Madras Agric. J., 2023; https://doi.org/10.29321/MAJ.10.200810

RESEARCH ARTICLE

Impact of KVK Interventions in Enhancing Knowledge Level of Pulse Growers on Yield Maximizing Technologies in Tiruchirappalli District of Tamil Nadu

Noorjehan A K A Hanif[1], Dhanushkodi V[2] and Amuthaselvi G[3]

1. Krishi Vigyan Kendra, Cuddalore - 606 001, Tamil Nadu Agricultural University, India

2. Department of Soil Science and Agricultural Chemistry, ADAC & RI, Tiruchirappalli – 620 027, Tamil Nadu Agricultural University, India

3. Department of Food Process Engineering, AEC & RI, TNAU, Coimbatore.

Received : 16 July 2023

Revised : 30 August 2023

Revised : 04 September 2023

Accepted : 22 September 2023

ABSTRACT

In India, Pulses are considered as poor man's protein. Pulses contain higher levels of 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 knowledge level of farmers in Tiruchirappalli district with regard to yield maximising pulse technologies which in turn 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 knowledge gap index was used to compute the data. It is clearly evident that through KVK interventions like Trainings have resulted in a horizontal spread of 108 ha area under various pulses cultivation followed by farmer participatory seed production through NFSM seed hub (92 ha) and On Farm Trials, Frontline demonstrations and Field days (76 ha). The pulse growing farmers gained knowledge on recommended TNAU newly released short duration, drought tolerant varieties of red gram (CO (Rg) 7), green gram (CO (Gg) 8), black gram (VBN 6, VBN 8 & MDU 1) and horse gram (Paiyur 2) varieties, seed rate, seed treatment with bio fertilizers, mechanized sowing behind seed drill, pre and post emergence application of weedicides, TNAU pulse wonder foliar spray, DAP foliar spray and seed treatment for storage through various KVK interventions. There existed a medium knowledge gap index irrespective of pulses grown among the farmers of Tiruchirappalli district of Tamil Nadu mainly due to interventions of KVK like OFT, FLDs, CFLDs, trainings and mass awareness programmes. There is a need to enhance the knowledge of pulse growers on pest and disease management practices and other yield maximising technologies, through joint efforts with State Department of Agriculture, NGOs and through FPO linkages

Keywords: *On farm trials; Frontline demonstrations; Farmer participatory seed production; Trainings; Knowledge gain; Knowledge gap index, Yield maximising technologies.*

INTRODUCTION

India's outstanding contribution towards total global acreage and production of pulses at 35 per cent and 25 per cent respectively is credited to our strength. The three five-year plans *viz.,* X, XI & XII exhibited an increasing yield trend, the highest being 784 kg/ha during 2016-17 as against the world's average productivity of 909 kg/ha, is less than the demonstrated potential under the frontline demonstrations. The targeted production and productivity are possible by way of harnessing this yield gap by growing pulses in new niches, precision farming, quality inputs, soil test based Integrated Nutrient Management and mechanized method of pulse cultivation complimented with generous *Governmental Policies* and appropriate funding support to implementing states/stake holders. The IT initiatives in extension/apps to access the market, Soil Health Cards, INM, crop advisories and E-NAM, involvement of KVKs in seed hub, additional breeder seed production, strengthening Bio-fertilizer/Bio-control production units and FPOs *etc.*, are other specific efforts. Creation of buffer stock *etc.*, are the other policy interventions. (GoI, Ministry of Agriculture, Dept of Pulses, Bhopal, 2017)

