

# Hybrid Rice Seed Production in Khammam District of Telangana State: A Critical Analysis

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## Abstract

*The success of hybrid rice cultivation depends on the success of the hybrid rice seed production programme which enables seed producers to produce high quality seed at an economical price. Different private companies are promoting this hybrid rice seed production and farmers are switching over to adopting the hybrid rice seed production against the traditional rice cultivation. Hybrid rice seed production requires specialized techniques which must be fully understood by the production staff. With this backdrop the present study was carried out to know the cost of cultivation of hybrid rice seed production in comparison with non hybrid rice production and also look into the aspects of constraints, reasons and suggestions given by the farmers regarding hybrid rice seed production in the Khammam district of Telangana during 2014-15. A total of 120 farmers were selected using multistage sampling method and they were personally interviewed with the help of schedule. The results from the study indicate that the net income obtained from hybrid rice seed production was Rs. 29,822/- per acre and that of non-hybrid rice was Rs. 9419/- per acre. The constraints faced by the farmers in cultivation of hybrid rice seed production includes hard work involved in cultivation compared to non-hybrid rice, difficulty in setting pollination, separate operations for male and female parents etc. As much as 82 per cent of the respondents expressed high profit from hybrid rice seed production when compared to non-hybrid rice and this is the major motivational factor among farmers to take up hybrid rice seed production in future. Also, nearly 48 per cent of the respondents felt that the prices offered by the company was low and it need to be increased.*

**Keywords:** Rice, Hybrid rice, Hybrid seed production Telangana, India.

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## **Introduction**

Rice (*Oryza sativa* L.) is the most important food crop of the world and it is the main source of food for more than half of the world's population including India. As the demand for rice is rapidly increasing with the increase in population and the near stagnant yield levels of semi-dwarf varieties of the green revolution era, there is a need for alternate solutions to boost rice production. Hybrid rice is one such practically feasible and readily adoptable option to increase the rice production. Seed is the real vehicle of production and other inputs like water and fertilizers can be regarded as fuel. The production of quality seeds is a specialized task and due care should be taken during various stages of crop development. To produce hybrid rice, a good quality hybrid seed is required and a large number of private firms have been actively involved in the production of hybrid seed. Telangana is the largest producer of hybrid seeds, followed by Maharashtra and Karnataka ([www.downtoearth.org.in](http://www.downtoearth.org.in)). Out of the total hybrid seeds market in India, paddy has a market share of only nine per cent. The major part of the hybrid seeds market is of Bt cotton (41 per cent), followed by maize (15 per cent) and fruits and vegetables (13 per cent). Despite the market share of 9 per cent, the area penetration of hybrid paddy is just 6 per cent of total paddy cultivation.

Currently hybrid rice seed production is taken up in the rabi season primarily in Telangana State. In this region, the crop is harvested by April-May, which after drying, processing, testing, packaging and transportation reaches north India for hybrid rice cultivation. More than 80% of the total hybrid rice area is in Eastern Indian states like Uttar Pradesh, Jharkhand, Bihar, Chhattisgarh, with some little area in states like Madhya Pradesh, Assam, Punjab, and Haryana. Good rice hybrids have the potential to yield more than 15-20 per cent of the best inbred variety grown under similar conditions. Sivagnanam and Murugan (2020) in their study found that hybrid rice yield rate had increased to 21.48 per cent compared to high yielding rice varieties during 2010-2011.

In 2018, the total market for seeds in India was valued at Rs 4.30 lakh crore. It is projected to increase by Rs 6.45 lakh for 2021. Around 50 per cent of the global seed market is controlled by a few multinationals such as Bayer AG (Germany) and its subsidiary Monsanto Co, DuPont (USA) and Chinese-owned Syngenta AG. According to the latest market study released by Technavio, a market research organisation, the hybrid seeds market in India is expected to grow at a Compound Annual Growth Rate of almost 13 per cent until 2021. As many companies are involved in this hybrid rice seed production,

this paper explores the cost of cultivation of hybrid rice seed production, constraints faced by farmers at field level as well as the suggestions from the farmer side.

