

# Economic analysis of Maize Seed Production on Farmers' Fields

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## ABSTRACT

Maize is an important fodder crop of summer and rainy season and suitable for silage making. It is the fast growing crop grown for both fodder and gain. The economics of Maize seed production crop (cv. African tall) was analysed for the period *Kharif* 2012-13 in seven farmers' fields in Nidhan Village, Morena, MP. The highest cost was incurred on harvesting and pooling of mature crop. The average total expenditure incurred on that was 5266.1 and it was 18.8% of total cost. The average total working capital was found as ₹ 19722.94 per hectare (70.32% of total cost) and total variable cost is ₹ 20314.63 which is 72.43% of total cost. The average total cost is found as ₹ 28045 per hectare. The average total labour man days used per hectare are 53.59. The average total expenditure incurred on labour is ₹ 13305.31 (47.4%) which is found as highest expenditure in total cost. The highest expenditure in percentage term is incurred on labour followed by manures, draft power and seed cost. On per hectare basis the average quality seed production was 1402.68 kilogram. The average rate of quality seed was ₹ 25 per kilogram. The total return was found as ₹ 56632.95 per hectare. The average net return is ₹ 28203.74 per hectare. The average benefit cost ratio at is found as 1.99. The cost of production of seed when only main product quality seed only) was considered for selling was ₹ 20.30 per kilogram of seed. The cost of production of seed when both main product (quality seed only) and other by-products (dry fodder, rejected seed etc.) was considered was ₹ 4.9 per kilogram of seed. Thus, it is clear from the study that seed production of Maize is highly profitable and has wide market available for it.

**Keywords:** Economic analysis, Maize seed production, Benefit- cost ratio

Maize is one of the oldest human-cultivated crops. The centre of origin is believed to be the Mesoamerica region, at least 7000 years ago when it was grown as a wild grass called teosinte in the Mexican highlands. The importance of cereal grains in human nutrition is widely recognized, as they provide substantial amounts of energy and protein to millions people, especially in developing countries (FAO, 2011). Maize (*Zea mays* L) is one of the most versatile emerging crops having wider adaptability under varied agro-climatic conditions. Globally, maize is known as queen of cereals because it has the highest genetic yield potential among the cereals. It is

cultivated on nearly 150 m ha in about 160 countries having wider diversity of soil, climate, biodiversity and management practices that contributes 36% (782 m t) in the global grain production. The United States of America (USA) is the largest producer of maize contributes nearly 35% of the total production in the world and maize is the driver of the US economy. The USA has the highest productivity ( $> 9.6 \text{ t ha}^{-1}$ ) which is double than the global average ( $4.92 \text{ t ha}^{-1}$ ). Whereas, the average productivity in India is  $2.43 \text{ t ha}^{-1}$ . In India, maize is the third most important food crops after rice and wheat. According to advance estimate it is cultivated in 8.7 m ha (2010-

11) mainly during Kharif season which covers 80% area. Maize in India, contributes nearly 9% in the national food basket and more than ₹ 100 billion to the agricultural GDP at current prices apart from the generating employment to over 100 million man-days at the farm and downstream agricultural and industrial sectors. In addition to staple food for human being and quality feed for animals, maize serves as a basic raw material as an ingredient to thousands of industrial products that includes starch, oil, protein, alcoholic beverages, food sweeteners, pharmaceutical, cosmetic, film, textile, gum, package and paper industries etc.

Recent trends (2003-04 to 2008-09) in growth rate of area (2.6%), production (6.4%) and productivity (3.6%) of maize in India has been of high order and 15 experienced highest growth rate among the food crops. Since 1950-51, the area, production and productivity of maize have increased by more than 3.4, 12 and 4.5 times from 3.2 m ha, 1.7 m t and 547 kg ha<sup>-1</sup> to current level of 8.17 m ha, 19.33 m t and 2414 kg ha<sup>-1</sup>, respectively due to increasing maize demand for diversified uses. In India, the maize is used as human food (23%), poultry feed (51%), animal feed (12%), industrial (starch) products (12%), beverages and seed (1 % each). Because of these important features, its seed has regular demand in the market in summer and *kharif* season. Thus, the economics of Maize seed production crop (cv. African tall) was analysed for the period *Kharif* 2012-13 in farmers' fields in Nidhan Village, Morena, MP to inform the farmers about the profitability of seed production process.