*Corresponding author's e-mail: noorjehan@tnau.ac.in

The major share of pulses in Tamil Nadu in terms of area and production comes from the Cauvery Delta region. In this zone pulses are grown in a larger area under no tillage condition as a relay crop to make use of the residual moisture and nutrients (Nagarajan *et al.,* 2004). The Cauvery Delta Zone (CDZ) in Tamil Nadu has a total land area of 1.45 million ha, which is equivalent to 11% of the state area. In this zone, rice fallow pulses are cultivated regularly after the *Samba* rice crop in December- January contributing a major share (>40%) to pulse production in the state. Nearly 3.1 lakh ha of *Samba* rice area is under rice fallow pulses and the yield realized ranged from 300 to 500 kg/ ha which is low compared to the potential yield under irrigated conditions. In Tamil Nadu, Salem, Namakkal, Tiruchirappalli, Cuddalore, Ramanathapuram, Madurai, and Villupuram are the main districts cultivating rice fallow pulses. In Cauvery delta zone of Tiruchirappalli district, under the wetland rice ecosystem, sowing of pulse either black gram or green gram is generally performed either by broadcasting seeds manually in standing crop of rice fields at 7 to 10 days before harvest or dibbling manually immediately after rice harvest as traditional practices, a low-cost technology which involves only sowing and seed cost. Even though these practices cause constraints like uneven distribution of seeds at shallow depth in the broadcasting method and randomly placed seeds with improper depth and loss of moisture in manual dibbling after rice harvest, which in-turn leads to poor contact between seeds and soil, low germination, more weed growth, unhealthy plants and lower yield, still the farmers continue.

Transfer of technology holds key to rapid development and transformation of rural society. Farm Science Centre or Krishi Vigyan Kendras (KVKs) having a district as jurisdiction, are playing a crucial role in Transfer of Technology and thereby enhancing the productivity and income of the farming community. KVKs are disseminating technologies through various methods and one of the effective methods of transferring the technologies is training. The KVKs aim is to bridge the gap between the technologies developed at the research institutions and its adoption at the field level by farmers through the demonstration of technology/ products *etc*. and by providing training to the farmers, rural youths and the extension personnel.

In Tiruchirappalli district, 9438 ha (normal area 22900 ha) is covered by major pulses, of which black gram and green gram are mainly under both rain fed and rice fallow, where red gram and horse gram are mainly under rainfed conditions. The Yield of pulses is very low due to unaware of improved varieties, lack of awareness and adoption of improved production technologies which results in low production and productivity of pulses in this district. KVK, Tiruchirappalli has been disseminating various high yielding, drought tolerant, short duration varieties suitable for rainfed situation and improved pulse production technologies through various interventions/methods *viz.*, on farm trials (OFT), front line demonstrations (FLD), Cluster Front Line Demonstrations (CFLDs), trainings and exposure visits since its inception 1977 onwards. Recently, exclusive seed hub centre for pulses has been established at KVK during 2018-19 for the production, processing and promotion of latest pulses varieties.

Therefore, the present study was attempted during 2020-2021 as a University Research Project and assessed the knowledge level of pulse growers about various yield maximising pulse technologies in Tiruchirappalli district with interventions of KVK, which would be essential for future planning by the policy.

MATERIAL AND METHODS

The research study “Impact of KVK Interventions on Minimising Yield Gap in Pulses under Rice Fallow and Sole crop cultivation in Tiruchirappalli district” was conducted during 2020-2021 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.

The area of operation of KVK Sirugamani, Tiruchirappalli 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 in total 28 villages from the 14 blocks were selected based on the 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.

Analysis of impact refers to the outcome of the results of activities and net effect of activities (done by any agency) on the economic and social status of the farmers (Dipak & Basavaprabhu, 2005). KVK had created a considerable impact on the increase in pulse yield and income of pulse growers in Tiruchirappalli district. Hence, it is imperative to study the impact of KVK interventions among the farming community of Tiruchirappalli district in enhancing their knowledge level in the recommended yield maximizing pulse technologies.

The knowledge gap of pulse growers was measured based on knowledge of the growers on pulse production. The knowledge of a farmer on pulse production was determined by computing a knowledge score based on a set of 20 questions regarding modern recommended variety, sowing time, fertilizer application, irrigation, disease, pest management and weed control. Each of the questions carried a full weight of 2. Then, the knowledge score of a farmer was obtained by adding together his/her weight for all the 20 questions. Thus, the knowledge score of a farmer could range from 0 to 40, where 0 indicates very low knowledge and 40 indicates the highest level of knowledge on pulse production.

