power weeders resulted in 75.8 per cent of saving in cost of weeding compared to manual weeding (Senthilkumar *et al*, 2012). Foster *et al.* (2011) revealed that larger land area is better suited for high capacity machinery and low credit costs. Large farms that use sustainably less labour per acre are more mechanized and more efficient. The present investigation has been conducted to know the impact of mechanization on cost of cultivation, various cost components and farm income measures of bengalgram in different farm size groups.

MATERIAL AND METHODS

Sampling and Data Collection

Prakasam district was purposively selected for the study as this district ranks first in productivity and second in production of bengalgram in Andhra Pradesh during 2011-12 and in this district farmers have gone for mechanization in most of the bengalgram farm operations. A three stage sampling procedure was used for the selection of respondents. Based on the criterion of highest number of farmers supplied with subsidized machinery during the period of 2009-11 through any government subsidy schemes, three mandals and from each mandal three villages were selected. From each selected village ten bengalgram farmers were selected randomly making the sample size of 90 farmers. The sample farmers were divided into

three groups viz., small, medium and large farmers based on the farm size. Of the total sample of ninety farmers 35 were small farmers, 29 were medium farmers and 26 were large farmers. A pre-structured schedule was used to collect the requisite information from the sample farmers through survey method. Secondary data was collected from different public resources of the district.

Analytical frame work

Tabular analysis

Various cost concepts were used to derive the total cost of cultivation and farm business analysis was used to study the various farm income measures of bengalgram. The cost concepts used in this study were specified as given below :

Cost A_1: Cost 'A_1' includes all the variable costs (excluding the imputed value of family labour) + land cess + interest on working capital + depreciation.

Cost A_2 = Cost A_1 + Rent paid for leased in land
Cost B_1 = Cost A_2 + Interest on value of owned fixed capital (excluding land)
Cost B_2 = Cost B_1 + Rental value of owned land
Cost C_1 = Cost B_1 + Imputed value of family labour
Cost C_2 = Cost B_2 + Imputed value of family labour
Cost C_3 = Cost C_2 + 10 per cent of cost C_2 to account for the value of management input of the farmer.

The various farm business measures are analyzed as follows:

Farm business income = Gross income – Cost A_1
Owned farm business income = Gross returns – Cost A_2
Family labour income = Gross income – Cost B_2
Net income = Gross income – total cost of cultivation (cost C_3)
Farm investment income = Farm business income – imputed value of family labour
Gross income = It includes the value of main and by-product

RESULTS AND DISCUSSION

Cost of cultivation for bengalgram according to cost concepts viz., cost 'A_1', cost 'B_1', cost 'B_2', cost 'C_1', cost 'C_2' and cost 'C_3' was presented in Table 1. The cost A_1 was Rs.34060, Rs.33711, Rs.33505, and Rs.33477 respectively on small, medium, large and all farms. It indicates that cost A_1 had shown decreasing trend as the size of farm increased. Cost A_1 was more on small farms and is mainly due to the increased labour costs of small farms compared to medium and large farms. The labour costs included in cost A_1 were cost of hired human labour and cost of machine labour.

The hired human labour costs were Rs.5404, Rs.4579, Rs.5040, and Rs.4924 respectively for small, medium, large and all farms. The machine labour costs were Rs.11085 for small farms, Rs.10997 for medium farms, and Rs.10348 for large farms. The labour costs were more on small farms and the reason for this was hiring of machinery in small farms which increased the cost of operation when compared to medium and large farms. It is due to the fact that hiring charges of machinery were more compared to owned machinery. Mechanization of farm operations in bengalgram with owned machinery and implements on large and medium farms increased the efficiency of machine labour and reduced the cost of labour compared to small farms. This is in concurrence with the study conducted by Andrew Foster and Mark Rosenzweig (2011).

