International Journal of Agriculture Sciences
ISSN: 0975-3710&E-ISSN: 0975-9107, Volume 7, Issue 14, 2015, pp.-883-886.
Available online at http://www.bioinfopublication.org/jouarchive.php?opt=&jouid=BPJ0000217

HYBRID RICE SEED PRODUCTION IN TELANGANA AND ANDHRA PRADESH STATES OF INDIA: A SITUATION ANALYSIS

Nirmala B.*
Scientist (Agricultural Economics), ICAR-Indian Institute of Rice Research, Hyderabad, India
*Corresponding Author: Email-bnirmaladrr@gmail.com

Received: October 16, 2015; Revised: December 07, 2015; Accepted: December 08, 2015

Abstract- The paper attempts to make a situation analysis of hybrid rice seed production in Telangana and Andhra Pradesh states of India from the perspectives of hybrid rice seed producers by employing the strengths, weakness, opportunities and threats (SWOT) method. Kendall's Coefficient of Concordance (w) was used to test the rank of factors associated with SWOT. The coefficients of concordance for SWOT were 0.6. This indicates that there is agreement among the seed producers about the factors that influence SWOT of hybrid rice seed production in the study area. The results revealed that, income stability, price certainty and timely supply of inputs and technical advices were the major strengths in hybrid rice seed production. The major weaknesses were a lower price being offered by the companies to the seed producers, lack of legal safe guard mechanism and drudgery in additional operations like rouging and supplementary pollination. Availability of quality seed and cooperative farming, which leads to improvement in standard of living, was perceived as the opportunities in hybrid rice seed production. The threats to hybrid rice seed production were perceived as dependence of seed producers for inputs and technical advices on the companies and monocropping. From results of the present study, it is suggested that there is a need to evolve legal safeguard mechanism to avoid breach of contract between producers and seed companies.

Keywords- Hybrid rice seed production, Swot analysis, India, Kendall Co-efficient.

Citation: Nirmala B., (2015) Hybrid Rice Seed Production In Telangana and Andhra Pradesh States of India: A Situation Analysis. International Journal of Agriculture Sciences, ISSN: 0975-3710 & E-ISSN: 0975-9107, Volume 7, Issue 14, pp.-883-886.

Introduction

Rice is the staple food crop of India, providing 30 % of calorie requirement for more than 70 % of Indian population. It occupies highest area among the crops grown in the country. The projected requirement of rice by the year 2050 for consumption purpose alone is 136 million tons for an expected population of 162 million [1]. This increase in production has to be achieved in the backdrop of declining and deteriorating resource base such as land, water, labour, and other inputs and without adversely affecting the quality of environment. The task no doubt is quite challenging and the options available are limited in view of plateauing trend of yield in high productivity areas, decreasing and degrading land, water, labour and other inputs. Hybrid rice technology is the most feasible and readily adoptable one, among the various genetic approaches possible, as has been amply demonstrated in the People's Republic of China.

Availably of quality seed at an affordable price is crucial for spread of hybrid rice technology in India. Hybrid rice seed production technology is different from that for inbred rice seed production, and is more complex than the seed production for many other hybrid crops. Currently, the most popular male sterility system is the Cytoplasmic Male Sterility system (CMS--popularly known as the three-line system in China) [2].

It has been observed that farmers in Andhra Pradesh and Telangana states of India have been taking up hybrid rice seed production on a large scale. Presently, about 80% of the hybrid seed requirement in the country is provided by Andhra Pradesh and Telangana states of India [3]. The major players in the large scale hybrid rice seed production are private seed companies. Several firms are investing heavily in Research and Development to improve yield performance and reduce yield variability of hybrid rice seed production. Spielman *et al.* [4] estimated annual R&D investments by the private sector at $9 million in 2009. In addition, many firms are also investing in the expansion of their marketing and distribution networks [5]. In majority of the cases seed companies are providing back end and front end support to the seed growers by means of supplying seed and other critical inputs like GA3 required for hybrid rice seed production. They are also offering technical expertise and guidance to hybrid rice seed producers by making visits to the fields at regular interval during the crop season. The hybrid seed thus produced is procured by seed companies. In this backdrop, the present study was conducted to make a strengths, weakness, opportunities and threats (SWOT) analysis of hybrid rice seed production in Andhra Pradesh and Telangana states of India.