For determining knowledge gap of a farmer, a knowledge gap index was computed on the deviation of obtained score from the maximum possible knowledge score (40). This deviation was then expressed in percentage as the proportion to maximum possible knowledge score as suggested by Singh *et al*. (1991). For better understanding, the formula for determining knowledge gap index is presented below:

$$KGI = \frac{Kp\text{-}Ko}{Kp} \times 100$$

Whereas,

KGI = Knowledge Gap Index

Kp = Maximum possible score of a farmer (*i.e*. 40)

Ko= Obtained knowledge score by a farmer

Thus, the knowledge gap index could range from 0 to 100, where 0 indicated very low knowledge gap and 100 indicated the highest knowledge gap (Kundu *et al*, 2013).

RESULTS AND DISCUSSION

Impact of KVK interventions

The newly released short duration, drought tolerant varieties of red gram (CO (Rg) 7), green gram (CO (Gg) 8), black gram (VBN 6, VBN 8 & MDU 1) and horse gram (Paiyur 2 & CRIDA 18 R) were demonstrated initially through front line demonstrations. Awareness on the improved varieties and technologies was created through field days, leaflets, folders, AIR Message and trainings. The new varieties along with Integrated Crop Management and Integrated Pest and Disease management practices were imparted through frequent training and special programmes to the farmers in the study area.

Front Line Demonstrations and trainings were conducted on newly released pulses varieties to the farmers since 2006 in Tiruchirappalli district and based on the acceptance and success of the varieties these varieties were again taken up for cluster frontline demonstrations during 2017 and 2018 in various blocks of Tiruchirappalli district. During 2016- 17, black gram cluster FLDs (50 no.s) and in 2018-19 cluster FLDs (50 no.s) were conducted. Further 350 q of black gram and green gram were produced through NFSM Pulses Seed Hub centre at KVK Sirugamani during 2019-20.

During the past five years (2016-2021) of taking this study, various interventions like OFT, FLD, field days, trainings, CFLD, seed hub, extension activities were executed through KVK for the benefit of the farming community is depicted in table 1.

From the above table 1, it is clearly evident that through KVK interventions like Training – on campus, off campus, Sponsored trainings – TN IAMP, NADP seed production had resulted in horizontal spread of 108 ha area under various pulses cultivation followed by farmer participatory seed production through NFSM seed hub (92 ha) and On Farm Trials, Frontline demonstrations and Field days (76 ha), pulses varieties were promoted. Through various extension activities *viz*., farm advisory services, diagnostic visit, Field days, Group discussion, Kisan ghosthi, Film show, Kisan Mela, Exhibition, Scientists visit to farmer fields, Farmers seminar, Method demonstrations, Exposure visit, Soil health/test campaigns, Farmers visits to KVK, Farmer scientist interaction, Awareness campaign, Field inspection with department, Video documentation, Cross learning, mass awareness and promotion of cultivation of pulses by farmers was made.

Similar findings reported by Dubey & Srivastava (2007) indicated that KVK training has a major impact on farmers in the adoption of newer technologies and knowledge than those farmers who have not undergone any training. Further, Kangali (2012) reported in his study the impact of the frontline demonstration of chickpea in Sehore District of Madhya Pradesh that the majority of the farmers (45.00%) possessed partial knowledge of total chickpea production technology considered in the study followed by (37.50%) farmers had full knowledge and (17.50%) farmers had low knowledge about chickpea production technology respectively. He also found that in the case of adoption of the frontline demonstration of chickpea growers, majority of the farmers (50.00%) had partial adoption of chickpea production technologies followed by (40.00%) full adoption and low adoption (10.00%) of chickpea production technologies respectively. Sharma *et al.* (2013) also infer that the on-campus trainees had more favourable attitude and exposure to KVK training programmes and significantly changed the attitude of farmers in desired direction.

