

## CONSTRUCTION OF TEST AND MEASUREMENT OF KNOWLEDGE LEVEL OF CLUSTER FRONTLINE DEMONSTRATIONS PULSE FARMERS

M. Vamshi <sup>1\*</sup>, C. Padma Veni <sup>2</sup> and V. Ravinder Naik <sup>3</sup>

1 M.Sc. Research scholar, Dept. of Agril. Ext., Prof. Jayashankar Telangana State Agricultural University, Hyderabad-500 030

2 Prof. and Head, Dept. of Agril. Ext., Prof. Jayashankar Telangana State Agricultural University, Hyderabad - 500 030

3 Associate Professor, Dept. of Agril. Ext., Prof. Jayashankar Telangana State Agricultural University, Hyderabad - 500 030

Email : vamshi6654@gmail.com)

### ABSTRACT

*A study was conducted during March 2021-22 in Central Telangana Zone, India to measure the knowledge level of CFLD-farmers on pulses by constructing a Knowledge Test battery on CFLD-Pulses. Relevant items were collected from review of literature, publications and discussion with scientists of related fields. For relevancy test, 30 items were sent to 50 experts for their judgement. Based on experts' judgement, 25 items were selected for item analysis and administered to 30 non sample farmers. Item analysis was done by item difficulty index, item discrimination index and point biserial correlation and 22 items were finalized for knowledge test. Reliability (Test-retest method) and validity (point biserial correlation) were estimated for standardization of the test and found to be highly significant. The test was finally administered to 160 respondents (100 beneficiary and 60 non-beneficiary farmers) of CFLD programme conducted by KVK Wyrā and KVK Malyal belonging to Khammam and Mahabubabad Districts of Telangana state respectively (50 beneficiary and 30 non-beneficiaries from each KVK). Majority of the CFLD-beneficiaries (59%) and (50%) of non-beneficiaries were in medium category followed by 28% beneficiary and 13% non-beneficiary farmers under high knowledge category. The item analysis indicated significant differences in knowledge level of farmers pertaining to Non-insecticidal methods of pest management, stage at which field day is conducted, wilt tolerant variety of red gram, recommended improved varieties of pulses for kharif and rabi.*

**Keywords:** cluster front line demonstrations, knowledge, KVK, pulses.

### INTRODUCTION

Pulses are important group of crops in addition to cereals that offer high-quality protein to most of the vegetarian population around world (Bansilal et al., 2020). Although India being the largest pulse cultivating country, share of pulse to total foodgrain production is only 7–10% in the country (Reddy et al., 2017). Although this crop group is more important from the nutritional point of view, there has not been any significant increase in area and production since 1950–51, however, significant growth has been recorded during the recent years (i.e. from 2020–2021) (Bora, 2020). With the increase in irrigation and infrastructural facilities/resources, productivity of pulses has increased about 111% at 932 kg ha<sup>-1</sup> during 2021–22 from the level of 441 kg ha<sup>-1</sup> during 1950–51 (Badhala et al., 2014). The production of food grains has also touched 315 mt during 2021–22 (PIB, 2022). The potential of pulses to help address future global food security, nutrition and environmental sustainability needs has been acknowledged through the UN declaration of the 2016 International Year of Pulses (Anonymous, 2017). Government initiatives like National Food Security Mission through its Cluster Front Line Demonstration (CFLD) programme made a conspicuous effort in increasing the productivity

of pulses in the country. Cluster frontline demonstrations (CFLDs) are the long-term educational activity conducted under NFSM in a logical method on farmer's field to show the worth of new technology under micro farming (Balai et al., 2021). The department of agriculture, Cooperation and Farmer welfare had sanctioned the project "cluster frontline demonstrations on Pulses and oilseeds" under National Food Security Mission, a scheme sponsored by Government of India and implemented by KVKs with the main purposes to increase production through demonstrations (Gamit et al., 2018, Inbasekar, 2014). The scheme targets adopted village by making improved technologies become available and spread improved seeds, Integrated Nutrient Management, Sulphur, bio fertilizers, weed management, Integrated Pest Disease Management, extension activities like training and mass media campaign (Singh et al., 2019, Puniya et al., 2021). The main aim of KVK is to reduce the time lag between the generation of technology and its transfer to the farmers for increasing productivity and income from the agriculture and allied sectors on a constant basis. CFLDs are a long-term educational activity conducted in a logical manner at farmers' fields to show the value of a new technology (Singh et al., 2018). The present study was taken up with the main

