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Support of the scientists in risk management: Farmer's perception

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Abstract

In Indian economy farmers face many risks and challenges in cultivating the crops to attain a valuable output. The factors that influence a farmer are economical, social, demographic and more significantly the natural elements of the region. Indian farmers till day can be categorized with certain features such as illiteracy, economic backwardness, deprived of enjoying the right to information, unawareness, etc. Farmer is still a dependent on money lenders to support his occupation financially, on government for availing subsidies, and on researchers and agriculture scientists to get technical support. Here, it is imperative to define the risks and related factors pertaining to farmers who involved in agriculture. Poor returns to cultivation and absence of non-farm opportunities are indicative of the larger socio-economic depression in rural India. This is accentuated by the multiple risk factors that the farmer faces – yield, price, input, technology and credit among others.

The present study explores the support extended by the agricultural scientists in adopting risk management techniques by the farmers to enhance agricultural output. The attitude, practices, and challenges experienced by the farmers in the Southern Zone of Andhra Pradesh are studied under this analysis.

Keywords: Risk Management, Scientist's support, Farmer's Perception

1. Introduction

In Indian economy farmers face many risks and challenges in cultivating the crops to attain a valuable output. The factors that influence a farmer are economical, social, demographic and more significantly the natural elements of the region. Indian farmers still are categorized with certain features such as illiteracy, economic backwardness, deprived of enjoying the right to information, unawareness, lack of technical knowledge, etc. Farmer is still a dependent on unlawful money lenders, on government for availing subsidies, and on researchers and agricultural scientists to get technical support. Here, it is imperative to define the risks and related factors pertaining to farmers who practices agriculture. Poor returns to cultivation and absence of non-farm opportunities are indicative of the larger socio-economic depression in rural India. This is accentuated by the multiple risks that the farmer faces – yield, price, input, technology and credit among others.

The present study explores the support extended by the agricultural scientists in adopting risk management techniques by the farmers in order to enhance agricultural output. The attitude, practices, and challenges experienced by the farmers of Southern region of Andhra Pradesh are studied under this analysis.

1.1. Issues of Farmers in farming processes

There are a number of factors affecting negatively the agricultural farming in India since decades. The factors can be classified under social and economic aspects. The basic factors such as;

- Lack of education
- Larger dependency on agriculture for livelihood
- Joint family systems,
- Climatic imbalances and threats,
- Lack of financial support from government,
- Insignificant initiatives from government.
- Lack of technological support
- Lack of awareness on the new developments and trends.

1.2. Role of Scientists

The role of agricultural scientists is of major importance when it comes to develop and improve the farm production especially, in India. Indian farmers are more unaware and innocent in matters of usage of technology, market intelligence, etc.

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The Agricultural scientists may extend the following support in this regard;

1. Create an integrated channel to educate the farmers in improving the crop production.
2. The knowledge and experience of scientists certainly help the farmers in the farming process.
3. The supportive systems should be established at various levels by the scientists to impact the agricultural sector in India.
4. Generate accessible, adequate and accurate information to the farmers of all types from large land holders to small land holders.
5. Continuous support and extend risk management techniques throughout the process of the farming.

1.3. Objectives of the study

1. To study the traditional risk management techniques implemented by farmers in general.
2. To identify the significant risk oriented areas for farmers where the support from scientists is required.
3. To assess the impact of demographic factors on farmers opinion regarding the role of scientists in farming issues.
4. To find out the significant supporting role of scientists in contemporary risk management techniques adopted by the farmers in terms of planning, implementation, control of agriculture farming.
5. To analyse the attitude, practices, and challenges faced by agriculture scientists in mitigating farmers risks in agriculture.

2. Review of Literature

B.P Ghidyal (1985) ^[3] states that rural poverty is much less a problem of total food availability than of who produces the food and who has the income to buy it. Therefore, a high priority should be placed to increase the resource - poor farmers' production.

David Tilman *et al.*, (2002) ^[6] identifies that agriculturalists are the principal managers of global usable lands and will shape, perhaps irreversibly, the surface of the earth in the coming decades. The farmers are going to play a greater role in global scenario.

Robert Chambers, Janice Jiggins, (1987) ^[13] states in their survey that the greatest challenge now farming agricultural science is not how to increase production overall but how to enable poor farmers produce more. They further quoted that the transfer - of - technology (TOT) model of agricultural research is part of the normal professionalism of agricultural scientists.

David W. Cash, *et al.* (2003) ^[7] mentions in an article that the challenge of meeting human development needs while protecting the earth's life support systems confronts scientists, technologists, policy makers, and communities from local and global levels.

A.M. Sewell, *et al.* (2014) opined that farmers are slow to adopt new and evidence based pastoral farming practices. While there is a long history of research on extension and technology transfer to farmers, a fresh and innovative approach is needed to ensure that farmers learn about, adopt highly effective technologies. Results of the study showed that farmers' learning was promoted when they participated in a learning community with agricultural scientists.

Jasper Eshuis, Marian Stuver (2005) ^[8], identifies differences between heterogeneous forms of farmers' knowledge and scientific knowledge was discursively constructed during

conflict and subsequent alignment over the validity and relevance of knowledge.

P. Krishna Reddy and R. Ankaiah (2005) ^[11] proposed a framework for a cost effective information dissemination system (AgrIDs), to disseminate expert agricultural knowledge to the farming community in order to improve crop productivity. AgrIDs is scalable system which can be immediately developed and extended to cover all the farmers (crops) of India in a cost-effective manner.