Cost B_1 for small, medium, large and all farms was Rs.35606, Rs.35504, Rs.35336, and Rs.35275 respectively. Cost B_1 had shown decreasing trend with increase in farm size. Cost B_2 was Rs.63891, Rs.59986, Rs.72547, and Rs.67497 respectively on small, medium, large and all farms. It indicates that cost B_2 was more on large farms followed by small and medium farms.

It was observed that cost C_1 for small, medium, and large farms was Rs.35986, Rs.35421, and Rs.35482 respectively. Cost C_2 was Rs.64271 on small farms, Rs.60157 on medium farms, Rs.72632 on large farms and Rs.67704 on all farms. Cost C_3 was Rs.70698, Rs.66172, Rs.79895and Rs.74481 in small, medium, large and all farms respectively. The total cost of cultivation was more on large farms followed by small and medium farms.

UNIT COST OF PRODUCTION AND PRODUCTIVITY

Unit cost of production and productivity of bengalgram according to farm size are presented in the Table 2.

Table 1. Cost concepts-wise and farm size-wise cost of cultivation of bengalgram (Rs. /ha).

S.No	Particulars	Small farms		Medium farms		Large farms		All farms	
		Cost	% to total cost	Cost	% to total cost	Cost	% to total cost	Cost	%to total cost
1.	Human labour	5404	7.64	4579	6.91	5040	6.30	4924	6.61
2.	Machine labour	11085	15.67	10997	16.61	10348	12.95	10623	14.26
3.	Seed	6743	9.53	6828	10.31	6742	8.43	6756	9.07
4.	Manures	1246	1.76	1278	1.93	1349	1.68	1327	1.78
5.	Fertilizers	6421	9.08	6438	9.72	6310	7.89	6335	8.50
6.	Plan protection chemicals	1872	2.64	2138	3.23	2028	2.53	2013	2.70
7.	Interest on working capital	501	0.70	412	0.62	454	0.56	460	0.61
8.	Land cess	110	0.15	114	0.17	127.5	0.16	115	0.15
9.	Depreciation	678	0.96	927	1.40	1107	1.39	924	1.24
	Cost A_1(1-9)	34060	48.17	33711	50.94	33505	41.93	33477	44.95
10.	Interest on fixed capital	1546	2.19	1793	2.70	1831	2.29	1798	2.41
	Cost B_1(1-10)	35606	50.36	35504	53.65	35336	44.22	35275	47.36
11.	Rental value of owned land	28285	40.00	24482	37.00	37211	46.57	32222	43.26
	Cost B_2(1-11)	63891	90.37	59986	90.65	72547	90.80	67497	90.63
12.	Imputed value of family labour	380	0.53	171	0.25	85	0.10	207	0.27
	Cost C_1	35986	50.90	35675	53.91	35421	44.33	35482	47.64
	Cost C_2	64271	90.90	60157	90.91	72632	90.90	67704	90.90
13.	10 percent value of Cost C_2	6427	9.09	6015	9.09	7263	9.09	6770	9.09
	Cost C_3	70698	100	66172	100	79895	100	74481	100

Table 2. Cost of production and productivity in bengalgram.

Particulars	Small	Medium	Large	All farms
Yield (q/ha)	19.76	19.01	23.42	21.57
Cost of cultivation(Rs./ha)	70698	66172	79895	74481
Cost of production(Rs./q)	3578	3480	3411	3452
Sale Price(Rs./q)	3331	3334	3315	3327

Table 3. Farm business analysis of bengalgram.

Particulars	Small farms	Medium farms	Large farms	All farms
Gross income	65829	63388	77646	71780
Farm business income	31769	29677	44144	38303
Family labour income	1976	3402	5099	4283
Farm investment income	31389	29506	44056	38102
Net income	-4869	-2784	-2249	-2701

From the table 2 the yield of bengalgram per hectare was 19.76 q, 19.01q, 23.42 q and 21.57 q respectively on small, medium, large and all farms. This indicates that the yield of bengalgram was more on large farms compared to other farms. This variation was mainly due to the variation in fertility status of lands of large farms and timeliness of farm operations with owned machinery. Generally large size cultivation was coincided with fertile soils and tractor owing farmers. This is in agreement with the study conducted by Nandal and Rai (1986).

