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Constraints Faced in Adoption of Yield Maximizing Technologies by Pulse Growers

Noorjehan A K A Hanif*, V Dhanushkodi[1] and N Tamilselvan[2]

ICAR- KVK, Vridhachalam, Cuddalore (Tamil Nadu Agricultural University)

ABSTRACT

Pulses in India are considered as poor man's protein. Pulses contain higher level of vegetable protein compared to any other grains and vegetables. The net availability of pulses has come down from 60 gm/day/person in 1951 to 53 gm/day/person in 2017. Therefore, the present study was attempted to assess the constraints in adoption of yield maximising pulse technologies as perceived by the farmers of Tiruchirappalli district which would be essential for future planning by the policy makers to meet the farmer needs and enhance the production and productivity of pulses. A total of 200 farmers @ 50 farmers per category of pulse crop were surveyed for the study using simple random sampling technique and purposive sampling. Percentage analysis and Garrett ranking method were used to compute the data. It is evident from the study that more than 90 per cent of the farmers perceived lack of knowledge on pests and disease management, lack of guidance on marketing, non-cooperation among farmers, exploitation by input dealers /private agencies as prime constraints. By Garrett ranking method of analysis, the first five ranked factors of constraints faced by the pulse growers are pest and diseases (78.465) ranked first followed by poor marketing guidance (75.385), lack of technical know-how (75.05), low market price/price fluctuation (74.735), exploitation by input dealers /private agencies (71.255). Conducting a greater number of extension activities, training programmes, awareness programmes and the use of ICT tools along with mass media will certainly minimise these constraints thereby reducing the yield gap in pulse production.

Key Words: Constraints, Garrett ranking, Growers, Pulse, Technologies, Yield.

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INTRODUCTION

Pulses in India are considered as poor man's protein. The area under pulses in India was 23 million hectares (2003-04) with an annual production of 15 Mt has been increased to 29.00 mha in the year 2017-18 with production of 25.23 Mt. However, productivity has been increased from 635Kg/ha to 841 Kg/ha over the mentioned period under study (DAC & FW, GOI, 2017-18). The net availability of pulses has come down from 60 g/day/person in 1951 to 53 g/day/person (Indian Council of Medical Research recommends 65 g/day/capita) in 2017 (DAC & FW, GOI 2017-18). Therefore, there is a need to identify the gaps in the present strategy to increase the area under pulses and also to develop the location specific suitable new varieties of seeds to minimise the gap of requirement and availability of pulses in the countries. (Sinha *et al,* 2019).

Production of pulses and its consumption are important in maintaining food security. They occupy an important place in the human diet. Pulses contain higher level of vegetable protein compared to any other grains and vegetables. People of different income groups in both rural and urban areas consume pulses at varying levels to fulfil their nutrition requirements. Pulses are very popular and important cash crops growing successfully throughout the year in India. Cultivation of pulses helps to maintain soil fertility through nitrogen

Corresponding Author's Email: noorjehan@tnau.ac.in *Associate Professor Agricultural Extension KVK, Cuddalore.

[1]Asst Professor (Soil Science & Agrl. Chemistry), ADAC & RI, Tiruchirappalli (Tamil Nadu Agricultural University)

[2]Prof (Agronomy) and Head, Dept of Agronomy, AC & RI, Thiruvannamalai (Tamil Nadu Agricultural University)

fixation. Pulses are also a profitable crop for farmers. They are cultivated in many parts and consumed in all parts of the world (Amutha, 2011).

The common reason for low productivity is due to low area coverage (41%). Non-adoption of Di Ammonium Phosphate (DAP) spraying and excessive weed growth was also reported for low productivity by equal number (18%) of respondents. Use of poor quality seeds (farmer-owned seed) was the problem of 9 per cent of the sampled farmers for the low productivity. For improving pulse production, the important techniques adopted by the sampled farmers are maintenance and evaluation of germ plasm (23%), usage of quality seeds (21%) and use of organic, inorganic and bio-fertilizers (18%) of the farmers while 14% of them reported that identification of varieties to suit rice-fallow condition, dry land condition, and inter-crop conditions was adopted by the sampled farmers. (Amutha, 2011). Therefore, the present study was attempted to assess the constraints in adoption of yield maximising pulse technologies as perceived by the farmers of Tiruchirappalli district, which would be essential for future planning by policy makers to meet the farmer's needs and enhance the production and productivity of pulses.