3. Methodology

This section deals with the methodology adopted for the study. It includes, research approach, design for the study, sample and sampling technique, tools to assess attitude and level of satisfaction of the farmers with regard to scientists support, data collection procedure and data analysis.

3.1. Research approach

Survey method is adopted to determine the level of satisfaction and attitude of farmers on the support extended by the agricultural scientists as a part of risk management strategies.

3.2. Study area and Population

The area of study is the southern region of Andhra Pradesh which includes the districts of Chittoor, YSR Kadapa and SPS Nellore. The agricultural farmers holding large and small land areas are considered under the study from all the districts in equal manner.

3.3. Sampling frame

This is a cross sectional study which involves various farmers of 3 major districts of Southern zone of Andhra Pradesh.

3.4. Study tool

A structured tool is drafted for farmers to assess their level of attitude and degree of satisfaction towards the suggestions rendered by the scientists at various stages of crop cultivation.

3.5. Sampling Technique and Sample Size

A Stratified Random Sampling technique has been used to collect data from the farmers of southern zone of Andhra Pradesh. The number of farmers from each district comprises 40 each. There by a total of 120 farmers are considered for the study.

3.6. Statistical Analysis

Collected data is analyzed using appropriate statistical tools like frequency tables (one-way tables), Cross tabulations (two-way tables), Percentages, Chi-square tests, and diagrammatic representations using SPSS version 20 (trial version). Obtained results are properly concluded at respected levels of significance.

4. Results and Discussion

The present study discloses interesting features regarding the farmers approach and opinion towards scientists support as a part of risk management strategies in crop cultivation. The study stands so unique because the studies so far undertaken are from the scientists and government's perspectives. In the present study, the farmers perspective is more weighed to assess the worth and sanctity of agricultural scientists in extending their timely and accurate duties to the farmers. The table-.1 represents the aspects related to farmers' socio demographic factors which play a crucial role in assessing

their attitude and their level of satisfaction on the scientists support in farming. The study is undertaken to analyse the scientist's role to support farmers in crop cultivation which is very risk oriented.

Table 1: Demographic Factors of the Farmers

Age (Years)	N (%)	Annual income (Rs)	N (%)
30 - 40	29 (24.2)	< 50000	54 (45)
40 - 50	28 (23.3)	50000 - 100000	29 (24.2)
> 50	63 (52.5)	100001 - 500000	37 (30.8)

Family size (Number)		Education	
Up to 4	85 (70.8)	Illiterate	4 (3.3)
4 - 8	25 (20.8)	Up to 5th class	35 (29.2)
More than 8	10 (8.3)	6th to 10 th	44 (36.7)
Total	120 (100)	Inter and above	37 (30.8)
		Total	120 (100)

Farmers are from age group of 30 years and above (Table 1). Nearly 53 per cent farmers belong to the age group of above 50 years. The age can be regarded as one of the significant factors in farming processes and their vast experience. The farmers' family size also indefinitely represents the present scenario of Indian family concerns for nuclear set-up. Majority of the farmers (71 per cent) have nuclear family set-ups consisting of 4 members. 45 percent of the farmers have annual income less than Rs.50000/-. 31 per cent of the farmers earning annual income from farming processes was found to be 1 - 5 lakh. This could be because of the portion of land holdings, or low yield from high portion of land holdings too. It's interesting to know that 31 per cent of the farmers have a minimum education qualification of Intermediate and above. The level of education is a vital parameter to make them updated and knowledgeable in the area of their farming operations. Only about 3 per cent are illiterates as per the present analysis.

Table 2: Farming Relevant Information of the Farmers

Farming experience(years)	N (%)	Type of crops	N (%)
< 10	30 (25)	Food crops	70 (58.3)
10 - 20	36 (30)	Commercial crops	10 (8.3)
20 -40	54 (45)	Oil seed crops	7 (5.8)
Land size (Acres)		Food and commercial crops	13 (10.8)
< 5	43 (35.8)	Food and oil seed crops	13 (10.8)
5 - 10	63 (52.5)	Commercial and oil seed crops	5 (4.2)
> 10	14 (11.7)	Food, commercial and oil seed crops	2 (1.7)
		No. of crops grown	
		Single crop	42 (35)
		Two crops	78 (65)
		Total	120 (100)

The table-2 exhibits the key characteristics of the farmers' crop related matters. Majority of the farmers (45 per cent) have vast i.e. about 20-40 years of experience in crop cultivation. 30 per cent farmers have 10-20 years of farming experience. The land cultivated by most of the farmers (53 per cent) range from 5-10 acres. 36 per cent of them having farm less than 5 acres of land. It's very interesting to find from the analysis that 65 per cent of the farmers' grow two crops annually and 35 per cent grow single crop. Regarding the types of crops grown in Southern region, 58 per cent of the

farmers' focus more on producing food crops. Only 11 per cent each grow food and commercial crops and commercial and oil seed crops. 8 per cent produce commercial crops. Farmers who are growing oilseed crops alone was found to be 5%. Farmers who cultivate food, commercial and oilseed crops are 2% only.

Table 3: Types of Problems encountered by the Farmers during Cultivation.

Type of problems during cultivation	N (%)
Climate conditions	71 (59.2)
Lack of water	21 (17.5)
Lack of information	2 (1.7)
Lack of manpower	11 (9.2)
Lack of technology	1 (0.8)
Lack of finance and water	6 (5)
Lack of finance and manpower	5 (4.2)
Lack of water and lack of information	3 (2.5)
Total	120 (100)

Agricultural farming is more dependent on the nature and climatic conditions; the same is evidently expressed through the above analysis in table-3 that 59 per cent of the farmers have said the same. 18 per cent have complained about lack of water as their problem in farming processes. Need to point out here that only 2 per cent of the farmers felt lack of information as significant problem in crop cultivation. Lack of water and information is expressed by 3 per cent of the farmers. This can be viewed in fig-1.