Front line demonstration program was very effective in changing attitude of farmers towards cultivation of summer green gram. Cultivation of demonstrated plots of summer green gram with improved technologies has increased the skill and knowledge as well as net returns of the farmers. The findings of the study revealed that yield of summer green gram could be increased by 45.23 per cent by innovative technology interventions coupled with the proper management of demonstrations field. Further

improved practices captured net returns of Rs. 29396/ha with B:C ratio of 2.59 as against Rs. 16089/ha and B:C ratio of 1.95 only in farmers practices. Under FLD improved practices create great awareness and motivated the other farmers to adopt improved production technologies for summer green gram. The selection of suitable variety, critical inputs and participatory approach in planning and conducting the demonstrations help in the transfer of technology to the farmers. (Singh *et al*, 2021)

The study revealed that the pulse growing farmers gained knowledge on recommended TNAU varieties, recommended YMV /sterility mosaic resistant varieties, seed rate, seed treatment with bio fertilizers, mechanized sowing behind seed drill, pre and post emergence application of weedicides, TNAU pulse wonder foliar spray, DAP foliar spray and seed treatment for storage through various KVK interventions implemented (Table 2). The various TNAU pulse newly released short duration, drought tolerant varieties of red gram (CO (Rg) 7), green gram (CO (Gg) 8), black gram (VBN 6, VBN 8 & MDU 1) and horse gram (Paiyur 2) were popularized through KVK. The knowledge gain was higher for the crops black gram and green gram as these are cultivated both as rice fallow crop and sole crops under irrigated conditions. The pulse horse gram crop is poorly maintained with the least care hence those farmers showed less interest in getting additional information in its cultivation. Red gram is grown a sole crop and capital investment and care is taken following the recommended practices; hence knowledge gain higher.

Ramasubramanian *et al,* (2010) reported that 39.50 per cent of the respondents were in medium level of knowledge on pulse production technologies followed by 33.50 per cent of respondents with a low level of knowledge and only 26 per cent of the respondents were a high level of knowledge. It is observed that knowledge of respondents was more with depth of sowing (93.50%), method of sowing (85.50%), improved varieties (74.00%), seed rate (67.50%) and time of sowing (67.00%). The respondents possessed a medium level of knowledge on the practices namely, spacing (58.00%) and biofertilizer application (49.50%). Lesser knowledge was possessed by respondents for seed treatment (22.00%).

The study by Janani *et al,* (2015) revealed that experience in seed production, social participation, urban contact and information seeking behaviour would increase the knowledge level of seed growers. The variables experienced in seed production contributed more than 75 per cent of the variation in the knowledge level.

Umamageswari *et al,* (2019) concluded that increase in awareness level on improved production technologies like varieties, time of sowing, seed rate, seed treatment, machinery for rice harvest, herbicide application, foliar spray, moisture stress mitigation and pest and disease management contributed to higher yields and income in rice fallow black gram and green gram cultivation in CDZ with an average 14.4% increase in net return in black gram and 16.4% in green gram was realized with Improved Practices in the districts of Cauvery delta zone.

Knowledge gain of pulse growers on Yield Maximising technologies

1. Knowledge level of pulse growers on Yield Maximising technologies in Black gram

The study revealed that cent per cent knowledge was recorded among the black gram farmers on recommended varieties for rice fallow black gram and YMV resistant varieties (82%). More than 90 per cent of the sample farmers had knowledge on Formation of beds and channels, Interval between irrigation, Pre emergence application of weedicides, Method of weed hand control. Least knowledge was recorded in seed treatment with chemicals, bio fertilizers and bio control agents, pest and disease management, application of TNAU mineral mixture, seed coating, weedicides, chemicals like $ZnSO_4$ application, KCl pray for drought mitigation. Through KVK interventions, knowledge on TNAU pulse wonder foliar spray, Mechanized sowing behind seed drill and DAP foliar spray were enhanced among the black gram farmers (above 50 %).

2. Knowledge level of pulse growers on Yield Maximising technologies in Green gram

The study revealed that more than three fourth of the farmers had knowledge on recommended varieties for rice fallow green gram and pre-emergence application of weedicides. Knowledge on mechanized sowing behind seed drill, recommended YMV resistant varieties for green gram and seed treatment with bio fertilizers were increased through KVK interventions. The Least knowledge was recorded in pest and disease management, application of TNAU mineral mixture, seed coating, weedicides, chemicals like $ZnSO_4$ application, KCl pray for drought mitigation.