### **Methodology:**

Khammam district of Telangana State was selected purposively for the study and from this district, 8 Mandals were selected on the simple criteria that the area under hybrid rice seed production was maximum. The mandals selected under the study includes- Dummugudem, Cherla, Sattupalli, Garla, Bayyaram, Nelakondapalli, Dammapeta and Kusumanchi. A total of 120 farmers were selected proportionately by considering the number of farmers growing hybrid rice for seed production in each Mandal. Similarly, a control group of 120 non-hybrid rice farmers were selected for studying the cost of production. Primary data related to the cost of inputs and different operations in hybrid rice seed production and non-hybrid rice along with yield were collected from the farmers during 2014-15. As most of the researchers used to design their questions by referring to the existing literature, in this study, in order to obtain the real field level situation, the questionnaire was designed with open ended questions, so that the farmers can freely express their problems and constraints in hybrid rice production. Apart from this, the study also looks into the suggestions from the farmers' point of view.

### **Results:**

Comparison of cost of cultivation of Hybrid rice seed production and non-hybrid rice in Rabi season:

A detailed study of cost of cultivation of both hybrid and non-hybrid (conventional rice) rice is presented in the table 1.

**Table 1: Comparison of Cost of Cultivation of Hybrid Rice Seed Production and Non-Hybrid Rice in Rabi Season (Rs. /Acre)**

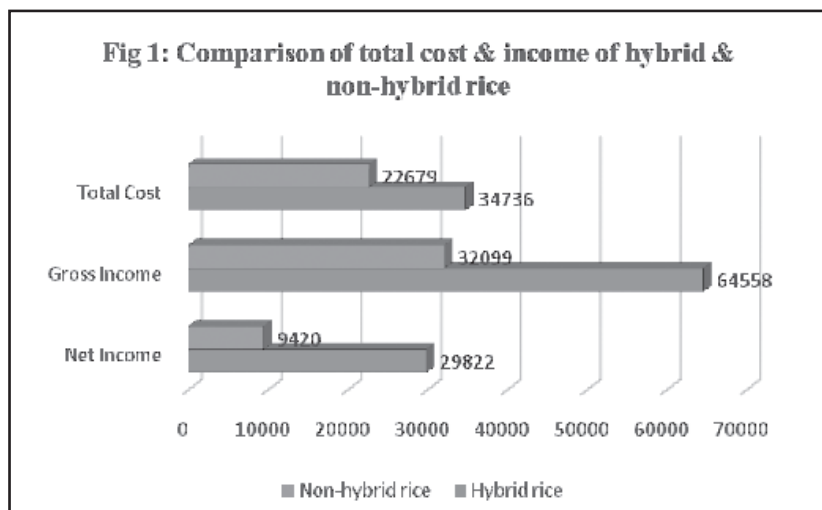
S.No.	Particulars	Hybrid Rice Seed Production Cost	Non-Hybrid Rice Cost
1	Seed	266	657
2	Seed treatment	0	21
3	Nursery	1058	1097
4	Land preparation	4059	4042

5	Transplantation	3869	2335
6	Fertilizer	5316	4398
7	Weeding	1956	469
8	Labour for weeding	0	1481
9	Irrigation	646	214
10	GA3	574	0
11	Supplementary pollination	4490	0
12	Roguing	2859	0
13	Insecticide	3688	3595
14	Harvesting Female	2096	2235
15	Harvesting Male	1979	
16	Threshing	1487	1230
17	Bags	71	274
18	Packing	268	0
19	Miscellaneous expenses	46	625
20	<b>Total costs</b>	34736	22678
21	Yield female (qt/acre)	7	26
22	Yield male (qt/acre)	7	
23	Rate female	7903	1175
24	Rate male	1052	
25	Straw yield (qt/acre)	17	17
26	Rate for straw	230	468
27	Income for Female	54795	31025
28	Income for Male	7497	
29	Income for straw	758	1073
30	Compensation	1507	0
31	Gross income	64558	32098
32	Net income	29822	9419
33	C:B ratio	1.86	1.42

Note: The amount mentioned is as per 2014 market price.