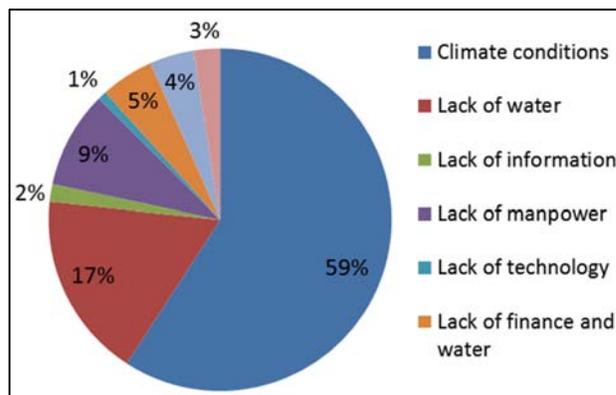


Fig 1: Type of problems during cultivation

Table 4: Types of Problems encountered after Produce is ready

Post-harvest problems	N (%)
Lack of market	27 (22.5)
Middlemen interference	10 (8.3)
Lack of price	35 (29.2)
Any other problems	2 (1.7)
Lack of market and price	4 (3.3)
Middlemen interference and price	4 (3.3)
Lack of market, middle men problem and lack of price	38 (31.7)
Total	120 (100)

The above data regarding the problems of farmers after the produce is ready discloses that lack of market, middle men problems and lack of price are of major problems (Table 4). 29 per cent have felt that lack of remunerative market price is a stern problem to sell their produce. 23 per cent exclusively mentioned that lack of market is a serious problem to them to sell their yield. It clearly indicates the extent of problems faced by the farmers. Except these problems, the other

problems are quoted to be 2 per cent. Fig-2 expresses the truth.

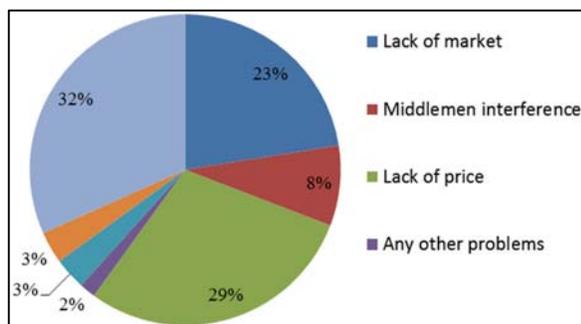


Fig 2: Post harvest problems

Table 5: Most Yielding and most Profitable Crops

More yielding crop	N (%)	More profitable crop	N (%)
Not expressed	68 (56.7)	Not expressed	68 (56.7)
Rice	39 (32.5)	Rice	41 (34.2)
Groundnut	5 (4.2)	Groundnut	5 (4.2)
Rice, Blackgram	3 (2.5)	Blackgram	2 (1.7)
Groundnut, Rice	2 (1.7)	Rice and Blackgram	2 (1.6)
Rice, Cotton	2 (1.7)	Rice, Cotton	2 (1.7)
Rice, Mango	1 (0.8)	Total	120 (100)
Total	120 (100)		

The table-5, displays the most yielding crop in the southern region. Rice is identified as the most yielding crop (32.5 per cent). Next to rice, Groundnut (4.2 per cent) stands second in the productivity. Further it is clear that most profitable crop of the region is Rice (34.2 per cent). Groundnut occupies at 4.2 per cent next to rice its position.

Table 6: Frequency of Support taken from the Scientists

Frequency of support taken	N (%)
Rarely	16 (13.3)
Sometimes	34 (28.3)
Frequently	42 (35.0)
Regularly	28 (23.3)
Total	120 (100)

The table- 6 depicts the data relevant to the frequency of support taken by the farmers from researchers or scientists for various issues of their crop cultivation. 35 per cent of the farmers frequently rely on the expertise of the scientists to find solutions for farm related problems and challenges. 28 per cent of the farmers approach for scientists support sometimes. About 13 per cent rarely rely on scientists for supportive advice. This analysis evidently designates that farmers at large have the knowledge and awareness that they could rely on agricultural scientists for taking support.

Table 7: Feasibility of the Scientists Suggestions on Crop Cultivation

Feasibility of the suggestions given by the Scientists	N (%)
Sometimes feasible	40 (33.3)
Total	120 (100)

There is a fascinating finding from the above table-7 which draws the conclusions regarding the feasibility of suggestions rendered by the scientists to the farmers. The analysis demonstrates that 67 per cent of the farmers find the suggestions forwarded by the scientists are feasible. 33 per

cent discover the suggestions extended by the scientists are sometimes feasible. Overall it can be understood that scientists' suggestions are considered by the farmers as feasible.

Table 8: Helpfulness of the Scientists Suggestions on Crop Cultivation

Feeling that the suggestions are helpful	N (%)
Highly helpful	57 (47.5)
Moderately helpful	56 (46.7)
Not at all helpful	7 (5.8)
Total	120 (100)

An analysis is made to find out the helpfulness of the scientists suggestions to the farmers. 4 per cent of the farmers find the suggestion highly helpful and 47 per cent of the farmers regard the suggestions moderately helpful to them in their farming processes. Only about 7 per cent disclosed that those are not at all helpful for them. The suggestions shown by the scientists should be helpful to the farmers in his farming business.