3. Knowledge level of pulse growers on Yield Maximising technologies in Red gram

More than 90 per cent of the red gram growers had knowledge on seed rate, spraying of Diammonium phosphate (DAP) or urea, NAA and salicylic acid an pre emergence application of weedicides. Through KVK interventions, knowledge gained enhanced in recommended sterility mosaic resistant varieties for red gram, red gram transplanting method, nipping technology in red gram, raising sunflower as intercrop (1:9) and maize as border crop for pod borers management and TNAU pulse wonder foliar spray. The least knowledge is recorded about seed coating with bio fertilizers and micronutrients, nitrogen substitution by organic sources for pulses**, s**eed treatment before sowing with chemicals, seed treatment with bio control agents and amendments for soil surface crusting.

4. Knowledge level of pulse growers on Yield Maximising technologies in Horse gram

The study revealed that more than three fourth of the horse gram farmers had knowledge on seed rate. More than 50 per cent of farmer had knowledge on recommended high yielding varieties for horse gram, foliar spray of 1% urea for yield improvement, foliar spraying of KCl to mitigate moisture stress, pre-emergence and post emergence application of weedicides. Least knowledge recorded in seed coating with bio fertilizers and micronutrients, nitrogen substitution by organic sources for pulses, seed treatment before sowing with chemicals, seed treatment with bio control agents and amendments for soil surface crusting, soil application of $ZnSO_4$ under irrigated condition, soil application of TNAU micronutrient mixture, diseases and pest controlled by chemicals, TNAU pulse wonder foliar spray and seed treatment for storage. As horse gram crop is grown in residual moisture conditions with least investment, farmers showed less interest in gaining the latest technologies.

From the table 3, it is observed that less than 50 per cent of the pulse growers under the study had acquired knowledge on pest and disease management practices, seed treatment with bio control agents, spraying of Diammonium phosphate (DAP) or urea, NAA and salicylic acid, foliar spray of 1% urea for yield improvement, diseases and pest controlled by chemicals, soil application of TNAU micronutrient mixture and least knowledge on amendments for soil surface crusting. It is also observed that knowledge gain was higher with respect to black gram and green gram as their acreage is higher and cultivated as rice fallow crops compared to red gram or horse gram. All the above 12 management technologies need to be popularised and promoted among the pulse growers through the efforts of KVK and Department of Agriculture in a farmer participatory mode.

Parthasarathi and Shaik Alauddin (2017) concluded that 'information source utilization' and 'information sharing' were significant in their relationship with the knowledge level of pulse growing farmers. The correlation values were found to be positive and contribute to the extent of knowledge and that those farmers with more information access could have possessed more knowledge on recommended pulse technologies.

Knowledge Gap Index analysis

The knowledge gap score of the respondents ranged from 20 to 38 in black gram, 18 to 36 in green gram, 16 to 32 in red gram and 12 to 28 in horse gram in accordance with scoring system against the possible range of 0-100.

On the basis of the knowledge gap, the pulse growers were classified into three categories as shown in Fig 1 and found that the pulse growers belonged to the medium knowledge gap index irrespective of pulses grown mainly due to interventions of KVK like OFT, FLDs, CFLDs, trainings and mass awareness programmes. Low KGI was found in black gram followed by green gram as these two crops are highly grown in the rice fallow belt than sole crop of red gram and horse gram. The KGI was medium to high in horse gram which is the least cared crop grown mainly for home purpose grains and fodder and are getting low yield.

Similar findings were reported by Kundu *et al.* (2013) that all the respondent farmers had knowledge gap in pulse crop production ranged from low (35.7 %) to high (8 %). But the majority (56.3 %) of the respondents belonged to the medium knowledge gap category. Obviously, farmers with a low knowledge gap are supposed to harvest some quantity of pulses. Co-efficient of correlation showed that out of 10 variables only 5 variables namely age, education, farming experience, economic motivation and risk orientation had significantly negative relationships to knowledge gaps in pulse production.

