

Policy Paper for HOPE Project *Milestone 1.2.2* in South Asia

Ex-ante Impacts of Rabi Sorghum Technologies in India

N. Nagaraj, Sachin More, Vasant Pokharkar and Surajit Halder

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International Crops Research Institute for the Semi-Arid Tropics, Patancheru, India

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Ex-ante Impacts of Rabi Sorghum Technologies in India¹

N. Nagaraj², Sachin More³, Vasant Pokharkar⁴ and Surajit Halder⁵

The major technologies in rabi sorghum are classified as **1. Crop Improvement 2. Crop Management and 3. Markets and prices**. The choice of any combination depends on the resource endowments of farmers, access and availability of quality inputs at the right time and place and the market forces. The ex-ante analysis of technologies considering different interventions, likely rate of adoption and costs and benefits of different technologies is done. The results are given below.

Table-2. Ex-ante Impact of rabi sorghum technologies

Rabi sorghum technologies	Productivity (Grain) (qtls/ha)	Index Number with Local variety as the Base	Index number of net returns per ha*
Local variety	10	100	100
Local variety + IMP	12.5	125	105
Local variety + IMP + one supplemental irrigation	15	150	117
Improved variety	15	150	106
Improved variety & IMP	20	200	125
Improved variety + IMP + one supplemental irrigation	32.5	325	213

* Net returns include return from grain and fodder

Ex-ante impact (partial budgeting results)

- The additional cost of applying fertilizer and one critical irrigation to the local varieties is around Rs 1500 per ha, generating additional income of Rs 2878 and the incremental income is Rs. 1378 leading to incremental return to cost ratio of 1.82

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² Principal Scientist, MIP, ICRISAT, Patancheru, India

³ Project Scientist, HOPE project, MAU, Parbhani, Maharashtra, India

⁴ Project Scientist, HOPE project, MPKV, Rahuri, Maharashtra, India

⁵ Scientific Officer, HOPE project, ICRISAT, Patancheru, India

- The additional cost of replacing local variety with improved variety along with associated cost is Rs 3413, yielding a net gain of Rs 6088 per ha with incremental returns to cost ratio of 2.78. The incremental income is Rs. 2675.
- Additional cost associated with replacing variety and improved management practices is Rs 4.83 with an incremental cost to return ratio of 3.51
- With supplementary irrigation, the net gain increased to the tune of Rs 14,418 per ha with incremental returns to cost ratio of 3.78

Table-3. Estimation of Incremental Returns at Macro level Considering Crop Improvement and Crop Management Technologies

Sl. No.	Particulars	Productivity (qtls/ha)	Adoption rate	Increase in production (lakh tonnes)	Increase in income (Rs Million)
1	Local variety (Maldandi/Dagdi/M-35)	10	15	-	
2	Local variety & Improved management practices	12.5	35	1.52	2124.2
3	Local variety, improved management practices & one supplemental irrigation	15	20	2.41	3370.3
4	Improved variety (Parbhani Moti/Parbhani Jyoti)	15	15	1.24	1733.3
5	Improved variety & improved management practices	20	10	1.17	1637.0
6	Improved variety , improved management practices & one supplemental irrigation	32.5	5	0.68	957.7
	Total			7.02	9822.4

Expected economic gain due to implementation of improved technologies in Maharashtra

- The area under rabi sorghum in Maharashtra is 31.12 lakh ha, of which 70 percent area is under local variety

- Now if the new technologies are adopted the net gain is Rs 3164 per ha
- Market linkages will further enhance the incomes by 20 %

Feasible R&D investment options

In order to improve the overall productivity and profitability of rabi sorghum, the R & D investment options were discussed with selected farmers and scientists considering the existing resource situation, technology, production and market constraints. The relevancy rating was done in order to know the relative importance of feasible R & D investment. In this endeavor, a focused interview was conducted with the concerned scientists and farmers. The respondents were asked to rank their preferences among crop improvement, crop management, selective mechanization, marketing and soil and water conservation. The ranks were allotted on 10 point scale with the first preference receiving 10 points, followed by 8, 6, 4 and 2 points in that order for 2nd 3rd 4th and 5th preference respectively. Considering the weighted average scores, for each preference, the relevancy ranking (RC) was done as indicated below.

$RC_i = \text{Total scores of all respondents for the } i^{\text{th}} \text{ preference} / (\text{Maximum of the continuum} \times \text{Total number of respondents})$

Based on their opinion, five main important components of R & D were ranked and obtaining results as under:

Table-4. Feasible R and D Investment options analysis

Sl. No.	Particulars	Relevancy rank (By scientists)	Relevancy rank (By farmers)
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1	Crop improvement (improved seed, seed multiplication, seed treatment)	2.00 2 nd rank	3.67 1 st rank
2	Crop management (plant population, deep sowing, spacing, disease/pest management, nutrient management)	2.20 1 st rank	2.07 3 rd rank
3	Selective mechanization (farm mechanization for sowing, intercultural operation, harvesting and processing)	1.53 3 rd rank	2.20 2 nd rank
4	Marketing (processing, value addition)	1.27 4 th rank	2.07 4 th rank
5	Soil and moisture management (one supplemental irrigation, moisture conservation)	0.93 5 th rank	2.00 5 th rank

Based on scientist's opinion, the priorities towards R& D investments are crop improvement, crop management, selective mechanization, marketing and soil and water conservation. On the other hand, farmer's priority towards R & D investment differs slightly. Crop improvement is the first priority followed by selective mechanization, crop management, marketing and soil and water conservation.

Thus, the thrust area's for R & D investment in case of rabi sorghum should be crop improvement followed by crop management and selective mechanization, market linkage and soil and water conservation in that order.

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