Table 9: Type of Problems Addressed by the Scientists

Type of problems addressed by the Scientists	N (%)
Crop cultivation	30 (25)
Usage of fertilizers	22 (18.3)
Improving the produce	29 (24.2)
Disease management	4 (3.3)
Crop cultivation and usage of fertilizers	29 (24.2)
Usage of fertilizers and improving the produce	6 (5)
Total	120 (100)

The analysis in the above table- 9 identifies that most of the time the scientists address crop cultivation (25 per cent), improving the produce (24 per cent), crop cultivation and usage of fertilizers (24 per cent) issues better according to the farmers. Other issues such as usage of fertilizers and improving of produce (5 per cent), disease management (3 per cent) are addressed in very rare situations which is expressed by fig-3.

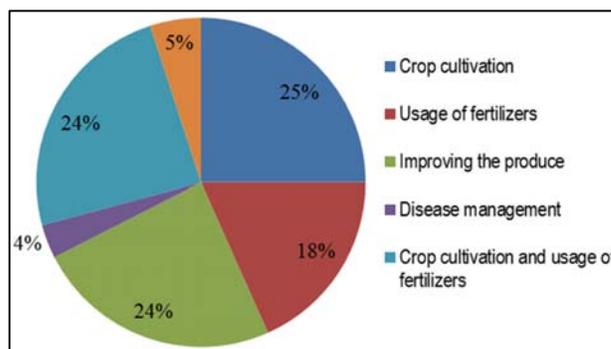


Fig 3: Type of problems addressed by the Scientists

Table 10: Aspects of Dissatisfaction on the Scientists Support.

Aspects of Dissatisfaction on the Scientists Support	N (%)
Nil	38 (31.7)
Lack of understanding	21 (17.5)
Lack of accessibility of scientists in time	45 (37.5)
Lack of experience	13 (10.8)
Non availability of suggested chemicals	3 (2.5)
Total	120 (100)

The aspects of dissatisfaction from farmers are presented in the above table-10. Farmers felt that lack of accessibility of scientists in time which accounts to 38% is one of the major problems they encounter in getting the support from the scientists. Lack of understanding is also felt by 18 per cent by

the farmers. 3 per cent of the farmers tend to feel that non-availability of suggested chemicals is the major problem in the process of getting support from scientists. 11 per cent have opined that lack of experience on the part of scientists is the major problem.

Table 11: General Approach of Scientists towards Farmers' Complaints.

General approach of Scientist towards Farmers' complaints	N (%)
Show keen interest to attend	46 (38.3)
Very positive, timely assistance	72 (60)
Very much disinterested	2 (1.7)
Total	120 (100)

Scientists approach towards the complaints brought by the farmers is very essential to impact the crop cultivation (Table-11). 60 per cent find the scientists being very positive, and extends timely assistance to them. 38 per cent find that

scientists show a keen interest to attend the problems and complaints raised by the farmers. Only 2 per cent feel that scientists show disinterest in this regard.

Table 12: Farmers' Opinion on the Knowledge of the Scientists

Farmer's opinion on the Knowledge of the Scientists	N (%)
Excellent	41 (34.2)
Good	71 (59.2)
Average	8 (6.7)
Total	120 (100)

Knowledge is most significant element to extend support for the farmers regarding farming. The same is identified from the farmers' perspective (Table-12). 59 per cent farmers'

opined that knowledge of the scientists is good, 34 per cent feel it is excellent and 7 per cent feel that it is average.

Table 13: Level of Farmers' Satisfaction on Scientists Suggestions.

Level of satisfaction	On all type of problems	On Date of sowing /time of crop
Highly satisfied	45 (37.5)	15 (12.5)
Satisfied	69 (57.5)	85 (70.8)
Neither satisfied nor dissatisfied	4 (3.3)	18 (15)
Dissatisfied	2 (1.7)	2 (1.7)
Total	120 (100)	120 (100)

The above table-13 specifies level of satisfaction of the farmers on scientists suggestions to be satisfied (58 per cent), highly satisfied (38 per cent). With regard to the farmers'

opinion on the scientists' suggestions on date of sowing/time of crop 71 per cent of farmers are satisfied. 13 per cent farmers are highly satisfied.

Table 14: Farmer's opinion on the Scientists Suggestions at Various phases and aspects of Crop Cultivation

	Whether Scientists giving same priority to all the farmers	Whether Scientists are giving suggestions during cyclones	Whether the Scientists cater all issues encountered by the farmers
Yes	94 (78.3)	82 (68.3)	92 (76.7)
No	3 (2.5)	9 (7.5)	3 (2.5)
Depending on situation	23 (19.2)	29 (24.2)	25 (20.8)
Total	120 (100)	120 (100)	120 (100)

The above interpretation discussed in table-14 is about the scientists' attitude towards the farmers in terms of equal priority, suggestions during natural calamities, issues encountered by the farmers. Farmers have expressed

positively towards the above enlisted aspects with regard to the support by the scientists at 78 per cent, 68 per cent, and 77 per cent respectively.

Table 15: Level of Farmers' Satisfaction on the Scientists Prediction on Market Intelligence of Agriculture

Farmer's opinion on the Scientist's prediction on market intelligence on agriculture	N (%)
Accurate	11 (9.2)
Sometimes coincides	75 (62.5)
Not at all accurate	6 (5)
Not provided	28 (23.3)
Total	120 (100)

The farmers are required to be supported by the scientists pertaining to the market intelligence on agriculture. To cater

such needs the predictions of the scientists do help the farmers in right time and in accurate manner. Table-15 shows that 63

per cent have opined that they sometimes find a coincidence of scientists' predictions on market intelligence with reference to agriculture. 23 per cent disclosed that they are not provided

anything relevant to the market intelligence. Only 9 % predictions are found accurate.