objective to assess the knowledge level of the CFLD farmers. Knowledge plays an important role in escalating the production and productivity . In order to increase the cognitive domain of farmers, it is crucial to assess their existing knowledge on the recommended package of practices (Sudha Rani et al., 2014). Knowledge in the present study was operationally defined as the quantum of technical information possessed by the respondents about the technology which the respondents had learnt in the vocational trainings or visits (Choudhary and Yadav, 2012, Paul et al., 2020). For measuring the knowledge level of farmers, there is a need to develop a suitable measurement tool . Hence, in the present study a knowledge test was developed, standardised and administered to assess the level of knowledge of CFLD-Pulse farmers on different aspects of production and protection practices (Pokar et al., 2014). It also included information on knowledge gaps and the transfer of technologies for knowledge items between the two group of respondents. Knowledge test helps to know the knowledge of the participants with main intention to identify the knowledge gained through CFLD-pulses conducted by KVKs ( Chandhana et al., 2022).

**OBJECTIVE**

Present study is carried out with the objective to assess the knowledge level of cluster frontline demonstration-pulse beneficiary farmers on the activities and trainings provided by KVKs for success of the program

**METHODOLOGY**

The present study was conducted during March 2021-22 in Central Telangana Zone at KVK Wyra (17.1918° N, 80.3575° E) and KVK Malyal (17.55° N, 79.961° E) of Khammam and Mahabubabad districts respectively. These KVKs were selected purposively as they were performing CFLD Programme since 2015–16 under Pulses. From each KVK 50 respondents as beneficiaries were selected purposively. A test was developed to measure the knowledge level of pulse farmers participating in CFLD programme under NFSM. For the overall comparison between knowledge levels, non-beneficiary farmers were also studied selecting 30 respondents randomly from each KVK. The content of knowledge test consists of questions called items. Comprehensive list of questions on the latest technologies demonstrated through CFLD-Pulses were collected from literature by taking care that no crucial practice was left out (Shakya et al., 2008). The collected items were discussed with Subject Matter Specialists from 2 KVKs (Malyal and Wyra), research scientists of concerned fields (faculty of Department of Agricultural extension and communication) for relevancy of the statements and for addition and alteration of the items. Keeping the subsequent three criteria in view, the items were selected for the test

**Selection of items**

Care was taken while selecting the items viz., The items should cover all aspects of Knowledge tested, they should differentiate well informed respondent from the less informed and should have certain difficulty value and should provide thinking instead of simply memorization. ( )

**Item analysis**

The item analysis was carried out in order to obtain two kinds of information viz., index of ‘Item difficulty’ and ‘Item discrimination’. While the index of ‘item difficulty’ indicates the extent to which an item was difficult and the ‘item discrimination’ was to find out whether an item really discriminates a well-informed respondent from poorly informed respondent. The items were administered to 30 non sample respondents for item analysis. These respondents were randomly selected and weren’t included with in the sample for final study. This was done to avoid testing effect. The scoring given for the test administered was ‘one’ for correct response and ‘zero’ for in-correct response. The total number of correct answers given out of total collected items was knowledge score of the individual. Item wise analysis was shown in Table 1 (Sudha Rani et al., 2014).

**Item Difficulty Index (P)**

It is defined as the proportion of respondents giving correct answer to that particular item.

$$P_i (\text{difficulty index}) = \frac{n_i}{N_i} \times 100 \dots\dots\dots(1)$$

Where,

$P_i$ =difficulty index in percentage of the  $i^{\text{th}}$  item

$n_i$ =number of respondents giving correct answer to  $i^{\text{th}}$  item

$N_i$ =total number of respondents to whom the  $i^{\text{th}}$  item was administered

The total scores for 30 non-sample respondents were calculated and arranged in descending order and were then divided into six equal groups, based on the total scores obtained by them. These groups were labelled as G1, G2, G3, G4, G5 and G6 respectively with five respondents in each group. For the purpose of item analysis, the middle two groups G3 and G4 were eliminated keeping only four extreme groups with high and low scores.