The cost of production per quintal of bengalgram was Rs.3578, Rs.3480, and Rs.3411 on small, medium, and large farms respectively. It indicates that the cost of production decreased with increase in farm size. It was more on small farms and decreased gradually with increase in farm size. This was mainly due to the high yield of large farms when compared to other farms.

FARM BUSINESS ANALYSIS

The various measures of farm business analysis and cost-benefit ratio were calculated and presented in Table 3. It can be observed from the table 3 that the gross income was Rs.65829, Rs.63388, Rs.77646 respectively on small, medium and large farms. It indicates that the gross income was more on large farms (George, 1978). The farm business income was Rs.31769, Rs.29677, Rs.44144 and Rs.38303 respectively on small, medium, large and all farms. The farm business income was high on large farms due to increased gross returns of these farms compared to other farms.

Family labour income was Rs.1976, Rs.3402, Rs.5099 and Rs.4283 respectively on small, medium, large and all farms. Farm investment income was Rs.31389 in small farms, Rs.29506 in medium farms, Rs.44056 in large farms and Rs.38102 in all farms. This revealed that both the family labour income and farm investment income were more on large farms compared to other farms.

The net income per hectare was Rs.-4869, Rs.-2784, Rs.-2249 and Rs-2701for small, medium, large and all farms respectively. It indicates that there was net deficit in all size groups of bengalgram farms which decreased with increase in the farm size. The reason for negative net income was high cost of production which was more than sale price.

Conclusions

The cost of cultivation of bengalgram was more on large farms. Machine labour was the major component in operational costs which decreased with increasing the farm size. Per hectare yield, gross returns and net returns were more on large farms. All the farm income measures were more on large farms. The cost of production of bengalgram was decreased with increasing farm

size. The cost of production of bengalgram was more than sale price in all the size groups which resulted in negative net income of bengalgram. The overall farm business was not profitable as revealed by the negative net returns of bengalgram.

LITERATURE CITED

Andrew Foster D and Mark Rosenzweig, R 2011 Are Indian farms too small? Mechanization, agency costs and farm efficiency. http:// www.econ.yale.edu/ seminars/develop/tdwll/rosenzweig-111114-pdf.

Anthony P 1995 Empirical evidence of mechanization effects on smallholder crop production systems in Botswana. *Agricultural Systems,* 41:199-210.

Chandola V K, Singh S R, Bohra J S, Singh R M and Nema A K 2011 Increasing income of resource poor farmers in Eastern Uttar Pradesh through improved planting techniques. *Environment and Ecology,* 29: 3B, 1493-1495.

George K M 1978 Agricultural implements owned by cultivators vis –a -vis size of holding and per acre returns. *Land Bank Journal,* 16 (4): 31-37.

Nandal D S and Rai K N 1987 Impact of Farm Mechanization on Farm Productivity and Income in Haryana.

Pradip Banerjee Giri A K 2008 Impact of tractorization on farming in India with special reference to the state of West Bengal. *AMA, Agricultural Mechanization in Asia, Africa and Latin America,* 39(1): 71-76.

Senthilkumar T, Duraisamy V M and Asokan D 2012 Evaluation of power weeders for mechanized weeding in pulse crop cultivation. *Madras Agricultural Journal,* 99(4/6): 394-396.

Shakir Ali Prasad S N and Ashok Kumar Singh K D 2009 On-farm evaluation of grain yield and water use of rainfed chickpea as influenced by tillage practices in hot semi-arid Western India. *Indian Journal of Agricultural Sciences,* 79(4): 305-308.

(Received on 11.06.2014 and revised on 16.10.2014)