Table 16: Reaction of the Scientists when the recommendations failed in the field level

Reaction of the Scientists when the recommendations failed in the field level	N (%)
Certainly accept	104 (86.7)
Blame farmer	16 (13.3)
Total	120 (100)

The true attitude of the scientists is assessed when anything or a careful prediction go wrong. The above data in table- 16 reveals that 87 per cent of scientists genuinely accept responsibility for the failure. 13 per cent blame on farmers for

the failure. This certainly represents the concern of the scientists for farmers and the professional responsibility what they exhibit in time of uncertainty and risk.

Table 17: Opinion on suggestions received during waterlogging situation in ID crops

Opinion on the suggestions received during water logging situation in ID crops	N (%)
Satisfactory	71 (59.2)
Not useful	3 (2.5)
Useful	42 (35)
Never useful	4 (3.3)
Total	120 (100)

Waterlogging which is saturation of soil with water is critical problem for ID crops. The suggestions on the degree of water logging for crop growth are necessary for farmers. Hence, an assessment is made in this context. The analysis shows (Table

17) that 59 per cent of the farmers are satisfied with the scientists suggestions, 35 per cent of farmers regarded the suggestions useful whereas 3 per cent considered it to be not useful and 3 per cent felt it is never useful.

Table 18: Frequency of taking technical support for solving crop related problems

Frequency of taking technical support for solving crop related problems	N (%)
Quite often	26 (21.7)
Regularly	75 (62.5)
Never	2 (1.7)
Very rarely	17 (14.2)
Total	120 (100)

The frequency of taking technical support for solving crop related problems by the farmers shows the reliance and dependency of farmers on scientists. The assessment in this regard (Table-18) points out that 63 per cent of the farmers

are regular with the frequency of taking support, 22 per cent take frequent support from scientists quite often, whereas 14 per cent take very rarely the support of research scientists.

Table 19: Impact of Farming Experience on the of Support taken from the Scientists

Chi-square value	p-value	Frequency of support taken from Scientists				Total
		Rarely	Sometimes	Frequently	Regularly	
42.05**	0.000					
Farming experience	< 10 years	7	19	2	2	30
		23.3%	63.3%	6.7%	6.7%	100.0%
	10 - 20 years	7	6	11	12	36
		19.4%	16.7%	30.6%	33.3%	100.0%
	20 -40 years	2	9	29	14	54
		3.7%	16.7%	53.7%	25.9%	100.0%
Total		16	34	42	28	120
		13.3%	28.3%	35.0%	23.3%	100.0%

*significant at 1% level

The table-19 exhibits the association between the farming experience of the farmers and the frequency of support they take from scientists. The analysis shows a positive association between both at 1% level of significance. The more the experience, the more the support yielded by the farmers from scientists. The farmers with 20-40 years frequently (54 per cent) take support from the scientists.26 per cent of the

farmers with high (20-40 years) experience have regular support from scientists. The farmers with less than 10 years of experience relied regular (7 per cent) for the support of scientists. The association between farming experience and frequency of support has been proved positively significant with the application of chi-square test.

Table 20: Influence of Farming Experience on Helpfulness of Scientists suggestions.

Chi-square value	p-value	Feeling that the suggestions are helpful			Total
		Highly helpful	Moderately helpful	Not at all helpful	
18.540**	0.001				
Farming experience	< 10 years	8	17	5	30
		26.7%	56.7%	16.7%	100.0%
	10 - 20 years	14	21	1	36
		38.9%	58.3%	2.8%	100.0%
	20 -40 years	35	18	1	54
		64.8%	33.3%	1.9%	100.0%
Total		57	56	7	120
		47.5%	46.7%	5.8%	100.0%

The most experienced farmers feel that the suggestions rendered by the scientists are helpful. This could be because of the long run association between the farmers, farming and agricultural scientists. The same is evaluated by the support of chi-square test and it has proved that there is a positive and significant impact of experience of farmers on their opinion

towards the support of scientists at 1% level. The above table-20 relates both the variables and gives a meaningful interpretation. Majority of the farmers opined scientists support to be highly helpful (65 per cent) and moderately helpful (33 per cent).

Table 21: Association of Farming Experience and Usefulness of Risk Management Suggestions by Scientists

Chi-square value	p-value	Usefulness of the Risk management suggestions given by Scientists			Total
		Highly useful	Useful	Somewhat useful	
20.43**	0.000				
Farming experience	< 10 years	4	15	11	30
		13.3%	50.0%	36.7%	100.0%
	10 - 20 years	3	8	25	36
		8.3%	22.2%	69.4%	100.0%
	20 -40 years	15	26	13	54
		27.8%	48.1%	24.1%	100.0%
Total		22	49	49	120
		18.3%	40.8%	40.8%	100.0%

There are a number of risks pertaining to the agricultural farming in India. The low level of knowledge and awareness leave the Indian farmers at high risk. Hence, an attempt is made to assess the relationship between the farming experience of the farmers and the usefulness of risk management suggestions given by the scientists (Table 21). This shows a positive correlation at 1 % level of significance

with the application of chi-square test. The farmers with less experience (<10 years) in farming about 37 per cent opine that the support extended in risk management are somewhat useful rather than very useful which are about 13 per cent only. Majority of farmers with vast experience 28 per cent and 48 per cent stated that the suggestions of scientists are highly useful and useful.

