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CONSTRAINTS ANALYSIS OF FARMERS IN ADOPTION OF PRECISION FARMING TECHNOLOGIES IN TELANGANA STATE

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ABSTRACT

This study was attempted to identify the constraints faced by farmers in adoption of precision farming technologies transferred by extension professionals. Three districts of Telangana state were purposively selected for the study. A sample of 120 respondents were surveyed under the study. The survey results showed that among the perceived constraints related to the farmers in adoption of precision farming technologies, majority (97.50%) identified Lack of subsidy from the government as their major constraint.It was found that majority (95.83%) of the respondents suggested that the awareness programmes and motivational campaigns need to be conducted by extension personnel to generate awareness and motivation among farmers for popularization of precision farming technologies.

The present agriculture scenario in India has led to certain vital points of concern for the planners and agricultural scientists to feed its growing population. Land is precious natural resource for agriculture and per capita availability of the land has decreased drastically to nearly one third from 0.46 ha in 1951 to 0.15 ha in 2016-17. This led the agricultural sector with the need to increase productivity of existing land by increasing number of crops or improving the input efficiency like fertilizers, herbicides, pesticides and irrigation etc. Agricultural production system is an outcome of a complex interaction of seed, soil, water and agro-chemicals. Hence with the sole pursuit of high productivity in order to meet the ever growing demand for agricultural products, it has resulted in indiscriminate utilization of resources which in turn resulted in neglecting the critical linkage between agriculture and the environment and has posed a threat to future of Indian agriculture on sustainable basis. Therefore judicious management of inputs is essential for the sustainability of such a complex system. It is clear that more accurate agricultural management practices with improved technology have the potential to benefit the farmer financially. Indiscriminate use of inputs coupled with improper management practices over a longer period has resulted in land degradation and decline in its productivity. Inspite of these the human population continues to grow steadily with the shrinking resources being used for production situates great challenge against Indian farming system to attain food and environmental security. To counter these twin challenges in the country like India there is a urgent need of application of modern Hi-tech technologies for enhancing the productivity and sustainability of farming system for long term on scientific basis. Among the technological developments, Precision farming (PF) looks a win-win strategic advancement technology towards improving the potential of agricultural land to produce crops on sustainable basis and to increase agriculture productivity in the future (Kumar *et al.,* 2017). Raj Khosla (2008) stated that precision agriculture is doing the right thing, in the right place at the right time. From the farmer's perspective, precision agriculture is primarily driven by economic return, but, in many cases, site-specific management also provides a positive environmental impact. Soil and water quality can benefit

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from reduced or targeted application of input such as nutrients, pesticides, and irrigation water. The other very significant benefit of precision farming is reduced soil compaction and erosion (Lowenberg- DeBoer, 2004). The success of future farming practices, output, efficiency and sustainability, would rely heavily on "farming the data" as much as "farming the land" and we can manage what we can measure. (Souhza Filho *et al.,* 2011). Therefore, agricultural research seeks the generation of new technologies to reorient the current and future needs and constraints.(references quoted in text)

Precision farming has emerged as a promising option in modern agriculture which enhances judicious crop management through application of farm inputs only in precise amounts to get increased average yields compared to conventional farming techniques. Precision farming helps in dealing with this challenge by proper and effective management of soil and crop variability with the use of information technology.

MATERIAL AND METHODS

An *Ex-post-facto* research design was used in the present investigation. Three districts of Telangana state namely Nizamabad district from Northern Telangana zone, Warangal district from Central Telangana zone and Ranga Reddy district from Southern Telangana zone were selected purposively for the study based on the frontline extension activities promoted related to precision farming technologies in major crops. Six mandals from three districts i.e, from Nizamabad district, Kotgiri and Armurmandals, from Warangal district Ghanpur (station) and Atmakurmandals, from Ranga Reddy district Yacharam and Manchalmandals were selected as sample. Two villages were selected purposively from each mandal which includes the adopted villages of ICAR/SAU from one mandal and frontline extension activities promoted villages by the department of agriculture & horticulture on precision farming technologies in major crops from another mandal thus constituting 12 villages for the study. Ten farmers from each village were selected purposively based on the adoption of precision farming technologies in major crops thus constituting the sample size of (10x12) 120 respondents for the study.

Constraints in adoption was operationally defined as the difficulties or problems faced by the farmers in adoption of precision farming technologies. The respondents were asked to express the problems faced by them in adoption of precision farming technologies transferred by the extension professionals. The responses stated by the respondents were recorded. The results were expressed in the form of frequencies and percentages for each problem for the purpose of discussion.

Suggestions were operationally defined as solutions offered by the farmers for continuous adoption of precision farming technologies. Respondents were asked to offer their suggestions in order to adopt the precision farming technologies being transferred by the extension professionals that are relevant to their farming situations and were also asked for measures to overcome the problems of technology rejection/ discontinuance of precision farming technologies by them. The results were expressed in the form of frequencies and percentages for the purpose of discussion.