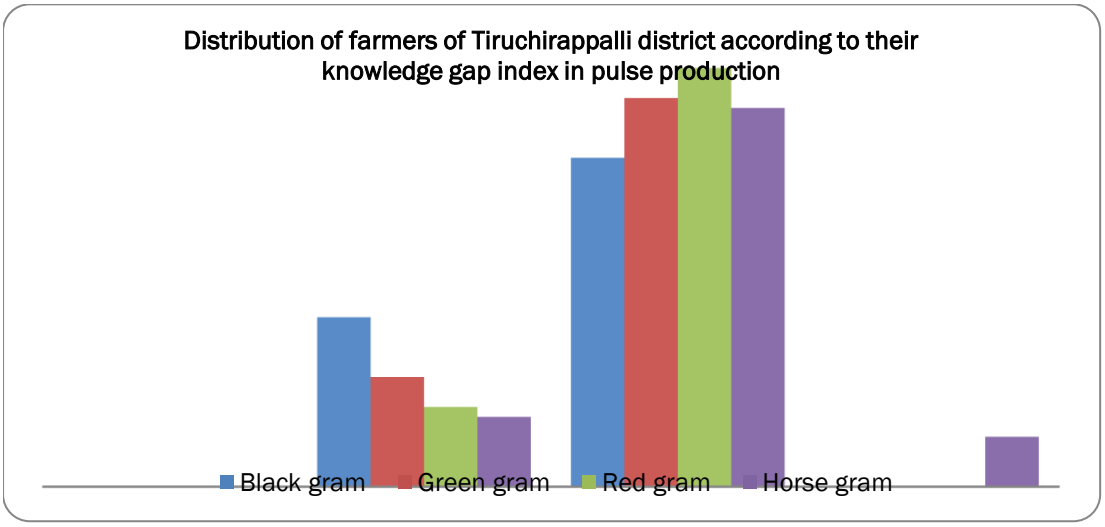

Fig 1. Distribution of farmers of Tiruchirappalli district according to their knowledge gap index in pulse production

Table.1. KVK interventions in Promotion of Pulses varieties and technologies among farmers of Tiruchirappalli district (2016-2021)

S.No.	Technologies Promoted	KVK interventions	Numbers	Horizontal area spread (ha)
1.	Blackgram (VBN 6 & VBN 8, MDU1) Greengram (CO (Gg) 8) Redgram (CO (Rg) 7) Horse gram (Paiyur 2 & CRIDA 18 R) Integrated Crop Management Integrated Pest and Disease management practices Crop booster TNAU Pulse wonder	On Farm Trials	01	76
2.		Frontline demonstrations	06	
3.		Field days	08	
4.	Blackgram (VBN 6 & VBN 8) Greengram (CO (Gg) 8) Redgram (CO (Rg) 7)	Farmer participatory seed production through NFSM seed hub	115	92
5.	New varieties Integrated Crop Management Integrated Pest and Disease management practices Crop booster TNAU Pulse wonder	Trainings – on campus, off campus, Sponsored trainings – TN IAMP, NADP seed production	48	108
6.	Improved varieties and technologies in pulses	Leaflets/Folders/ booklets	04	Mass awareness & promotion
7.	Improved varieties and technologies in pulses	AIR /TV Messages	12	
8.	Extension activities	Advisory services Diagnostic visit Field days Group discussion Kisan ghosthi Film show Kisan Mela Exhibition Scientists visit to farmer field Farmers seminar Method demonstrations Exposure visits Soil health/test campaigns Farmers visits to KVK Farmer scientist interaction Awareness campaign Field inspection with department Video documentation Cross learning	468 144 32 15 07 06 12 36 837 03 96 27 09 628 14 04 45 05 04	

Table 2. Knowledge gain on Yield Maximising Pulses Production Technologies among the farmers of Tiruchirappalli district

