

An economic analysis of soybean cultivation vis-à-vis its competing crops in Madhya Pradesh

Soybean originated in China and was introduced to India centuries ago through the Himalayan routes, and also brought in via Burma (now Myanmar) by traders from Indonesia. Soybeans are looked upon not merely as a means to supply food for humans and animals, but also at the same time to serve as a means for improving the soil through their ability to fix atmospheric nitrogen. As a legume, it is an ideal component of a sound agricultural system.

Madhya Pradesh (MP) is known as the soybean state in view of rapid as well as concentrated development pattern in 11 out of 45 districts. Area under soybean in MP is nearly 55 percent of the national area. There is ample scope to increase the production of soybean in the state. However, many constraints in recent times such as non-availability of short duration high yielding varieties and adequate good quality seeds cause hindrance in achieving higher productivity. Similarly, there has been a slow but steady growth in the production of soybean which is attributed to erratic monsoon, poor management, incidence of pests and disease, shattering of pods, soybean rust and above all low input technology. Under the circumstances, farmers are substituting soybean with jowar and maize in recent years. In this regard, there is need to understand the profitability of soybean as whole pulse as well as its competing crops namely jowar and maize in Madhya Pradesh.

The study was purposively confined to Madhya Pradesh state since area (55.13%) and production (52.58%) in soybean is more than 50 per cent of the total area and production in the country during the year 2008-09. For selection of sample farmers, a multistage sampling procedure was adopted for the selection of districts, blocks, villages and farmers in the study area. In the first stage, three districts namely Ujjain, Dewas and Shajapur were chosen since they occupy the highest area of soybean in Madhya Pradesh. Similarly, one block was chosen in each of the selected districts based on the highest area in the second stage. In the third stage, three villages from each of the selected blocks were chosen based on highest area under soybean crop. In the fourth stage, 10 farmers were selected randomly from each of the sample villages who were growing soybean. Thus, the total sample size of soybean farmers constituted 90. Correspondingly, 30 farmers were chosen randomly who were growing competing crops of soybean such as jowar and maize from the selected districts.

The tabular technique was followed to study the economic characteristics of different size groups of sample farmers such as costs and returns expressed by the farmers in case of soybean, maize and jowar.

The following farm management cost concepts (Raju and Rao, 1990) were used for calculating the cost per hectare of soybean crop.

Cost 'A1': It included wages of hired human labour, cost of bullock labour, cost of seed, value of organic manure and

chemical fertilizers, value of plant protection components, interest on working capital, depreciation on farm machinery, implements, equipments, farm buildings etc.

Cost 'A2': Cost A1 + Rent paid for leased-in land.

In the present study, Cost 'A' was considered in the absence of rent paid for leased-in land.

Cost 'B': Cost A2 + Imputed rental value of owned land + Interest on owned fixed capital.

Cost 'C': Cost B + Imputed value of family labour. It is the total cost of cultivation.

A perusal of Table 1 shows that the cost of cultivation of soybean worked out to ₹. 15946/ha, of which variable cost and fixed cost formed about 76.79 and 23.21 percents, respectively. The expenditure on human labour (₹. 3890/ha) formed major component (24.39%) in variable cost followed by cost on machine works (20.59%), seeds (11.49%), manures (5.85%), bullock labour (4.14%), plant protection chemicals (PPC) (4.01%) and chemical fertilizers (3.24%). Similarly, rental value of the land (₹. 3225/ha) formed major component among fixed costs.

A perusal of Table 2 shows that the total cost of cultivation of jowar worked out to ₹. 8923/ha which was about three fourth of total cost of cultivation of maize (₹. 12516/ha). Human labour requirement was similar in both crops with 34.33 man days in maize and 36.13 man days in jowar per hectare. Bullock labour requirement was found to be marginally higher in case of jowar

