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Dynamics of Profitability from Soybean in Central India

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ABSTRACT

The cost and profitability of soybean vis-à-vis *risk in its production over competing crop (hybrid maize) have been analyzed in Chhindawara, Nirsinghpur and Khandwa districts of Madhya Pradesh considering 240 soybean growers from marginal (60), small (60), medium (60) and large (60) sized farms. Soybean was found to be more profitable over hybrid maize as an average farmer received 45.03 and 43.80 per cent more gross and net returns over hybrid maize. Although the cost of cultivation of soybean (Rs 15,238/ha) was found to be more than the hybrid maize (Rs 10,710/ha), an average soybean grower received more net income from soybean (Rs 19,202/ha) as compared to maize (Rs 13,239/ha). The cost of production per quintal was also found higher in case of soybean (Rs 13,297) as compared to hybrid maize (Rs 5,434), as the levels of yield was found more in hybrid maize (1,971 kg/ha) as compared to soybean (1,146 kg/ha). In both the cases operational cost as well as profitability was found to increase with size of farm. It is also observed that price and income risk were found more in soybean (14.99 % and 15.66 %) as compared to hybrid maize (8.71 % and 13.92 %), while acreage risk was found more in maize (122.29 %) as compared to soybean (50.25 %). This was true for all the categories of farms with minor variations. Hence, it can be said that soybean still found more profitable than its competing crop hybrid maize across all the categories of farms. This suggest that steps are to be taken to reduce price and income risk through stabilizing prices and net income at higher level in cultivation of soybean in Madhya Pradesh and by uplifting the standard of living of the farmer community.*

Key words: Hybrid maize, Madhya Pradesh, profitability, risk, soybean

Soybean, paddy, maize and jowar are the major crops cultivated by the farmers of Madhya Pradesh during rainy season. Hybrid maize is a competing crop of soybean in Madhya Pradesh in the state (Jaiswal and Hugar, 2011). The area, production and yield of both the crops are showing an increasing trend. The area, production and yield of soybean has increased with a higher pace with a magnitude of 124.58 thousand ha, 174.79 thousand tonnes and 11.54 kg per ha, respectively as compared to the maize 2.79 thousand ha, 11.51 thousand tonnes and 538 kg per ha during the period of last 20 years, respectively (Table 1).

Maize covers only 860 thousand ha of area producing 1,324 thousand tonnes with productivity of 1,492 kg per ha, while soybean covers 5,670 thousand ha producing 6,280 thousand tones with productivity of 1,108 kg per ha in Madhya Pradesh (2011-12). The productivity of maize (1,492 kg/ha) is found 34.65 per cent higher than soybean (1,108 kg/ha). The present study examines the level of different inputs used, cost of production and associated factor in production of these two crops.

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Table 1. Area, production and yield of soybean and maize in last two decades

Year	Area (000'ha)		Production (000'tonnes)		Yield (kg/ha)	
	Maize	*Soybean*	*Maize*	*Soybean*	*Maize*	*Soybean*
1991-92	878	2645	864	2088	984	790
2000-01	840	4475	1218	3431	1459	767
2010-11	849	5560	1340	6670	1266	1200
2011-12	860	5670	1324	6280	1492	1108
Mean	836.86	4365.81	1191.81	4337.29	1409.43	979.29
Regression Coefficient (b)	2.79	124.58	11.51	174.79	5.38	11.54
Linear Growth (%)	0.33	2.85	0.97	4.03	0.38	1.18

Source: Madhya Pradesh Agricultural Statistics, Department of Farmers' Welfare and Agriculture Development 2012/ Commissioner Land Record Gwalior 2012

MATERIAL AND METHODS

A multistage, purposive sampling method was used to select the districts, blocks, villages and farm households. At first stage, all the districts were classified into two categories *i.e.*, high area districts and low area districts considering area more than the mean and area less than the mean respectively for a particular crop. One district in each category having high area high yield (Chhindwara), high area low yield (Khandwa) and low area high yield (Narsinghpur) have been selected for the study (Table 2).