Materials and Methods

A total of 120 hybrid rice seed producers were randomly selected across 4 districts of India. Thirty respondents each from Warangal, Medak and Karimnagar districts of Telangana and Kurnool district of Andhra Pradesh of India were selected randomly. Warangal, Medak, Karimnagar and Kurnool districts were purposively selected as they are the hubs of hybrid rice seed production in India. More than 85 percent of the total hybrid rice seed production of India is taken up in these four districts. The data on the perceptions of farmers about various factors associated with SWOT in hybrid rice seed production were obtained. The survey data pertains to the year 2013-2014.

Socio-economic characteristics of the respondents

The various Socio-economic characteristics of the respondents were obtained by using structured questionnaires. The data pertaining to socio-economic characteristics was analysed and expressed as averages and frequencies.

SWOT analysis

Strengths, Weakness, Opportunities and Threats (SWOT) analysis deals with the

examination of an organization's/sector's internal strengths and weaknesses, and its environments, opportunities, and threats. It is a general tool designed to be used in the preliminary stages of decision-making and as a precursor to strategic planning in various kinds of applications [6].The sample hybrid rice seed producers were asked to rank factors associated with Strengths, Weakness, Opportunities and Threats (SWOT) in Hybrid rice seed production in a descending order, which is from the most important factor to the least important factor. Then, agreement among the respondents about ranking was assessed through Kendall's coefficient of concordance (W).

Kendall's coefficient of concordance (W)

Kendall's coefficient of concordance (W) was proposed by Maurice G. Kendall and Bernard Babington Smith [7]. Kendall's coefficient of concordance (W) is a measure of the agreement among several (m) variables that are assessing a set of 'n' objects of interest. In the social sciences, the variables are often people, called judges or respondents, assessing different subjects or situations. Kendall's coefficient of concordance (W) uses the $\chi 2$ statistic for testing. If the test statistic *W* is 1, then all the survey respondents have been unanimous, and each respondent has assigned the same order to the list of subjects or situations. If *W* is 0, then there is no overall trend of agreement among the respondents, and their responses may be regarded as essentially random. Intermediate values of *W* indicate a greater or lesser degree of unanimity among the various respondents.

Let S represent the variance of the sum of ranks which is given by:

$$S = \sum_{i=1}^{n} (R_i - \bar{R})^2$$

S is the sum of square statistic over the row sums of ranks R_i and

$\overline{R}$ = m (n+1)/2

Kendall's statistic can be obtained as:

$$W = \frac{12S}{m^2 (n^3 - n) - mT}$$

Where,

n is number of objects

m is number of variables/respondents

T is correction factor for tied ranks

$T = \sum (t_k^3 - t_k)$

't_k' is the number of tied ranks in each (k) of g groups of ties. The sum is computed over all groups of ties found in all m variables of the data table. T is 0 when there are no tied values.

Testing the significance of W

The $\chi 2$ distribution provides a reasonably good approximation of the sampling distribution of W [8]. The $\chi 2$ is computed as follows:

$\chi 2 = m (n-1) W$

The degrees of freedom employed for the above equation are *df* = n-1

This quantity is asymptotically distributed like chi square with v = (n-1) *df*, it can be used to test W for significance.

According to Kendall and Babington Smith, this approximation is satisfactory only for moderately larger values of m and n. Sidney Siegel and N.John in 1988 [9], recommend the use of a table of critical values of W when n is less than or m is less than or equal to 20, otherwise they recommend testing the $\chi 2$ static using the $\chi 2$ distribution.

The calculated $\chi 2$ value is evaluated with the table value of $\chi 2$ distribution. In order to reject the null hypothesis the obtained value of $\chi 2$ must be greater than table critical value at the prescribed level of significance.