RESULTS AND DISCUSSION

1. Constraints expressed by the respondents on adoption of precision farming technologies

It could be observed from the Table.1 that among the perceived farmer related constraints in adoption of precision farming technologies, majority (98.33%) of respondents identified small size fragmented landholdings as their major problem followed by lack of knowledge about precision farming technologies (91.67%), Lack of awareness about precision farming technologies (87.50%), Lack of motivation to adopt from officials (83.30%), Difficulty in understanding the usage of precision farming technologies (79.16%), Low literacy level of farmer (75.00%), Lack of self-confidence to adopt the precision farming technologies (66.67%) and Rigidity to adopt precision farming technologies as they believe in traditional farm practices (62.50%) in the order of priority.

Among the perceived technological constraints, majority (97.50%) opined that high infrastructure requirement followed by complexity of technology usage (90.83%), lack of dissemination of the technology related to precision farming which is compatable to their farming situations (87.50%), lack of practicability of precision farming technologies transferred (85.00%), limitation of technology usage (83.33%), Prohibitive costs of precision farming technologies (73.33%) and low

observability of precision farming technologies transferred (70.83%) in the order of priority.

Among technical constraints majority (95.83%) of the farmers reported lack of technical Know-how as major constraint followed by non availability of skilled labour (93.33%), lack of technical skills to assess in-field variations (85.00%) and lack of awareness of agro-environmental problems (81.67%) in the order of priority.

Among economic constraints majority (100.00%) identified lack of subsidy from the government as major constraint followed by high initial investment (98.33%), inadequate financial support (90.83%), high operational cost (84.16%), low annual income of farmers (81.67%), lack of assets like land, farm inputs etc (74.16%) and market Imperfection (62.50%) in the order of priority.

Among the perceived social constraints, majority (98.33%) opined that Lack of success stories related to precision farming technologies as major constraint followed by Lack of support from other social groups for adoption of precision farming technologies (97.50%), Lack of confidence among the community members to adopt the precision farming technologies due to fear of failure (93.33%), Overriding isolated approach over community spirit (91.67%), Lack of community action for adoption of precision farming technologies (84.16%), Lack of enthusiasm among the community members to adopt the precision farming technologies (76.67%) and Lack of regular meetings by the community regarding adoption of precision farming technologies (68.33%) in the order of priority.

Among extension related constraints majority (98.33%) identified lack of dissemination of the precision farming technologies which are compatable to their farming situations as major constraint followed by lack of training assistance related to precision farming technologies (95.83%), less number of Frontline demonstrations related to precision farming technologies (94.16%), lack of skill oriented training programmes related to precision farming technologies (93.33%), lack of training skills among officials (91.67%), The precision farming technologies demonstrated were not location specific (79.16%) and lack of continuous technical guidance and supervision (75.00%) in the order of priority.

Table 1. Constraints faced by farmers in adoption of precision farming technologies

(N=120)

S No	Perceived Constraints	Frequency*	Percentage	Rank
A.	**Farmer related constraints**			
	1. Lack of awareness about precision farming technologies.	105	87.50	III
	2. Lack of motivation to adopt from officials.	100	83.33	IV
	3. Small size fragmented land holdings.	118	98.33	I
	4. Low literacy level of farmer.	90	75.00	VI
	5. Lack of knowledge about precision farming technologies.	110	91.67	II
	6. Rigidity to adopt precision farming technologies as they believe in traditional farm practices.	75	62.50	VIII
	7. Lack of self confidence to adopt the precision farming technologies.	80	66.67	VII
	8. Difficulty in understanding the usage of precision farming technologies.	95	79.16	V
B.	**Technological constraints**			
	1. Complexity of technology usage.	109	90.83	II
	2. Limitation of technology usage.	100	83.33	V

S No	Perceived Constraints	Frequency*	Percentage	Rank
	3. High infrastructure requirement.	117	97.50	I
	4. Lack of dissemination of the technology related to precision farming which is compatable to their farming situations.	105	87.50	III
	5. Low observability of precision farming technologies transferred	85	70.83	VII
	6. Prohibitive costs of precision farming technologies.	88	73.33	VI
	7. Lack of practicability of precision farming technologies transferred.	102	85.00	IV
C	**Technical constraints**			
	1. Lack of technical Know-how.	115	95.83	I
	2. Non availability of skilled labour.	112	93.33	II
	3. Lack of technical skills to assess in-field variations.	102	85.00	III
	4. Lack of awareness of agro-environmental problems.	98	81.67	IV
D	**Economic constraints**			
	1. High initial investment.	118	98.33	II
	2. High operational cost.	101	84.16	IV
	3. Inadequate financial support.	109	90.83	III
	4. Lack of subsidy from the government.	120	100.0	I
	5. Lack of assests like land, farm inputs etc.	89	74.16	VI
	6. Low annual income of farmers.	98	81.67	V
	7. Market Imperfection.	75	62.50	VII
E	**Social constraints**			
	1. Lack of confidence among the community members to adopt the precision farming technologies due to fear of failure.	112	93.33	III
	2. Lack of community action for adoption of precision farming technologies.	101	84.16	V
	3. Lack of support from other social groups for adoption of precision farming technologies.	117	97.50	II
	4. Overriding isolated approach over community spirit	110	91.67	IV
	5. Lack of enthusiasm among the community members to adopt the precision farming technologies.	92	76.67	VI
	6. Lack of success stories related to precision farming technologies.	118	98.33	IV
	7. Lack of regular meetings by the community regarding adoption of precision farming technologies.	82	68.33	II
F	**Extension constraints**			
	1. Lack of training assistance related to precision farming technologies.	115	95.83	II
	2. Lack of training skills among officials.	110	91.67	V