Table 1. Cost of cultivation of soybean of sample farmers in the study area

Particulars	Quantity	Value	₹. / ha Percentage
Variable cost			
Seed (kg)	65.76	1832	11.49
Manure (FYM) (ton)	6.22	933	5.85
Chemical fertilizer (kg)	32.35	517	3.24
Bio fertilizer (g)	194.11	19	0.12
Plant protection			
chemicals (kg)	1.71	640	4.01
Human labour (MD)	49.13	3890	24.39
Bullock labour (BPD)	4.99	660	4.14
Machine works (hours)	10.29	3283	20.59
Interest on working capital @ 8%	-	471	2.95
Total variable cost	-	12245	76.79
Fixed cost			
Land revenue	-	4	0.03
Depreciation	-	214	1.34
Rental value of land	-	3225	20.22
Interest on fixed capital @ 15%	-	258	1.62
Total fixed cost	-	3701	23.21
Total cost (variable + fixed)	-	12946	100.00

Note: MD – Man days BPD – Bullock pair days

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Table 2. Cost of cultivation of jowar and maize of sample farmers in study area

Particulars	Jowar			Maize			₹ / ha
	Quantity	Value (₹)	Per cent	Quantity	Value (₹)	Per cent	
A Variable cost							
Seed (kg)	14.51	180	2.02	26.27	1078	8.61	
Manure (FYM) (ton)	1.85	278	3.12	2.81	421	3.36	
Chemical fertilizer (kg)	20.59	298	3.34	84.79	1075	8.59	
Plant protection chemicals (kg)	-	0	0.00	8.49	637	5.09	
Human labour (MD)	34.33	2876	32.23	36.13	2957	23.62	
Bullock labour (BPD)	8.65	1146	12.84	5.84	759	6.06	
Machine works (hours)	1.24	394	4.42	5.51	1727	13.80	
Interest on working capital @ 8%	-	207	2.32	-	346	2.77	
Total variable cost	-	5379	60.28	-	9000	71.91	
B Fixed cost							
Depreciation	-	68	0.76	-	42	0.34	
Land revenue	-	4	0.04	-	4	0.03	
Rental value of land	-	3225	36.14	-	3225	25.77	
Interest on fixed capital @ 15%	-	247	2.77	-	245	1.96	
Total fixed cost	-	3544	39.72	-	3516	28.09	
Total cost (variable + fixed)	-	8923	100.00	-	12516	100.00	

Note: MD – Man days, BPD – Bullock pair days

Table 3. Cost and returns of soybean vis-à-vis jowar and maize of sample farmers

Costs/ Returns	Jowar	Maize	Soybean	₹. / ha	
				Percent change in soybean over jowar	Percent change in soybean over maize
Cost					
Cost A	2601	6813	10240	293.69	50.30
Cost B	6073	10283	13723	125.97	33.45
Cost C	8923	12516	15946	78.71	27.40
Returns					
Gross returns	9393	14570	20499	118.24	40.69
Net returns over					
(a) Cost A	6792	7757	10259	51.05	32.25
(b) Cost B	3320	4287	6776	104.10	58.06
(c) Cost C	470	2054	4553	868.72	121.67
B:C	1.05	1.16	1.29	22.86	11.21

(8.65 bullock pair days/hectare) as compared to maize (5.84 bullock pair days/ hectare) whereas, machine labour use was higher in case of maize (5.51 hours), compared to jowar (1.24 hours). It is interesting to note that variable cost incurred in

maize was higher than jowar but fixed cost incurred in jowar was slightly higher than maize. Further, the costs incurred on all the components of total cost like seed, manure, chemical fertilizer etc were higher in case of maize than jowar. An examination of profitability of soybean vis-à-vis its competing crops (Table 3), clearly shows that cultivation of soybean was highly profitable over jowar and maize. Even though the cost of cultivation of soybean was higher than that of jowar and maize, its gross returns as well as net returns were also correspondingly higher than jowar and maize. Cost A, B and C all were higher in case of soybean when compared to jowar and maize. Similarly, net returns per hectare were significantly higher over Cost A, B and C, in case of soybean when compared to jowar and maize. The net returns in soybean over jowar (868.72%) was significantly higher than maize (121.67%). Similarly, benefit cost ratio was higher in case of soybean (1.29) than that of maize (1.16) and jowar (1.05). The percentage change in benefit cost ratio of soybean over maize and jowar was 11.21 and 22.86 percents, respectively. The study indicated that there have been incentives for farmers to grow soybean in kharif instead of its competing crops. Similar observations were made by Kajale (2002).

Department of Agricultural Economics
University of Agricultural Sciences
Dharwad - 580 005, India
Email: lbhugar@gmail.com

ANKIT JAISWAL
L. B. HUGAR

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