**Item discrimination index (E<sup>1/3</sup>)**

$$E^{1/3} = \frac{(S1+S2)-(S5+S6)}{N/3} \dots\dots\dots(2)$$

S1, S2, S5 and S6 are frequencies of correct answers in groups G1, G2, G5 and G6 respectively.

N=total number of respondents in the sample of item analysis.

After estimating the item difficulty and discrimination index values, 22 items were tested for the validity by point biserial correlation (rpbis) based on the procedure followed by Varma, 2007). Test-retest method was used for testing the reliability . Point biserial correlation (Item-total correlation) and experts’ opinion were used for testing the validity of the test. Based on the availability of the beneficiaries, From Khammam district 3 mandals (2 for beneficiary and 1 for non-beneficiary farmers) and from Mahabubabad district 4 mandals (3 for beneficiary and 1 for non-beneficiary farmers) were selected. From each mandal one village was selected. Thus, from each beneficiary village randomly based on the availability, respondents were selected. The data were collected with the help of semi-structured schedule by personal interview method. The data were subjected to analysis using SPSS v.20.

**RESULTS AND DISCUSSION**

The results of the item difficulty index showed that

Pi values ranged from 20 to 93 (Table 1). Items with values <20 and >80 were considered as very easy and very difficult items respectively. So, the values <20 and >80 were not included in the test battery. In Item’s discrimination, higher E<sup>1/3</sup> value indicates that the item has validity. Acceptable range is between 0.30 to 0.70 . The results of E<sup>1/3</sup> values ranged between 0 to 0.8 (Table 1). Items with E<sup>1/3</sup> value lower than 0.30 were excluded from the test. Point biserial correlation coefficient is used to determine the internal consistency of dichotomous or binary items. It indicates the relationship between the overall score and a dichotomized response for each particular item (Varma, 2007). Thus, rpbis revealed information on how well an item measures or distinguishes in respect to the rest of the test. Acceptable range was between 0.25-0.70. Therefore, finally 22 items were selected for the test out of 30 items

**Administering the knowledge test**

The final knowledge test was administered on the selected sample farmers. The knowledge of CFLD farmers about latest Pulse technologies was studied by using developed test. While collecting the data, each item in the knowledge test was read out to the respondents in translated version (Telugu) to make it understandable to the respondents. The correct answer was assigned a weightage of ‘one’ and the incorrect with ‘zero’.

**Table 1: Item analysis for knowledge test**

Sr. No.	Frequencies of correct answer in four extreme groups				Total correct answers by all six groups	P	E <sup>1/3</sup>	Rpbis
	G1	G2	G5	G6				
1	5	3	4	0	20	66	0.4	0.330*
2	5	3	2	2	18	60	0.4	0.360*
3	5	5	5	3	28	93	0.2	0.192 <sup>NS</sup>
4	5	5	3	3	22	73	0.4	0.320*
5	3	3	4	0	16	53	0.2	0.200 <sup>NS</sup>
6	3	3	0	0	10	33	0.6	0.54**
7	3	3	3	5	20	66	0.2	0.19 <sup>NS</sup>
8	5	3	1	3	14	46	0.4	0.35*
9	5	3	1	1	14	46	0.6	0.542*
10	5	4	1	3	14	46	0.5	0.462*
11	5	3	3	3	18	60	0.2	0.187 <sup>NS</sup>
12	4	2	0	1	16	53	0.5	0.398*
13	5	3	2	0	18	60	0.6	0.52**
14	4	2	0	2	10	33	0.4	0.392*
15	2	4	2	2	16	53	0.2	0.192 <sup>NS</sup>
16	2	2	1	0	6	20	0.2	0.292*
17	3	3	1	1	16	53	0.4	0.37*
18	3	3	0	2	12	33	0.4	0.299*
19	3	5	2	0	14	46	0.6	0.43*