Table 22: Relationship between Farming Experience Usefulness of the Scientist Suggestions during Drought

Chi-square value	p-value	Usefulness of the Scientists Suggestions during Drought Season				Total
		Highly useful	Useful	Somewhat useful	Not at all useful	
19.79**	0.003					
Farming experience	< 10 years	2	15	11	2	30
		6.7%	50.0%	36.7%	6.7%	100.0%
	10 - 20 years	3	17	14	2	36
		8.3%	47.2%	38.9%	5.6%	100.0%
	20 -40 years	15	33	6	0	54
		27.8%	61.1%	11.1%	0.0%	100.0%
Total		20	65	31	4	120
		16.7%	54.2%	25.8%	3.3%	100.0%

Droughts are the risks encountered by the farmers inevitably in the tropical region like India and especially the southern region of Andhra Pradesh. The rationale suggestions extended by the scientists on right selection and farming of the crops, precautionary measures to increase the yield and eliminate the serious problems of insects and other plant affecting infections will be of great help to the farmers. Hence, an

assessment is made in table-22 to test whether there is an association between the farming experience and usefulness of the suggestions given by Scientists during drought. It is evidently estimated and proved with the help of chi-square test that there is a significantly positive impact of farming experience on the usefulness of the suggestions given by scientists during drought situation or phase.

Table 23: Association between the Land Size and Frequency of Scientists Support

Chi-square value	p-value	Frequency of support taken				Total
		Rarely	Sometimes	Frequently	Regularly	
5.281	0.508					
Land size	< 5 acres	6	16	10	11	43
		14.0%	37.2%	23.3%	25.6%	100.0%
	5 - 10 acres	9	14	26	14	63
		14.3%	22.2%	41.3%	22.2%	100.0%
	> 10 acres	1	4	6	3	14
		7.1%	28.6%	42.9%	21.4%	100.0%
Total		16	34	42	28	120
		13.3%	28.3%	35.0%	23.3%	100.0%

The extent of land size does influence the degree of responsibility and higher risk in the process of farming. Hence, an attempt is made to analyse whether there is a correlation between the land size and the frequency of scientists support taken by the farmers. With the application of chi-square test (Table-23). It is evidently put forward that size of the land has no significant impact on frequency of

support take by the farmers from the scientists. The farmers holding more acres > 10 acres, between 5- 10 acres and <5 acres 21 per cent, 22 per cent and 26 per cent respectively have been regularly taking the support of the scientists in crop cultivation issues. Thus, it can be concluded that there is no correlation between the both variables.

Table 24: Relationship between the Land Size and Helpfulness of Scientists suggestions

Chi-square value	p-value	Feeling that the suggestions are helpful			Total
		Highly helpful	Moderately helpful	Not at all helpful	
10.41*	0.034				
Land size	< 5 acres	13	25	5	43
		30.2%	58.1%	11.6%	100.0%
	5 - 10 acres	35	26	2	63
		55.6%	41.3%	3.2%	100.0%
	> 10 acres	9	5	0	14
		64.3%	35.7%	0.0%	100.0%
Total		57	56	7	120
		47.5%	46.7%	5.8%	100.0%

Analysed to find out the relationship between the land size and the helpfulness of the suggestions by the scientists (Table 24). The land size has an influence on the suggestions taken by the farmers from the scientists. Farmers holding greater than 10 acres 64 per cent opined that the suggestions of

scientists are very highly helpful and farmers holding 5 – 10 acres of land size, 57 per cent regard that the suggestions are highly helpful in farming process. Hence, the same is proved with the application of chi-square test where it designates that the level of significance at 5 %.

Table 25: Association between the Land Size and Level of Farmers Satisfaction on Scientists Support

Chi-square value	p-value	Level of Satisfaction of farmers on Scientist's suggestions				Total
		Highly satisfied	Satisfied	Neither satisfied nor dissatisfied	Dissatisfied	
25.04**	0.000					
Land size	< 5 acres	6	37	0	0	43
		14.0%	86.0%	0.0%	0.0%	100.0%

5 - 10 acres	32	25	4	2	63
	50.8%	39.7%	6.3%	3.2%	100.0%
> 10 acres	7	7	0	0	14
	50.0%	50.0%	0.0%	0.0%	100.0%
Total	45	69	4	2	120
	37.5%	57.5%	3.3%	1.7%	100.0%

Correlation between the land size and the level of satisfaction of farmers on scientists' suggestions revealed that the farmers holding large land areas,>10 acres show satisfaction at 100 per cent (Table 25). The farmers with less land holdings (5-10 acres) are highly satisfied at 51 per cent. Farmers with <5

acres are highly satisfied at 14 per cent. This data evidently signifies that there is a positive correlation between land size and level of farmers' satisfaction on scientists' suggestions at 1% level of significance. Fig-4 expresses the same.