Hypotheses and Significance Test for W

The null and alternate hypotheses were stated as follows:

H_0: There is no agreement among the hybrid rice seed producers regarding the ranking of the SWOT factors in the order of increasing severity

H_1: There is agreement among the hybrid rice seed producers regarding the ranking of the SWOT factors in the order of increasing severity

Results and Discussion

Socio-economic characteristics of the respondents

The Socio-economic characteristics of the sample hybrid rice seed producers are represented in [Table-1]. The average age of the respondents was 41 years. This implies that most of the respondents were middle aged. This may be due to the migration of younger population to urban areas either for education or better employment opportunities.It was observed that 20 percent of the respondents were illiterates and 32 percent had primary education in the range of 1-5 years. 26 percent of the respondents had education more than 10 years. This implies that, 80 percent of the sample respondents were literate and hence are adopting a technology like hybrid rice seed production, which corroborates the fact that educated farmers are likely to adopt new technologies more intensively.

It was observed that the average farm size of the sample was 1.51 ha and the average area under hybrid rice seed production was 1.33 ha. The private seed companies purposively opt to engage small farmers who have an assured irrigation facility for seed production because these small farmers usually engage fully in seed production without shifting to other farm activities [10]. The sample seed producers have an average experience of 6 years in hybrid rice seed production.

Table-1 *Socio-Economic Characteristics of Sample Seed Producers*

Sl.No.	Characteristics	
1.	Average Age (years)	41
2.	Education (Frequency of No. of years of schooling) Figures in parentheses indicate percentage to the total sample respondents	
	0	24 (20%)
	1-5	39 (32%)
	6 to 10	26 (22%)
	11 to 12	19 (16%)
	>12	12 (10%)
3.	Family Size (Average No. of persons)	4
4.	Average Farm Size (Hectares)	1.51
5.	Average Area under HRSP (Hectares)	1.33
6.	Average Experience (Years)	6

SWOT analysis of hybrid rice seed production

Sample respondents ranked eight factors in a descending order, which is from the most important factor to the least important factor. The mean rank of each factor is then used to determine the relative position among the total factors associated with the strength in hybrid rice seed production. The ranks of factors associated with strengths in hybrid rice seed production are presented in [Table-2]. The results of the present study reveal that the parameter, income stability had a mean rank of 1.95, representing the highest ranking order. This is followed by price certainty and timely availability of inputs with mean ranks of 2.48 and 3.26 respectively. Kendall' test of concordance was used to test the agreement among rankings of the factors associated with strengths in hybrid rice seed production. The coefficient of concordance was 0.6 with 7 degrees of freedom. The value of chi-square was found to be 505.039. The obtained value of Chi square is greater than the Critical value (14.067) at 7 degrees of freedom and hence we reject the null hypothesis that there is no agreement among the sample seed producers about the ranking of factors associated with strengths in hybrid rice seed production.

The ranks of factors associated with weaknesses in hybrid rice seed production are presented in [Table-3]. The major weaknesses as perceived by the sample hybrid rice seed producers were that companies offer relatively lower price to seed producers and sell at higher price in other hybrid rice growing areas. Lack of legal

safe guard mechanism and drudgery in additional operations like rouging and supplementary pollination with mean ranks of 2.37 and 3.18 respectively were other weaknesses. There is also a tendency by the companies to reject low quality products without compensation. The coefficient of concordance was 0.61 with 7 degrees of freedom. The value of chi-square was found to be 512.412. The obtained value of Chi square is greater than the Critical value (14.067) at 7 degrees of freedom and hence we reject the null hypothesis that there is no agreement among the sample seed producers about the ranking of factors associated with weaknesses in hybrid rice seed production.