The results from the above table clearly indicate that the total cost incurred by hybrid rice per acre (Rs.34736/-) is more compared to non-hybrid rice (Rs. 22678/-). The increase in cost of production in hybrid rice is mainly due to pollination and fertilizer cost. If we look at the Gross income, hybrid rice has taken a step higher level (Rs. 64558/-) when compared to non-hybrid rice (Rs. 32098). The net income component from hybrid rice looks promising at Rs. 29822/- per acre when compared to non-hybrid rice at Rs. 9419/-.

Total cost, gross income and net income from both hybrid and non-hybrid rice (Fig. 1). The Benefit: Cost ratio is observed to be highest in hybrid rice (1.86) compared to non-hybrid rice (1.42). Chanda et al. (2019) in their study found that the Boro (Hybrid) rice gave high benefit cost ratio (BCR) and it varies from 2.10-2.36 when compared to other HYV and local varieties of rice.



### Constraints faced by the Hybrid Rice Seed Production Farmers:

**Table 2: Constraints Faced by the Hybrid Rice Seed Production Farmers (N=120)**

S.No	Constraints	Frequency	Percentage
1	Hard work compared to rabi paddy	84	70.00
1a	Supplementary pollination	38	31.67
1b	Separate operations for Male & Female	16	13.33

1c	Transplantation	12	10.00
1d	Roguing	10	8.33
1e	Harvesting of Male	6	5.00
1f	Nursery raising	2	1.67
2	Non availability of timely labour	46	38.33
3	High cost of labour	34	28.33
4	High risk	32	26.67
5	High cost of cultivation	20	16.67
6	Electricity shortage	20	16.67
7	Synchronization problem	14	11.67
8	High water requirement	6	5.00
9	Payment is very late	6	5.00
10	High fertilizer requirement	6	5.00
11	High incidence of pests and diseases	6	5.00
12	Timely operations	6	5.00
13	Improper guidance	4	3.33
14	High fertilizer cost	4	3.33
15	Levelling of land	2	1.67
16	Powder spraying causing itching	2	1.67
17	No contacts with company	2	1.67
18	Not giving compensation	2	1.67

If the technology is new to any area then there are problems that arise out of it, in this study also the constraints faced by the farmers with respect to hybrid rice production were surveyed (Table 2). As much as 70 per cent of the respondents revealed that there is a hard work involved in hybrid rice seed production compared to non-hybrid rice. Mainly due to the crop care to be taken especially for the growth of male and female parents for flowering synchronization for effective pollination and harvesting of male and female parents separately. Research findings from Shah and Thomas (2015) found that that a vast majority of non-adopters (97.5%), de-adopters (94.2%) and continuing

adopters (89.2%) perceived moderate to serious risks in cultivating hybrid rice seed production. Around 31.67 per cent of the farmers were of the opinion that supplementary pollination is one of the constraints faced by the farmers. This may be due to the fact that in hybrid rice seed production yields depends upon the pollination, hence to increase the pollination, farmers have to carry out mechanical pollination. In a study by Manjunath and Prasad (2012) reported that nearly 90% of seed growers experienced the problem of non-availability of trained labor in crossing operations. Non availability of timely labour contributes 38.33 %. This is mainly due to the fact that the hybrid rice production is cultivated to the maximum extent in certain villages at the same time and the demand for labour to perform pollination also increases.