Table 2. Number of respondents in selected crops

Particulars	Districts	Talukas/ Blocks	Villages	*Sample size (HHs)*
High area high yield	Chhindwara	Chaorai	Simariya, Lahagdua, Chandanwada	80
High area low yield	Khandwa	Pandhana	Pipalod Khurd, Rustampur, Gokul Goan	80
Low area high yield	Narsinghpur	Kareli	Jova, Midali, Rakai	80
Total sample size				**240**

In the second stage one block has been selected on the basis of maximum area in respective crops in each. In the third stage three villages were selected randomly in each selected block. In the last stage a list of all the farmers of the selected villages was prepared in ascending order to their size of holding and classified them into marginal (less than 1 ha), small (1-2 ha), medium (2-4ha) and large (above 4 ha), and 20 farmers in each category

were be selected randomly for soybean and 10 farmers to each category were selected for maize. Thus, the study covers 240 soybean growers and 120 maize growers of different size of farms in selected districts of Madhya Pradesh. The study ensures the adequate coverage of major agro-climatic regions of the state. The primary data of the study collected from sample respondents of different locations of the study through pre-tested interview schedule in light of the Madhya Pradesh conditions. The required secondary data were collected on different aspects of the study from the Commissioner, Land Record, Gwalior (Anonymous, 2012) and Department of Farmers' Welfare and Agriculture Development (Anonymous, 2010) from their published records and internet websites. The primary data pertained to the year 2010 – 11, whereas secondary data were pertained to years from 1991-92 to 2011-12. The total operational cost of cultivation has been taken into considerations while analyse the cost and profitability on different size of farms. Raju and Rao (1990) and Sharma *et al.* (2005) also used these concepts to calculate the profitability of soybean.

RESULTS AND DISCUSSION

Profitability of soybean *vis –a-vis* maize

Soybean competes with maize in the study area. The operational cost of cultivation per hectare in case of soybean was documented as Rs. 12,785, Rs 14,500, Rs 16,469, Rs 17,169 and 15,238 while in case of maize it was Rs 9,157, Rs 10,657, Rs 11,313 and Rs 11,714 and Rs 10,710 respectively in case of marginal, small, medium, large size and overall categories of farmers (Table 3).

Net income of soybean in case of marginal, small, medium, large and overall categories of the farmers was recorded as Rs 18, 395, Rs 18,129, Rs 19,170, Rs 20,443 and Rs 19,009 per ha, while in case of maize this was Rs 8,564, Rs 14,704, Rs 16,305, Rs 13,369 and Rs 13,125 per hectare, respectively. Soybean was found more profitable than its competing crop maize. The benefit: cost ratios obtained under soybean cultivation were 2.44, 2.25, 2.16, 2.19 and 2.25, while in case of maize, the ratios recorded were 1.94, 2.38, 2.44, 2.14 and 2.23 among above mentioned categories, respectively. The yield of soybean obtained under marginal, small, medium, large and overall categories was 1,057, 1,102, 1,190, 1,235 and 1,146 kg per ha and the cost of production to obtain a quintal of soybean was recorded as Rs 12,096, Rs 13,158, Rs 13,839, Rs 13,924 and Rs 13,297, respectively. In case of maize, the yield obtained was 1,589, 2,055, 2,249, 1,990 and 1,971 kg per hectare and the cost of production recorded was Rs 5,763, Rs 5,186, Rs 5,030, Rs 5,886 and Rs 5,434 per quintal respectively among above mentioned categories (Table 4).

Gautam and Nahatkar (1993) also reported that soybean is a prospective crop in terms of income and ensure the highest profit among major *kharif* crops of Madhya Pradesh. Jaiswal and Hugar (2011) also reported that even though the cost of cultivation of soybean was higher than that of maize, its gross return as well as net return were also correspondingly higher than maize in Madhya Pradesh.

Profitability *vis-à-vis risk* in soybean production

In soybean, acreage variability, yield, price and net income risk at overall level was found to be 50.25, 16.33, 14.99 and 15.66 per cent, while in case of maize it was found to be 122.29, 19.66, 8.17 and 13.92 per cent, respectively (Table 5).