Table-2 *Ranks of factors for Strengths in Hybrid Rice Seed Production*

Sl.No	Factor	Mean Rank	Rank
1.	Scope for adoption of new technology	4.53	5
2.	Income stability	1.95	1
3.	Increase in employment	7.20	8
4.	Price certainty/Aversion of price risk	2.48	2
5.	Timely supply of inputs	3.26	3
6.	Guidance from qualified staff on management aspects	4.17	4
7.	Development of new skills in operations like rouging/supplementary pollination through better technical advices by staff of companies	5.69	6
8.	Transportation costs not involved	6.57	7
	Test statistics		
	(N) Sample size	300	
	Kendall's W	0.6012	
	Chi-square	505.039	
	Degrees of freedom	7	
	Asymptotic significance	<0.000001	

Hybrid rice seed producers also opined that the increase in price for hybrid rice seed is not in tune with the increase in input costs and also felt that currently the seed yields are lower and there is a need to increase the yields to enhance the profitability. The farmers also felt strong need to have insurance for the seed production like other crops [11].

Table-3 *Ranks of factors for Weaknesses in Hybrid Rice Seed Production*

Sl.No	Factor	Mean Rank	Rank
1.	Dependence of farmers on companies for inputs and technical advices	7.18	8
2.	Delayed payments	6.63	7
3.	Reject low quality products/mixtures/less purity seeds without compensation	4.52	4
4.	High degree of institutional dependency	5.18	6
5.	Companies offer relatively lower price to seed producers and sell at higher price in other hybrid rice growing areas	1.92	1
6.	No legal safeguard in place in case of dishonouring the contracts by either parties	2.37	2
7.	Too many additional operations requiring skills/technical expertise	3.18	3
8.	Misunderstanding between the growers and the representatives of the companies on adoption of production practices	4.95	5
	Test statistics		
	(N) Sample size	300	
	Kendall's W	0.6100	
	Chi-square	512.412	
	Degrees of freedom	7	
	Asymptotic significance	<0.000001	

Availability of quality seed and cooperative farming, which leads to improvement in standard of living, were perceived as the opportunities in hybrid rice seed production [Table-4]. One of the most important pre-requisites for producing genetically pure hybrid rice seed is maintenance of isolation distance between two combinations. An isolation distance of 100 m should be maintained in between two combinations for hybrid rice seed production.

Table-4 *Ranks of factors for Opportunities in Hybrid Rice Seed Production*

Sl.No	Factor	Mean Rank	Rank
1	Cooperative farming	2.47	2
2	Ensured supply of inputs to farmers and Output to companies	5.32	6
3	Uniform seed quality ensured	1.85	1
4	Additional employment days	7.13	8
5	Helps in improving standard of living	3.14	3
6	Removal of market imperfections	6.44	7
7	Increased area under hybrid rice cultivation	4.23	4
8	Contribution to food security	5.11	5
	Test statistics		
	(N) Sample size	300	
	Kendall's W	0.6124	
	Chi-square	514.420	
	Degrees of freedom	7	
	Asymptotic significance	<0.000001	

It is observed that the isolation distance is maintained by sample seed producers themselves through cooperative farming and through mutual cooperation and understanding, seed production of the same hybrid combination is taken up in large area. Cooperative farming facilitates easy supervision by company agents, timely farm operations and effective use of resources and thereby helps to increase seed yields as well as profitability of the hybrid rice seed production technology [12].

Table-5 *Ranks of factors for Threats to Hybrid Rice Seed Production*

Sl.No	Factor	Mean Rank	Rank
1	Lobbying by the group representative/Organizer	3.45	3
2	Breach of contract either y grower or by Company	5.93	6
3	Mismanagement of inputs	6.53	7
4	Chances of creation on monopsony market	4.30	4
5	Cut throat competition among the companies due to more number of companies	4.70	5
6	Overdependence on Companies	1.61	1
7	HRSP competing with other remunerative crops	6.97	8
8	May lead to monocropping	2.53	2
	Test statistics		
	(N) Sample size	300	
	Kendall's W	0.6105	
	Chi-square	512.877	
	Degrees of freedom	7	
	Asymptotic significance	<0.000001	

The coefficient of concordance was 0.61 with 7 degrees of freedom, for the ranks of factors associated with opportunities in hybrid rice seed production. The value of chi-square was found to be 514.42. The obtained value of Chi square is greater than the Critical value (14.067) at 7 degrees of freedom and hence we reject the null hypothesis that there is no agreement among the sample seed producers about the ranking of factors associated with opportunities in hybrid rice seed

production.