S No	Perceived Constraints	Frequency*	Percentage	Rank
	3. Lack of dissemination of the precision farming technologies which are compatable to their farming situations.	118	98.33	I
	4. Lack of skill oriented training programmes related to precision farming technologies.	112	93.33	IV
	5. Less number of Frontline demonstrations related to precision farming technologies.	113	94.16	III
	6. The precision farming technologies demonstrated were not location specific.	95	79.16	VI
	7. Lack of continuous technical guidance and supervision.	90	75.00	VII

2. Suggestions offered by the respondents for adoption of precision farming technologies

From the Table. 2 it was evident that majority (95.83%) of the respondents suggested that awareness programmes and motivational campaigns need to be conducted by extension personnel to generate awareness and motivation for popularization of precision farming technologies followed by presence of subsidy from the government (93.33%), availability of training assistance related to precision farming technologies (90.00%), need of Skill oriented training programmes related to precision farming technologies (87.50%), presence of technical Know-how (86.67%), The precision farming technology transferred should be compatable to their farming situation (83.33%), availability of adequate credit from financial institutions (81.67%), use of low cost, simple, effective farm technology (80.83%), presence of location-specific precision farming technologies (79.16%), presence of success stories related to precision farming technologies (75.00%), availability of skilled labour (73.33%), presence of continuous technical guidance and supervision (71.66%), ease in understanding the usage of precision farming technologies (68.33%), more number of Frontline demonstrations related to precision farming technologies (66.67%) and presence of community action in adoption of precision farming technologies (62.50%) in the order of priority.

Table 2. Suggestions as given by the respondents for adoption of precision farming technologies.

(N=120)

S No	Suggestions	Frequency*	Percentage	Rank
1.	Awareness programmes and motivational campaigns need to be conducted by extension personnel to generate awareness and motivation for popularization of precision farming technologies.	115	95.83	I
2.	Need of Skill oriented training programmes related to precision farming technologies.	105	87.50	IV
3.	Presence of subsidy from the government.	112	93.33	II
4.	The precision farming technology transferred should be compatable to their farming situation.	100	83.33	VI
5.	Use of low cost, simple, effective farm technology.	97	80.83	VIII
6.	Presence of technical Know-how.	104	86.67	V
7.	Availability of training assistance related to precision farming technologies.	108	90.00	III

S No	Suggestions	Frequency*	Percentage	Rank
8.	Presence of location-specific precision farming technologies.	95	79.16	IX
9.	Availability of adequate credit from financial institutions.	98	81.67	VII
10.	Presence of community action in adoption of precision farming technologies.	75	62.50	XV
11.	Presence of success stories related to precision farming technologies.	90	75.00	X
12.	Availability of skilled labour.	88	73.33	XI
13.	Presence of continuous technical guidance and supervision.	86	71.66	XII
14.	More number of Frontline demonstrations related to precision farming technologies.	80	66.67	XIV
15.	Ease in understanding the usage of precision farming technologies.	82	68.33	XIII

CONCLUSION

It could be concluded from the paper that awareness programmes and motivational campaigns need to be conducted by extension personnel to generate awareness and motivation among farmers for popularization of precision farming technologies. However, Precision farming is still only in the early stages of implementation in most developing countries. The strategic support from the public and private sectors is also in the conception stage. Lack of information, connectivity problems faced in remote areas and lack of financial support are hurdles in the path of Precision Agriculture. Successful adoption of Precision farming comprises of three phases including exploration, analysis and execution. While exploration and analysis are way ahead, execution is steadily catching-up. Precision farming addresses both economic and environmental issues that surround agriculture production today. Coordination between famers and both the MNCs and the government is gaining momentum. However, concerns about cost-effectiveness and the most effective ways to use the technological tools we now possess, still remains a work-in-progress. In the light of tomorrow's expected need and today's urgent requirement, Precision farming needs to become the only choice and not a choice in the field of agriculture.

REFERENCES

Khosla R (2008), Paper presented on Precision Agriculture In: The 9th International Conference on Precision Agriculture July 20-23.

Kumar, S., Karaliya, S.K., Choudhary, S. 2017. Precision farming technologies towards enhancing productivity and sustainability of rice-wheat cropping system. *International Journal of Current Microbiology and Applied Sciences*, 6(3): 142-151.

Lowenberg-DeBoer, Lambert, D.M., Peone, J. 2004. Precision Farming: Adoption, Profitability and making better use of data, Site Specific Management Center - Purdue University.

Souhza Filho, H. M., Buanian, A. M., Silveira, J. M. F. 2011. Adoption of Precision Agriculture technologies by farmers: A systematic review and proposition of an integrated conceptual framework. *Annual Proceedings and workshop on Technologia*, Brasília. 28(1): 223-2.