## MATERIAL AND METHODS

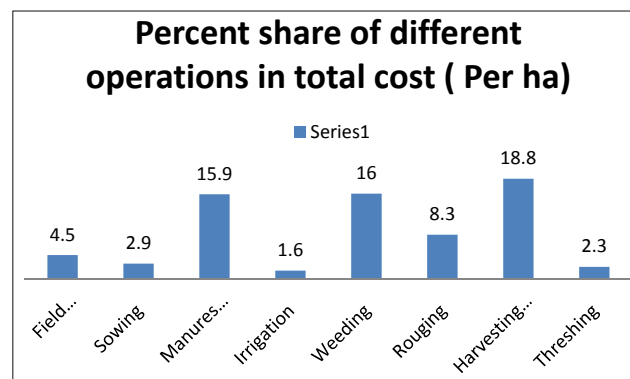
The present research work was based on seven farmers of Nidhan, Morena, M.P. who have taken the seed crop were selected for the period *Kharif* 2012-13. The fields were prepared by harrow and cultivators. The seed rate was 12.5 kg per hectare and crop was sown by seed drill. 20-40 quintal of FYM was applied and 100 kg DAP was applied as basal dose and 100 kg Urea was applied in two times (50% as basal and 50% as top dressed). As crop was sown in Rainy season, so very little irrigation was required. No fodder cuttings were taken. The variable cost and fixed cost were calculated for different machines used and multiplied with hours for which they used to find the expenditures incurred on them. The labour rate

in respect of man days was taken as per the prevalent market rate. The total working capital shows the total variable cost incurred on various operations. The total variable cost is calculated by adding three percent interest to total working capital. The addition of all the fixed cost, overhead cost and rental value of land gives the total fixed cost. The rental value of land was considered as that prevailing in the locality that is ₹ 5000/ha for one crop (Kumar *et al.* 2013). The management and risk was considered as ten percent of total variable and fixed cost. The cost of cultivation data were calculated for every stage of crop growth.

## RESULTS AND DISCUSSION

### Operation wise cost of cultivation

The cost of cultivation was calculated for individual farms and then the data were converted into per hectare basis. The operation wise expenditure is presented in Table 1 and also represented in Fig. 1.



**Fig. 1:** Operation-wise cost of cultivation in improved Maize seed production

The average expenditure incurred on field preparation was ₹ 1250.30 per hectare that comes to 4.5% of total cost. The average expenditure incurred on sowing was ₹ 823.30 which is 2.9% of total cost. The average expenditure per hectare on manures and fertilizers is ₹ 4465.2 that comes to 15.9% of total cost. The total expenditure incurred on weeding was ₹ 4486.3 which was 16.0% of total cost. The highest cost was incurred on harvesting and pooling of mature crop. The total expenditure incurred on that was 5266.1 and it was 18.8% of total cost. The average total working capital was found as ₹ 19722.94 per hectare (70.32% of total cost) and total variable cost is ₹ 20314.63 which is

72.43% of total cost. The average total cost is found as ₹ 28045.75 per hectare.

**Table 1:** Operation wise cost of cultivation for Maize seed (cv. African tall) production (*Kharif* 2012-13)

Operations	Average per hectare (₹)	Percentage to total cost
Field preparation	1250.3	4.5
Sowing	823.3	2.9
Manures and fertilisers	4465.2	15.9
Irrigation	439.7	1.6
Weeding	4486.3	16.0
Fodder cutting	0.0	0.0
Rouging	2338.5	8.3
Harvesting and pooling	5266.1	18.8
Threshing	653.4	2.3
Total Working capital	19722.94	70.32
Interest on WC	591.68	2.10
Total variable cost	20314.63	72.43
Fixed cost and overhead charges	181.50	0.64
Rental value of land	5000	17.82
Total fixed cost	5181.50	18.47
TVC + TFC	25496.13	90.90
Management & Risk	2549.61	9.09
<b>Total Cost</b>	<b>28045.75</b>	<b>100</b>