The maximum variability was found in case of area in both the crops and yield risk in case of maize. At overall more price and net income variability was found in soybean as

Table 3. Operational cost of cultivation of soybean *vis –a-vis* maize (Rs/ha)

Cost items	Marginal	Small	Medium	Large	All Farms
			Soybean		
Seed	2747	2870	3008	3173	2950
Fertilizer and manure	2560	3054	3421	3405	3110
Insecticides and pesticides	1919	2343	3261	3501	2756
Human labour	- -	- -	- -	- -	- -
Family	643	600	705	733	670
Hired	228	648	930	1257	766
Machine labour	2344	2497	2639	2746	2556
Bullock labour	- -	- -	- -	- -	- -
Irrigation	- -	- -	- -	- -	- -
Harvesting and threshing	2261	2392	2398	2273	2331
Interest on working capital	84	95	107	109	99
Total Operational Cost	12785	14500	16469	17196	15238
			Maize		
Seed	461	451	517	554	496
Fertiliser and manure	2792	2879	3008	3154	2958
Insecticides & pesticides	1195	1203	1326	1340	1266
Human labour	- -	- -	- -	- -	- -
Family	923	947	906	780	889
Hired	627	862	1007	1086	896
Machine labour	1176	2289	2503	2719	2172
Bullock labour	- -	- -	- -	- -	- -
Irrigation	- -	- -	- -	- -	- -
Harvesting and threshing	1970	2011	2031	2064	2019
Interest on working capital	13	14	16	17	15
Total Operational Cost	9157	10657	11313	11714	10710

compared to maize, while the acreage variability was found to be more in maize (122.29 %) as compared to soybean (50.25 %). This was found true for all the categories of farms with minor variation.

Among different size of holdings, the acreage variability, yield, price and net income risk of soybean were found maximum in medium (68.62 %), medium (18.48 %), small (22.11 %) and small (18.73 %) and minimum in large (35.44 %), large (13.81 %), medium (10.80 %) and large (13.51 %) categories. In case of maize the maximum acreage variability, yield, price and net income risk were found in marginal (170.47 %), marginal (23.90 %), large (10.95 %) and large (14.92 %) and minimum in medium (72.61 %), medium (15.15 %), small (5.87 %), medium (11.93 %) as compared to other categories.

Table 4. Profitability of soybean *vis –a-vis* maize (Rs/ha)

Particulars	Marginal	Small	Medium	Large	All Farms
			Soybean		
Yield (kg)	1057	1102	1190	1235	1146
Price (Rs/q)	2866	2877	2908	2959	2903
Value of main-product	30294	31705	34605	36544	33263
Value of by-product	886	924	1034	1095	985
Gross Income	31180	32629	35639	37639	34247
Net Income over operational cost	18395	18129	19170	20443	19009
Cost of production (Rs/t)	12096	13158	13839	13924	13297
Cost of cultivation	12785	14500	16469	17196	15238
Returns/ Rupee	2.44	2.25	2.16	2.19	2.25
			Maize		
Yield (kg)	1589	2055	2249	1990	1971
Price (Rs/q)	1049	1163	1163	1192	1142
Value of main-product	16669	23900	26156	23721	22501
Value of by-product	1052	1461	1462	1362	1334
Gross Income	17721	25361	27618	25083	23835
Net Income over operational cost	8564	14704	16305	13369	13125
Cost of production (Rs/t)	5763	5186	5030	5886	5434
Cost of cultivation	9157	10657	11313	11714	10710
Returns/ Rupee	1.94	2.38	2.44	2.14	2.23

1q = 100 kg

It is clear from the about discussion that soybean still found more profitable than its competitive crop hybrid maize as it provides Rs 34,247 and Rs 19009 more gross and net income to them as compared to hybrid maize although there was found more price and income risk in cultivation of soybean as compared to hybrid maize. Hence efforts should be made to reduce price and income risk associated with soybean production through stabilize prices of input as well as output in long run and by uplifting the standard of living of farmers. The study indicated that there have been incentives for farmers to grow soybean in *kharif* instead of its competitive crop. Similar observation made by Kajale (2002).

Table 5. Profitability vis-à-vis risks in soybean production

Indicators	Marginal	Small	Medium	Large	All Farms
Main crop			***Soybean***		
Acreage variability	30.65	66.27	68.62	35.44	50.25
Yield risk	17.67	15.36	18.48	13.81	16.33
Price risk	13.83	22.11	10.80	13.21	14.99
Net income risk	15.75	18.73	14.64	13.51	15.66
Main Competing Crop			***Maize***		
Acreage variability	170.47	165.61	72.61	80.45	122.29
Yield risk	23.90	20.69	15.15	18.89	19.66
Price risk	7.16	5.87	8.71	10.95	8.17
Net income risk	15.53	13.28	11.93	14.92	13.92

Coefficient of variation of area, yield, price and net income of main oilseeds and main competing crops

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