S.No.	Yield Maximising Pulses Production technologies	Knowledge gain (%)				Average Knowledge gain (%)
		Black gram	Green gram	Red gram	Horse gram	
1.	Recommended TNAU varieties	100	90	70	58	79.5
2.	Recommended YMV /sterility mosaic resistant varieties	82	62	48	58	50.5
3.	Amendments for soil surface crusting	18	14	24	18	18.5
4.	Seed rate	62	58	96	78	73.5
5.	Seed treatment before sowing with chemicals	52	44	38	34	42
6.	Seed treatment with bio fertilizers	78	62	46	38	56
7.	Seed treatment with bio control agents	62	40	38	36	44
8.	Mechanized sowing behind seed drill	78	70	-	-	74
9.	Soil application of ZnSo4 under irrigated condition	62	46	38	22	42
10.	Soil application of TNAU micronutrient mixture	38	32	28	22	30
11.	Foliar spray of 1% urea for yield improvement	42	34	32	38	36.5
12.	Foliar spraying of KCl to mitigate moisture stress	38	30	24	22	28.5
13.	Seed coating with bio fertilizers and micronutrients	42	22	38	14	29
14.	Nitrogen substitution by organic sources for pulses	52	32	38	14	34
15.	Spraying of Diammonium phosphate (DAP) or urea, NAA and salicylic acid	38	24	88	42	48
16.	Pre emergence application of weedicides	96	84	82	54	79
17.	Post emergence application of weedicides	76	60	70	54	65
18.	Pest and disease management practices	52	48	46	42	47
19.	Diseases and pest controlled by chemicals	44	38	38	24	36
20.	TNAU pulse wonder foliar spray	82	66	32	24	51
21.	DAP foliar spray	86	66	76	42	67.5
22.	Seed treatment for storage	78	70	52	34	58.5
23.	Red gram transplanting method Nipping technology; Raising sunflower as intercrop (1:9) and maize as border crop for pod borers management	-	-	58	-	-

Table 3. Yield Maximising Pulses Production technologies which need Knowledge improvement among farmers of Tiruchirappalli district

S.No.	Yield Maximising Pulses Production technologies	Knowledge gain (%)				Average Knowledge gain (%)
		Black gram	Green gram	Red gram	Horse gram	
1.	Amendments for soil surface crusting	18	14	24	18	18.5
2.	Foliar spraying of KCl to mitigate moisture stress	38	30	24	22	28.5
3.	Seed coating with bio fertilizers and micronutrients	42	22	38	14	29
4.	Soil application of TNAU micronutrient mixture	38	32	28	22	30
5.	Nitrogen substitution by organic sources for pulses	52	32	38	14	34
6.	Diseases and pest controlled by chemicals	44	38	38	24	36
7.	Foliar spray of 1% urea for yield improvement	42	34	32	38	36.5
8.	Seed treatment before sowing with chemicals	52	44	38	34	42
9.	Soil application of ZnSo4 under irrigated condition	62	46	38	22	42
10.	Seed treatment with bio control agents	62	40	38	36	44
11.	Pest and disease management practices	52	48	46	42	47
12.	Spraying of Diammonium phosphate (DAP) or urea, NAA and salicylic acid	38	24	88	42	48

Conclusion

It is concluded from the study that the pulse growing farmers gained knowledge on recommended TNAU newly released short duration, drought tolerant varieties of red gram (CO (Rg) 7), green gram (CO (Gg) 8), black gram (VBN 6, VBN 8 & MDU 1) and horse gram (Paiyur 2) varieties, seed rate, seed treatment with bio fertilizers, mechanized sowing behind seed drill, pre and post emergence application of weedicides, TNAU pulse wonder foliar spray, DAP foliar spray and seed treatment for storage through various KVK interventions. There existed medium knowledge gap index irrespective of pulses grown among the farmers of Tiruchirappalli district of Tamil Nadu mainly due to interventions of KVK like OFT, FLDs, CFLDs, trainings and mass awareness programmes There is need to enhance the knowledge of pulse growers on pest and disease management practices, seed treatment with bio control agents, spraying of Diammonium phosphate (DAP) or urea, NAA and salicylic acid, foliar spray of 1% urea for yield improvement, diseases and pest controlled by chemicals, soil application of TNAU micronutrient mixture and least knowledge on amendments for soil surface crusting by joining hands with State Department of Agriculture, other Non-Governmental Agricultural Organisations, through Farmer Producer Organisations (FPO) linkages and by utilizing latest ICT tools.