In spite of the difficulties faced by the farmers in cultivation of hybrid rice seed production like, hard work involved in cultivation compared to non-hybrid rice, difficulty in pollination, separate operations for male and female plants etc. the farmers continue to express their willingness to go for hybrid rice seed production. It is revealed that 98 per cent of the respondents expressed high profit from hybrid rice seed production when compared to non-hybrid rice and this is the major motivational factor among farmers to take up hybrid rice seed production in future (Table 3). Nirmala and Suhasini (2013) in their study revealed that the main reason to continue cultivation of hybrid rice by the farmers was hope for better yield from cultivation of hybrid rice. Janaiah and Xie (2010) in their study found that Hybrid rice cultivation generated an additional net profit of about 13% in Chhattisgarh and about 33% in Uttar Pradesh. Furthermore, they also revealed that 100% of the farmers in their study are willing to take up seed production in the future because of its high profitability and assured profits.

Around 21.67 per cent of the respondents felt that compensation provided by the company in case of failure as one of the factors drives them to take up hybrid rice. Nearly 12 per cent of the respondents felt that the hybrid rice production can generate employment and that made the farmers to go for hybrid rice seed production in future. These are the three major factors that drive the farmers to opt for continuing hybrid rice seed production in future.

## Reasons for Continuing Hybrid Rice Seed Production:

**Table 3: Reasons for Continuing Hybrid Rice Seed Production (N=120)**

S.No	Reasons	Frequency	Percentage
1	High profit than rabi paddy	98	81.67
2	Providing compensation	26	21.67
3	Providing employment	14	11.67
4	Market problem for commercial paddy	6	5.00
5	Regular technical advice	4	3.33
6	Fixing rates at start of the cultivation only	4	3.33
7	Providing inputs by organizer & company	4	3.33
8	Providing credit without interest	2	1.67
9	Payment through online	2	1.67

During the field survey suggestions were asked from farmers view point to improve the services of seed companies (Table 4). The results revealed that nearly 48.33 per cent of the respondents felt that the prices offered by the company was low and it need to be increased. As much as 26.67 per cent of the respondents expressed delay in payments and suggested to make payments quickly. Around 18.33 per cent of the respondents suggested to provide inputs at low cost, 15 per cent of the respondents suggested to increase the amount of credit that the company used to pay at the initial stages of crop growth. A small fraction (13.33 %) of the respondents suggested providing seeds of high yielding hybrids, this may be due to the fact that the company provided seeds may not yield higher as anticipated by the farmer. Negi et al (2020) in their study revealed that the relative yield advantage of hybrids over open-pollinated modern varieties is not large enough to incentivize rapid adoption of hybrid rice technology. A relatively small portion (10 %) of the respondents suggested that the companies to guarantee the compensation in case of crop failure. This may be due to the fact that the hybrid rice is new to this region and the farmers may fear that the chances of crop failure may hamper the conditions of future tie up with the company. Fear of failure component among the respondents towards a new technology (in this case previous knowledge of hybrid rice seed production) also

be the factor to ask for compensation guarantee. Abebrese et al (2019) in their study in Ghana found that 80 per cent of the farmers did not have previous knowledge about hybrid rice cultivation.

### **Suggestions for Seed Companies to Improve their Services:**

**Table 4: Suggestions for Seed Companies to Improve their Services**

**(N=120)**

<b>S.No</b>	<b>Suggestions</b>	<b>Frequency</b>	<b>Percentage</b>
1	Increase in price	58	48.33
2	Make payments quickly	32	26.67
3	Provide inputs for low cost	22	18.33
4	Increase the amount of credit	18	15.00
5	Provide seeds of high yielding hybrids	16	13.33
6	Compensation guarantee	12	10.00
7	Don't cut 10% in weight	8	6.67
8	Direct contact with farmers without local organizers	8	6.67
9	Develop transplanting machine	6	5.00
10	Weighing and grading to be done in presence of farmer	6	5.00
11	Develop small scale machine harvesters	6	5.00
12	Provide labour cost for transplantation, pollination & rouging	4	3.33
13	Conduct health campaigns	4	3.33
14	Develop mechanical supplementary pollination	4	3.33
15	Regular technical guidance by company staff	2	1.67
16	Increase compensation	2	1.67
17	Buy male seed	2	1.67
18	Create infrastructure facilities	2	1.67
19	Provide safety equipment	2	1.67