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MATERIALS AND METHODS

The study was conducted in Tiruchirappalli district where Krishi Vigyan Kendra, Sirugamani is situated. Simple random sampling technique and purposive sampling were employed to draw the samples for the study. As area of operation of KVK Sirugamani covers the whole district, all the pulse (red gram, black gram, green gram and horse gram) growing 14 blocks were selected for the study. Two villages in each block were selected based on the area under cultivation of pulses and totally 28 villages from the 14 blocks were selected based on Random Sampling method.The major pulse crop growers *viz.,* Black gram, Red gram, Horse gram and Green gram under marginal and small farmer category @ 25 farmers from each category were selected. A total of 200 farmers @ 50 farmers per category of pulse crop were surveyed for the study. Percentage analysis and Garett ranking method were used to compute the data.

The required data pertaining to the constraints faced in the adoption of yield maximising technologies in pulses cultivation by farmers was gathered. Constraints were identified and farmers were asked to rank the problems proposed to them. Garrett's Ranking Technique provides the change of order of constraints and advantages into numerical scores. The prime advantage of this technique over simple frequency distribution is that the constraints are arranged based on their severity from the point of view of respondents (Zalkuwi *et al,* 2015). Hence, the same number of respondents on two or more constraints may have been given different ranks. Garrett's formula for converting ranks into percent is as below:

Percent position = 100 * (Rij – 0.5)/Nj

Where, Rij = rank given for ith constraint by jth individual;

Nj = number of constraints ranked by jth individual.

The per cent position of each rank will be converted into scores referring to the table given by Garrett and Woodworth (1969). For each factor, the scores of individual respondents will be added together and divided by the total number of respondents to whom scores will be added. These mean scores for all the constraints will be arranged in descending order; the constraints will be accordingly ranked.

Constraints in adoption of yield maximizing pulse technologies

The Garrett ranking technique has been used to analyse various factors influencing the production of pulses by the respondents. The respondents were asked to rank the ten factors identified for the purpose of this study as 1, 2, 3, 4 .....10 in order to know their preference in the selection of constraints. The calculated percentage position for the rank 1, 2, 3.....10 and their correspondent Garrett table as shown in Table 1. For factors, the

Table 1. Percentage positions and their corresponding Garrett Table values.

Rank	Percentage position		Garret table score
1	100 (1-0.5)/10	5	82
2	100 (2-0.5)/10	15	70
3	100 (3-0.5)/10	25	63
4	100 (4-0.5)/10	35	58
5	100 (5-0.5)/10	45	52
6	100 (6-0.5)/10	55	48
7	100 (7-0.5)/10	65	42
8	100 (8-0.5)/10	75	36
9	100 (9-0.5)/10	85	29
10	100 (10-0.5)/10	95	18

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total score is calculated by multiplying the number of respondents ranking that factor as 1, 2, 3,,,,,, and 10 Garrett and Woodworth (1969).

RESULTS AND DISCUSSION

The data (Table 2 and 3), it was evident that more than 90 per cent of the farmers perceived lack of knowledge on pests and disease management, lack of guidance on marketing, non-cooperation among farmers, exploitation by input dealers/ private agencies, lack of knowledge on chemicals with their doses and method of application, lack of knowledge on weed management, lack of knowledge on soil health management and lack of knowledge on scientific method of storage as the major constraints in adoption of yield maximising technologies in pulses.

The finding coincides with Zalkuwi (2011) who stated that the overall production cost increases due to expenses incurred for pest and disease management. Price fluctuations by 42 per cent, inadequate transport facilities and the high cost of transport were stated to be the problem by 17 per cent collusion among traders and reduction of prices by the traders were also reported as a problem (16%) were Problems faced by the sampled farmers in pulses cultivation and marketing by Amutha (2011). Lack of knowledge in mechanisation to overcome a shortage of skilled labour and higher wages is another problem in pulse production. The results are in consonance with the findings of Zalkuwi *et al* (2015) and Ginigaddara and Lankapura (2018).