REFERENCES

Dipak and Basvaprabhu, J. 2005. Impact assessment, National Seminar on Extension Methodology Issues in Impact Assessment of Agricultural and Rural Development Programmes, New Delhi. 20-26.

Dubey, A.K. and Srivastava, J.P. 2007. "Effect of training programme on knowledge and adoption behavior of farmers on wheat production technologies" *Indian Research Journal of Extension Education,* **7 (2&3):** 41-43 https://seea.org.in/uploads/pdf/v07313.pdf

Janani, S., Palaniswamy, A. and Balarubini, M.2015. Relationship Between Knowledge Level with Characteristics of Pulses Seed Growers. *Journal of Extension Education*, Vol. **27 No. 1**, 2015 Retrieved from https://extensioneducation.org/index.php/jee/article/view/36

Kangali, Sarita (2012). A study on adoption behaviour of pigeonpea technology among the farmers of Simour block of Rewa district of M.P. Unpub. M.Sc (Ag.) Thesis R.V.S.K.V.V. Gwalior.

Kundu, S, Islam, M. R., Ali, M. S., Azam, M. S. and Mozumder, A. H. 2013. Correlates of Pulse Production Knowledge Gap of the Farmers. *J. Expt.* Biosci. **4(1):***39-44* *https://www.researchgate.net/publication/349107316_CORRELATES_OF_PULSE_PRODUCTION_KNOWLEDGE_GAP_OF_THE_FARMERS*

Nagarajan, R., Ramanathan, S., Muthukrishnan, P., Stalin P, Ravi, V. and Babu, M. 2004. Site-specific nutrient management in irrigated rice systems of Tamil Nadu, India. Increasing Productivity of Intensive Rice Systems through Site-Specific Nutrient Management. Science Publishers, Enfield, NH (USA) and International Rice Research Institute, Los Banos, Philippines, 2004, 101-123.

Parthasarathi, S. and Shaik Alauddin, A. 2017.Communication Behaviour of Farmers Adopting Rice Fallow Pulse Technologies. *Journal of Extension Education,* Vol. **29 No. 2**, 5864-5869 https://doi.org/10.26725/JEE.2017.2.29.5864-5869

Ramasubramanian, M., Seeralan, S., Sekar, V. and Israel Thomas, M. 2010. Cognition and Adoption of Pulse Production Technologies by Dry Land Farmers of Tamil Nadu. *Legume Res.,* **33 (2)**: 102 – 107 https://arccjournals.com/journal/legume-research-an-international-journal/ARCC1288

Sharma, N, Arora, R.K. and Kher, S. 2013. "Attitude of farmers towards KVK training programmes and their impact." *Agriculture Update,* **8(1&2):** 31-34

Sharma, R., Porwal, R. and G. N. Mathur.2013. Impact of FLD on adoption of improved technologies of green gram in K.V.K., Tabiji, Ajmer, Rajasthan. Indian *J. of Environment and Ecology*, **31(6):** 730-734. https://www.i-scholar.in/index.php/Au/article/view/47910

Singh, S.P., Hudda, R.S., Verma, H.K., 1991. Knowledge gap of Citrus Growers. *Indian Journal of Extension Education* **XXVII (1&2),** 117-120.

Singh Mahender, Narendra Kumawat, Tomar I S, Chandan Kumar and Dharmendra Singh. 2021. Innovative Technological Interventions Coupled with Proper Management is the Need of the Day for Producing Summer Green Gram in the Tribal District of Madhya Pradesh. *J Krishi Vigyan* 2021, **10 (1):** 133-137 DOI : 10.5958/2349-4433.2021.00079.9

Umamageswari. C, Manimaran, R and K. Iyanar. 2019. Impact of improved production technologies on yield of rice fallow pulses in Cauvery delta zone. *Journal of Pharmacognosy and Phytochemistry* 2019; **SP2:** 963-967 https://www.phytojournal.com/archives/2019/vol8issue2S/PartY/SP-8-2-264-743.pdf