### Item wise cost share

Item wise cost of cultivation on per hectare basis is presented in Table 2. The average draft power used per hectare was 5.74 hours. The variable cost incurred on draft power was ₹ 1433.43 per hectare. The average total labour man days used per hectare were 53.59. The average total expenditure incurred on labour was ₹ 13305.31 (47.4%) which was the highest expenditure in total cost. The expenditure incurred on seed purchase was ₹ 524.06 per hectare. The total expenditure incurred on manures and fertilizers was ₹ 4261.86 per hectare. Thus, the highest expenditure in percentage term was incurred on labour followed by manures, draft power and seed cost.

### Economic Returns

The average return from maize seed production was

analysed and presented in Table 3. On per hectare basis, the average quality seed production was 1402.68 kilogram. The average rate of quality seed was ₹ 25 per kilogram (the rate at which farmers have sold).

**Table 2:** Item wise cost of cultivation for scientific Maize seed production (per hectare)

Item wise cost of cultivation	Average cost per hectare (₹)	Percent
Draft power	0.00	
Draft power hours	5.74	
Draft power cost	1433.43	5.1
Labour power	0.00	
Total mandays	53.59	
Total Labour cost	13305.31	47.4
Seed cost	524.06	1.9
Manures and Fertilizers	4261.86	15.2
Irrigation	0.00	
Tubewell hours	12.88	
Tubewell cost	198.29	
Total working capital	19722.94	70.3
Interest on WC	591.69	
Total variable cost	20314.63	72.4
Fixed and other overhead cost	181.50	
Rental value of land	5000.00	17.8
Total fixed cost	5181.50	18.5
TVC+ TFC	25496.13	90.9
Management & risk	2549.61	9.1
<b>Total cost</b>	<b>28045.75</b>	<b>100.0</b>

The total dry fodder produced was 8256.92 kg and the imputed value of it was taken as ₹ 300 per quintal. The total return was found as ₹ 56632.95 per hectare. The average net return was ₹ 28203.74 per hectare. The average benefit cost ratio was 1.99. The cost of production of seed when only main product as quality seed only was considered was ₹ 20.30 per kilogram of seed. The cost of production of seed when both main product (quality seed) and other by-products (dry fodder, rejected seed etc.) were considered, was ₹ 4.90 per kilogram of seed. Thus, it was found that if the farmers are able to utilise/sell the by-products efficiently, the cost of production of seed will reduce drastically.

**Table 3:** Economic Returns from Maize seed production

Particulars	Average
Total cost of seed production, ₹	28429.21
Pure seed, kg	1402.683
Rate (₹/kg)	25
Dry fodder, kg	8256.92
Gross return, ₹	56632.95
Net return, ₹	28203.74
B:C ratio	1.99
Cost of production of seed, ₹/kg (when only main product is considered)	20.30
Cost of production of seed, ₹/kg (considering by-product also)	4.91

## CONCLUSION

The average total cost of Maize seed production (including processing) was ₹ 28429 per hectare. The highest share in the total cost was of human labour accounted to be 47.4% followed by the expenditure incurred on manures, draft power and seed cost. On per hectare basis, the average quality seed production was 1402.68 kg. The gross return was ₹ 56632.95 per hectare, whereas the average net return was ₹ 28203.74 per hectare. The average benefit cost ratio was 1.99. The cost of production of seed when only main product (quality seed) was considered was ₹ 20.30 per kilogram of seed and ₹ 4.91 per kg if farmer would be able to utilise by-products also. The maize seed is available in markets during the sowing season at the rate of ₹ 40-60 per kilogram and the farmers can earn attractive profits from the production of quality seed. Thus, it is clear from the study that seed production of maize is highly profitable due to the availability of market.

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