Among the ten factors of constraints faced by the pulse growers (Table 4), pests and diseases **(**78.465) ranked first followed by poor marketing guidance (75.385), lack of technical know-how (75.05), low market price/price fluctuation (74.735), exploitation by input dealers /private agencies (71.255) as the fifth rank. Lack of cooperation among farmers (69.00), shortage of labour (59.43), inadequate farm credit (56.89), poor storage facility (41.385) and inadequate research and extension support (25.50) were the other ranked factors of constraints as indicated by the sample farmers in the study area.

In the study area, the farmers cultivated pulses either as rice fallow or sole crop with limited investment to reap more profit and hence showed lesser interest in gaining knowledge about pest and disease management technologies or to mitigate

Table 2. Constraints faced by the Pulse growers in adoption of yield maximising technologies in Tiruchirappalli district. (n=200)

Sr. No.	Constraint	Frequency	Percentage
1.	Ignorance about improved varieties	129	64.5
2.	Lack of knowledge on improved cultivation practices	131	65.5
3.	Non-availability of suitable varieties seeds	147	73.5
4.	Non-availability of Farm Yard Manure	164	82
5.	No timely supply of inputs either from Department or Institutions	177	88.5
6.	Lack of knowledge on seed treatment	169	84.5
7.	Lack of knowledge on soil health management	186	93
8.	Lack of knowledge on chemicals with their doses and method of application	195	97.5
9.	Lack of knowledge on weed management	193	96.5
10.	Lack of knowledge on pests and disease management	199	99.5
11.	Lack of knowledge on crop boosters	163	81.5
12.	Lack of knowledge on mechanization in pulses	158	79
13.	Lack of knowledge on scientific method of storage	184	92
14.	Non-cooperation among farmers	197	98.5
15.	Exploitation by input dealers /private agencies	196	98
16.	Lack of guidance on marketing	198	99

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them. This can be managed by imparting regular training and hands on materials be distributed to the farmers on pet and disease management practices in pulses. This in turn will improve technical knowledge on pulses cultivation and enhance their yield and net income.

Farmers also complained of less market price/ price fluctuations compared to other crops, which resulted in less profit as compared to other crops, that is why they prefer other crops which have minimum support price in market. However, this can be overcome by suitable alterations in the sowing/planting time or adjusting sowing time in such a way so that early harvest can be taken and remunerative returns can be fetched. Conversely, few growers believed that non-existence of number of intermediaries and protection from frequent price fluctuations would still make the contract growing system/rented land system more appropriate.

Another major constraint was lack of cooperation among farmers in the cultivation of YMV resistant varieties of black gram, green gram or sterility mosaic resistant red gram varieties for the reason that their knowledge level and adoption rate are low. Shortage of labour was the existing reality to carry out the cultivation practices in time.

The findings are in line with Kumar *et al* (2010) who revealed that among the technological constraints, lack of knowledge about seed rate, spacing, sowing date was ranked I on the basis of mean percent score (MPS 92.50) followed by lack of knowledge about seed treatment and

Table 3. Constraints faced by the Pulse growers in adoption of yield maximising technologies in Tiruchirappalli district. (n=200)

Sr. No.	Constraint faced in pulses cultivation	Constraints Per cent
1.	Lack of knowledge on pests and disease management	99.5
2.	Lack of guidance on marketing	99
3.	Non-cooperation among farmers	98.5
4.	Exploitation by input dealers /private agencies	98
5.	Lack of knowledge on chemicals with their doses and method of application	97.5
6.	Lack of knowledge on weed management	96.5
7.	Lack of knowledge on soil health management	93
8.	Lack of knowledge on scientific method of storage	92
9.	No timely supply of inputs either from Department or Institutions	88.5
10.	Lack of knowledge on seed treatment	84.5
11.	Non availability of Farm Yard Manure	82
12.	Lack of knowledge on crop boosters	81.5
13.	Lack of knowledge on mechanization in pulses	79
14.	Non-availability of suitable varieties seeds	73.5
15.	Lack of knowledge on improved cultivation practices	65.5
16.	Ignorance about improved varieties	64.5

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lack of knowledge about insect pest and disease management were ranked II and III with an overall MPS of 88.75 and 82.75 respectively.