The threats to hybrid rice seed production were perceived as dependence of seed producers for inputs and technical advices on the companies and monocropping with mean ranks of 1.61 and 2.53 respectively. The coefficient of concordance was 0.61 with 7 degrees of freedom, for the ranks of factors associated with threats in hybrid rice seed production [Table-5]. The value of chi-square was found to be 512.877. The obtained value of Chi square is greater than the Critical value (14.067) at 7 degrees of freedom and hence it is implied that that there is agreement among the sample seed producers about the ranking of factors associated with threats in hybrid rice seed production.

Conclusion

From results of the present study, it is suggested that there is a need to evolve legal safeguard mechanisms to avoid breach of contract between producers and seed companies. Since hybrid rice can contribute significantly to food security of the country there is an opportunity to increase hybrid rice seed yields and strengthen hybrid rice seed production sector in India. The sample seed producers have perceived that the companies offer relatively lower price to them and sell at higher price in other hybrid rice growing areas and hence there is a need to increase the price offered by the seed companies to the seed producers to make seed production more remunerative to seed producers. Also, there is a wide perception that adoption of hybrid rice seed production continually may lead to monocropping in the area; hence there is a need to adopt crop diversification and identify other potential areas for seed production in the country.

Conflict of Interest: None declared

References

[1] Ramesh C. (2012) *Vision Discussion, Presentation made in the Knowledge Meet: Meeting of AU Vice Chancellors and ICAR Directors, 21-22 August, NASC, Pusa, New Delhi*.

[2] Wanjari R.H., Mandal K.G., Ghosh P.K., Tapan Adhikari and Rao N.H. (2006) *Journal of Sustainable Agriculture,* 28:1, 19-39.

[3] Nirmala B., Meera S.N., Vasudev N. and Viraktamath B.C. (2014) *An economic analysis of hybrid rice technology in India Xie F, Hardy B, editors (2014a) Public-private partnership for hybrid rice. Proceedings of the 6th International Hybrid Rice Symposium, 10-12 September 2012, Hyderabad, India. Los Baños (Philippines): International Rice Research Institute.* 328 p. p. 315-321 .ISBN 978-971-22-0303-9.

[4] Spielman D.J., Kolady D.A., Cavalieri and Rao N.C. (2011) *The Seed and Agricultural Biotechnology Industries in India: An Analysis of Industry Structure, Competition, and Policy Options. IFPRI Discussion Paper 1103, Washington, DC: International Food Policy Research Institute.*

[5] Viraktamath, B.C. and Nirmala B. (2008) *Economics of Hybrid Rice Seed Production in India. Accessed January 2014. http://hrdc.irri.org*

[6] Johnson G., Scholes K. and Sexty R.W. (1989) *Exploring strategic management. Scarborough, Ontario: Prentice Hall.*

[7] Kendall M.G., Babington S.B. (1939) *Annals of Mathematical Statistics,* 10(3), 275--287.

[8] David J.C. (2003) *Hand book of parametric and non-parametric statistics procedures, CRC publications, 3rd edition*, 1193 – 1197.

[9] Siegel S. and Castellan N.J. (1988) *Nonparametric Statistics for the Behavioural Sciences (2nd ed.). Mc Graw-Hill, New York,* 266. ISBN 0-07-057357-3,.262-272

[10] Janaiah A. and Xie F. (2010) *Hybrid rice adoption in India: farm-level impacts and challenges, IRRI Technical Bulletin No. 14, Los Baños (Philippines): International Rice Research Institute*, 20.

[11] Nirmala B. (2014b) *Progressive Research: An International Journal,* Vol 9 Conf. (Part I), p.188-190.

[12] Nirmala B., Muthuraman P., Shaik N., Meera, Mangal Sain and Viraktamath B.C. (2009) *'Economics of hybrid rice seed production in India' Edited by Xie F, Hardy B. Accelerating Hybrid Rice Development. Los Banos (Philippines): IRRI. 698, 495-504.*