Apart from the suggestions towards company's improvement, suggestions to improve Government intervention in hybrid rice production is also collected during the field visit (Table 5). From the table it is clear that as much as 40 per cent of the respondents were of the opinion that the company should operate through Mandal Agricultural Office (MAO). This may be due to the fact that they fear the company's hybrid seed may not give yields all the time. Nearly 25 per cent of the respondents stressed the need to compensation, this may be due to difficulty in pollination of the crop and crop set. Around 18.33 per cent of the respondents suggested to increase price payed by the company and suggested the Government to fix MSP (Minimum Support Price). An equal per cent (18.33%) of the respondents also suggested to provide subsidy on inputs and make availability of inputs as and when it is needed. Nearly 13.33 per cent of the respondents suggested providing insurance in case of crop failure due to poor crop set. A fraction (10 %) of the respondents suggested the Government to create awareness among the farmers to go for hybrid rice production. This may be due to the fact that the farmer receives good profit from hybrid rice compared to non-hybrid rice. Sivagnanam and Murugan (2020) in their study in Tamil Nadu revealed that some of the districts such as Thiruvallur, Karur, Dindigul and Kanyakumari have not adopted the hybrid rice technology due to lack of awareness among the farmers, less availability hybrid seeds, technical problems, high cost of cultivation and absence of enthusiasm from government.

### **Suggestions to Government for Promotion of Hybrid Rice Seed Production:**

**Table 5: Suggestions to Government for Promotion of Hybrid Rice Seed Production (N=120)**

<b>S.No</b>	<b>Suggestions to Government</b>	<b>Frequency</b>	<b>Percentage</b>
1	Companies should operate through MAO	48	40.00
2	Make compensation as mandatory	30	25.00
3	Increase price & Fix MSP	22	18.33
4	Provide inputs on subsidy	22	18.33
5	Make availability of inputs	22	18.33
6	Provide insurance	16	13.33
7	Create awareness	12	10.00

8	Provide credit	6	5.00
9	Develop technology for easy supplementary pollination	4	3.33
10	Grading to companies	4	3.33
11	Provide irrigation facilities	4	3.33
12	Provide power supply	4	3.33
13	Govt. Should purchase male seed	4	3.33
14	Give due recognition to hard work	2	1.67

### Conclusion:

It is clearly evident from the findings that the net income obtained from hybrid rice production compared to non-hybrid rice production was Rs. 29, 822/- per acre and that of non-hybrid rice was Rs. 9419/- per acre. This reveals about the profitable nature of hybrid rice seed production compared to non-hybrid rice. The higher profit is the main reason that the farmers expressed willingness to take up the crop in the future. The visibility factor of the hybrid rice production helps in continuing the adoption of an innovation. The farmers expressed concern about difficulties in pollination and also growing male and female lines separately. It may be due to the fact that they were not used to do this kind of cultivation earlier as it is new to them. The climatic factors and new parental hybrids for hybrid rice seed production also expressed concern about the failure of crop; hence some of the farmers stressed the need for compensation. Even some of the farmers suggested the Government to involve in fixing compensatory mechanism for the hybrid rice seed production as a mandatory. This indicates that the farmers are ready to take up the hybrid rice seed production but the fear of crop failure may discourage some of the farmers to discontinue production in the future. Furthermore, the farmers suggested that if the companies operate through Mandal Agricultural Officers, the confidence among the farmers will improve and this leads to an increase in number of farmers to go for hybrid rice seed production. The farmers also expressed concern about the prices offered by the private companies at the time of harvest and delay in payment. From the company's point of view at least the payment to be made timely so that the farmers gain confidence in the company.

It is of utmost important for the R&D sector to develop hybrids which suits to all the agro-climatic regions. Promotional efforts from the Government side are very low, and areas where good irrigation facilities are available, Government has to promote this hybrid rice seed production among the farmers.

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