Another study by Sinha *et al* (2019) found that major socio-economic constraints perceived by the farmers related to their socioeconomic conditions were low profit, high cost of inputs followed by the non-availability of credit in time & high cost of labour ranked I, II, III & IV with an overall garret score were 69.8, 65.4, 60.9 & 44.4 respectively. Under technological constraints, lack of knowledge about seed rate, spacing and sowing date was ranked I on the basis of garret score (66.6) whereas lack of knowledge about insect pest and disease management and lack of knowledge about seed treatment were ranked II and III with an overall score of 62.0 and 54.0 respectively. Lack of regulated market was ranked I (57.0), weak research-extension-farmer linkage was ranked II (52.0) and the third in order to this was the non-availability of suitable extension material, leaflets *etc* (41.1) to adopt the better package and practices by the farmers were the Institutional constraints. Among the infrastructural constraints, non-availability of HYV seeds of pulses and non-availability of plant protection chemicals were the two major constraints perceived by the sample farmers as institutional constraints.

Similar findings of Sharma *et al* (2020) revealed that, the top five major challenges experienced by off season vegetable growers in block Majri of Mohali district are high cost of inputs like seed, fertilizers, sarkanda grass *etc*. (77.30), high price of rented land (67.06), pest and diseases (62.50), low

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Table 4. Factors for Constraints in adoption of yield maximizing pulse technologies– Garret ranking method

Sr. No.	Factor	Rank										Total number of farmers	Total score	Total mean	Rank
		1	2	3	4	5	6	7	8	9	10				
1.	Pest and diseases	151	32	17	0	0	0	0	0	0	0	200	15693	78.465	I
2.	Lack of technical Know how	104	67	22	7	0	0	0	0	0	0	200	15010	75.05	III
3.	Shortage of labour	0	0	96	77	19	8	0	0	0	0	200	11886	59.43	VII
4.	Inadequate farm credit	6	5	68	41	34	29	17	0	0	0	200	11378	56.89	VIII
5.	Poor marketing guidance	102	82	9	7	0	0	0	0	0	0	200	15077	75.385	II
6.	Low market price/price fluctuation	97	72	31	0	0	0	0	0	0	0	200	14947	74.735	IV
7.	Poor storage facility	0	0	0	0	48	35	27	51	39	0	200	8277	41.385	IX
8.	Lack of cooperation among farmers	0	175	20	5	0	0	0	0	0	0	200	13800	69.00	VI
9.	Exploitation by input dealers /private agencies	85	44	31	28	12	0	0	0	0	0	200	14251	71.255	V
10.	Inadequate research and extension support	0	0	0	0	0	0	18	19	66	97	200	5100	25.50	X

market price/price fluctuation (61.83), shortage of labour (54.63). Besides these other challenges like stray wild animals (45.06), the perishable nature of produce/poor storage facility (38.50), damage from frost (34.43), inadequate research and extension support (28.33) and lack of know how (24.33) were found to be limiting factors for off season vegetable cultivation. Khuvung *et al* (2022) revealed that non-availability of quality seeds (I rank) followed by high pest and disease incidence (II rank), lack of proper financial assistance and subsidies (III rank), low market value for crops (IV rank), lack of result-oriented training and demonstrations (V rank) were the major problems expressed by the farmers. These findings are similar to that of the findings of Biswas *et al* (2017), Marbaniang and Pasweth (2017) and Oinam & Sudhakar (2014).

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CONCLUSION

It was concluded that pulses cultivation is perceived as an essential livelihood option by all the farmers throughout the year. Seed production in pulses fetches a higher market price than other crops with lesser capital investment possible only when the farmers are technically expert in the latest technologies. There are variations in the type of constraints that farmers faced related to their ability to comprehend the problem. To minimise economic loss due to these constraints, key stakeholders should take suitable steps to remove the constraints identified. Conducting a greater number of extension activities, training programmes, awareness programmes, use of ICT tools along with mass media will certainly minimise these constraints thereby reducing the yield gap in pulse production.

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