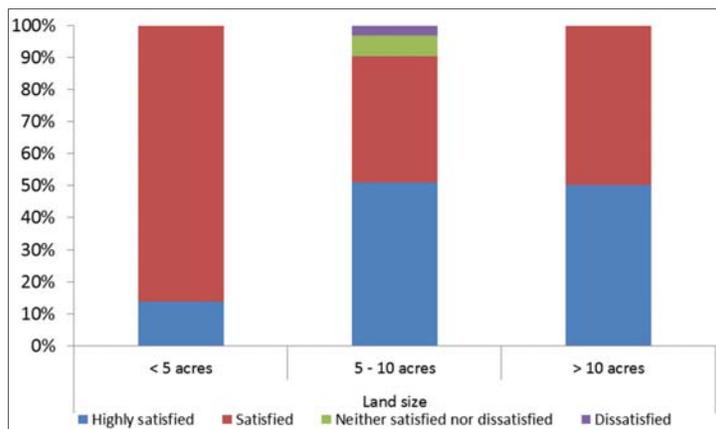


Fig 4: Association between the Land Size and Level of Farmers Satisfaction on Scientists Support

Table 26: Correlation between the Land Size and Frequency of Scientists Support

Chi-square value	p-value	Usefulness of the Risk management suggestions given by Scientists			Total
		Highly useful	Useful	Somewhat useful	
16.37**	< 5 acres	2	16	25	43
		4.7%	37.2%	58.1%	100.0%
	5 - 10 acres	16	24	23	63
		25.4%	38.1%	36.5%	100.0%
	> 10 acres	4	9	1	14
		28.6%	64.3%	7.1%	100.0%
Total		22	49	49	120
		18.3%	40.8%	40.8%	100.0%

The impact of size of the land held by farmers may also have an effect on the opinions of the farmers on the usefulness of the suggestions given by the scientists in the matters of risk management (Table-26). The same is gauged through the application of chi-square analysis. The above interpretation clearly manifests that there is a positive correlation between

land size and the suggestions by scientists in risk management. Farmers possessing larger land areas are told that the risk management suggestions given by Scientists are highly useful (29 per cent) than the farmers comprising small land sizes (5 per cent). Hence, it can be stated that both are associated positively.

Table 27: Correlation between the Land Size and Usage of the Scientists Suggestions During Drought

Chi-square value	p-value	Usefulness of the suggestions during drought given by Scientists				Total
		Highly useful	Useful	Somewhat useful	Not at all useful	
20.51**	< 5 acres	2	28	13	0	43
		4.7%	65.1%	30.2%	0.0%	100.0%
	5 - 10 acres	11	31	17	4	63
		17.5%	49.2%	27.0%	6.3%	100.0%
	> 10 acres	7	6	1	0	14
		50.0%	42.9%	7.1%	0.0%	100.0%
Total		20	65	31	4	120
		16.7%	54.2%	25.8%	3.3%	100.0%

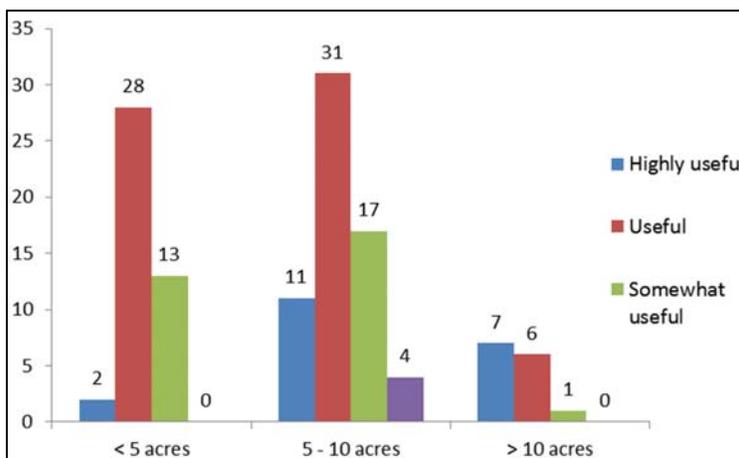


Fig 5: Correlation between the Land Size and Usage of the Scientists Suggestions During Drought Season

The land size has more influence of droughts too. The degree of risk in drought is expected to be more for the farmers who hold huge land areas. An attempt is made in this regard to calculate the relationship between the land size and the usefulness of suggestions by scientists in drought situations (Table-27). Farmers constituting more land in area have felt that the suggestions are highly useful at 50 per cent compared to farmers with low level of land portions at 5 per cent. The application of chi-square test also apparently shows the same.

5. Findings and Conclusion

The study on the level of farmers' satisfaction on the scientists support in the crop cultivation puts forward the following findings.

The analysis reveals that socio demographic aspects of the farmers considered for the study. Most of the farmers are from age group of 30 years and above. This showcases that the farmers of low age groups are more in crop cultivation sector. The trend of increasing nuclear family setups is also evidently observed wherein majority of the farmers (71 per cent) have nuclear families. The annual income is a key indicator for the farmers to show interest on agricultural farming and thereby to take support of the scientists. 45 per cent of the farmers have very low annual income from farming. 31 per cent of the farmers have a minimum education qualification of Intermediate and above. Only about 3 per cent are illiterates as per the present analysis in southern zone of Andhra Pradesh.

Regarding the crop related matters, majority of the farmers (45 per cent) have vast, about 20-40 years of experience in crop cultivation. 30 per cent have 10-20 years of farming experience. The land cultivated by most of the farmers (53 per cent) range from 5-10 acres. 36 per cent of them farm less than 5 acres of land. Though there is a possibility of growing two crops a year in Indian weather circumstances, 65 per cent of the farmers grow 2 crops annually and 35 per cent grow single crop. Regarding the types of crops grown in southern region, it is food crops more specifically, 58 per cent of the farmers focus more on producing food crops in the region.

Agricultural farming is more dependent on the nature and climatic conditions; the same is evidently expressed through the above analysis that 18 per cent have complained about lack of water as their problem in farming processes. 23 per cent exclusively mentioned that lack of market is a serious problem to them to sell their marketable produce. 29 per cent have felt that lack of price is a stern problem to sell their marketable produce.

Rice is identified as the most yielding crop (33 per cent). Next to rice, Ground nut (4 per cent) stands second in the productivity. With regard to the frequency of support taken by the farmers from scientists for various issues of their crop cultivation, 35 per cent of the farmers frequently lie on the expertise of the scientists to find solutions for farm related problems and challenges. 67 per cent of the farmers find the suggestions forwarded by the scientists are feasible. An analysis is made to find out the helpfulness of the scientists suggestions to the farmers. 4 per cent of the farmers find the suggestion highly helpful and 47 per cent of the farmers regard the suggestions moderately helpful to them in their farming processes.

Most of the time the scientists address crop cultivation (25 per cent), improving the produce (24 per cent), crop cultivation and usage of fertilizers (24 per cent) issues better according to the farmers. The aspects of dissatisfaction from farmers are presented in the above table- 10. 38 per cent of the farmers

felt that lack of accessibility of scientists in time is one of the major problems they encounter in taking the support of scientists.

Scientists approach towards the complaints brought by the farmers is very essential to impact the crop cultivation. 60 per cent find the scientists being very positive, and extends timely assistance to them. 38 per cent find that scientists show a keen interest to attend the problems and complaints raised by the farmers.

Knowledge is most significant element to extend support for the farmers regarding farming. The same is identified from the farmers' perspective. 59 per cent farmers' opinion on the knowledge of the scientists is good, 34 per cent feel it is excellent and 7 per cent feel that it is average.

The level of satisfaction of the farmers on scientists' suggestions to be satisfied (58 per cent) highly satisfied (38 per cent). With regard to the farmers' opinion on the scientists' suggestions on date of sowing/time of crop 71 per cent of farmers are satisfied. 63 per cent have opined that they sometimes find a coincidence of scientists' predictions on market intelligence with reference to agriculture.

The true attitude of the scientists is assessed when anything or a careful prediction go wrong. 87 per cent of scientists genuinely accept responsibility for the failure. This certainly represents the concern of the scientists for farmers and the professional responsibility what they exhibit in time of uncertainty and risk.

Waterlogging which is saturation of soil with water is critical problem for ID crops. The analysis shows that 59 per cent of the farmers are satisfied with the scientists' suggestions. The frequency of taking technical support for solving crop related problems by the farmers shows the reliance and dependency of farmers on scientists, 63 per cent of the farmers are regular with the frequency of taking support.

The more the experience, the more the support elicited by the farmers from scientists. The farmers with 20-40 years frequently (54 per cent) take support from the scientists. 26 per cent of the farmers with high (20-40 years) experience have regular frequency of support from scientists. The most experienced farmers feel that the suggestions rendered by the scientists are helpful. This could be because of the long run association between the farmers, farming and agricultural scientists. Majority of the farmers 65 per cent and 33 per cent opined scientists support to be highly helpful and moderately helpful respectively.

The farmers with less experience (<10 years) in farming about 37 per cent opine that the support extended in risk management are somewhat useful rather than very useful which are about 13 per cent only. Majority of farmers with vast experience 28 per cent and 48 per cent stated that the suggestions of scientists are highly useful and useful which shows significantly positive impact of farming experience on the usefulness of the suggestions given by scientists during drought situation or phase.

The farmers holding more acres > 10 acres, between 5- 10 acres and <5 acres 21 per cent, 22 per cent and 26 per cent respectively have been regularly taking the support of the scientists in crop cultivation issues. Farmers holding greater than 10 acres 64 per cent opined that the suggestions of scientists are highly helpful and farmers holding 5 – 10 acres of land size, 41 per cent regard that the suggestions are highly helpful in farming process. The farmers holding large land areas, >10 acres show satisfaction at 100 per cent. The farmers with less land holdings (5-10 acres) are highly satisfied at 51 per cent. Farmers with <5 acres are highly

satisfied at 14 per cent. The size of the land held by farmers may also have an effect on the opinions of the farmers on the usefulness of the suggestions given by the scientists in the matters of risk management. Farmers possessing larger land areas are rather highly satisfied (94 per cent) than the farmers comprising small land sizes (42 per cent).

Farmers constituting more land in area have felt highly satisfied at 50 per cent compared to farmers with low level of land portions at 5 per cent. Possessing the knowledge on market intelligence is very key element for the scientists. The farmers need more support in this regard too.

Suggestions

The findings from the study induce the researcher to cite certain pertinent suggestions.

- The scientists can enhance the positive impact on farming processes with their involvement in supporting the farmers.
- Most of the farmers in crop cultivation belong to the age group of 30 to 50 years. This makes it convenient for them to understand and develop the necessary knowledge base to take technological support from the agricultural scientists.
- Creating awareness and developing a positive attitude towards farming activity is very crucial to improve the involvement of the farmers in farming sector. This could possibly be done by the agricultural scientists.
- Experienced farmers mostly felt the importance of the scientists support rather than less experienced farmers. Hence, awareness and accessibility to all types of farmers has to be made.
- As most of the farmers have the problem of marketing their farm produce, the agricultural scientists may also help the farmers with added information and data regarding the marketing strategies of the crops. Thus, an integrated effort can be broadened in this area too.

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Conclusion

The role of agricultural scientists is of great benefit to the farmers to improve the agricultural production. As agriculture is more risk oriented and the status of farmers in India is wretched, it is crucial for the scientists to extend their enormous support to them in this regard. The present study had successfully put forward the attitude of the farmers and scientists as well in creating a mutual and supportive environment to tackle the risk factors in agriculture farming in Southern zone of Andhra Pradesh. The results lined plenty of scope for the scientists to support the farmers to overcome the threats and challenges in farming process.

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