Sr. No.	Frequencies of correct answer in four extreme groups				Total correct answers by all six groups	P	E <sup>1/3</sup>	Rpbis
	G1	G2	G5	G6				
20	3	3	2	0	14	46	0.4	0.32*
21	5	3	0	3	16	53	0.5	0.42*
22	5	5	2	2	20	66	0.6	0.48*
23	5	3	0	2	12	40	0.6	0.32**
24	5	5	3	3	22	73	0.4	0.38*
25	5	2	1	3	10	33	0.3	0.28*
26	5	5	2	2	22	73	0.6	0.56**
27	0	2	2	0	8	26	0	0
28	5	5	4	2	22	73	0.4	0.38*
29	5	1	4	0	14	22	0.2	0.199 <sup>NS</sup>
30	5	3	0	0	12	40	0.8	0.75**

**Table 2: Details of construction of knowledge Test**

Knowledge test	knowledge items	P	E <sup>1/3</sup>	Test-retest method	Final items
CFLD-Pulses	30	35–80	0.30–0.8	r=0.72	22

**Selection of item for the test**

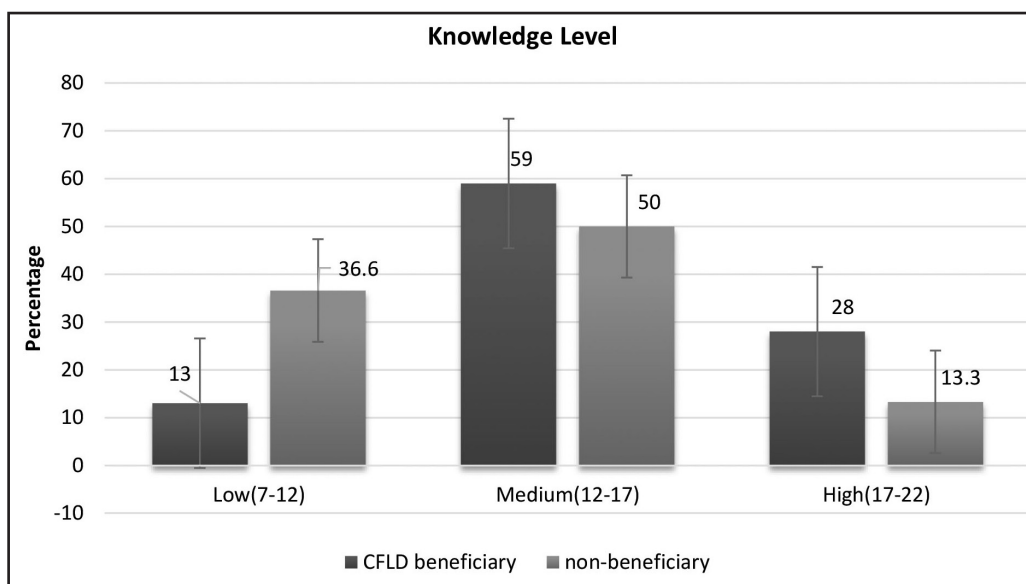
Observing from Table 1, suitable range of values based on two Criteria viz., item difficulty index and item discrimination index were selected and are presented in Table 2 and were considered for selection of items. Items with difficulty level ranging from 35 to 80 and discrimination

indices ranging from 0.3 to 0.8 were selected. That means, the items which were neither too difficult nor too easy to reply and could discriminate the well informed respondents to poorly informed respondents were selected. The details of initial knowledge items, item difficulty, item discrimination, r value of test-retest method for Reliability test and finally no. of items are presented in Table 2.

**Table 3: Distribution of CFLD farmers according to their knowledge**

(n=160)

Sr. No.	Knowledge level	CFLD beneficiary (n <sub>1</sub> =100)		CFLD non-beneficiary (n <sub>2</sub> =60)	
		F	%	F	%
1	Low (7–12)	13	13	22	36.6
2	Medium (12–17)	59	59	30	50
3	High (17–22)	28	28	8	13.3
	Mean	17.59		13.66	
	Z Value	5.12*			



**Fig. 1: Distribution of CFLD farmers according to their knowledge on latest pulse technologies (n=160)**

The table 3 and figure 1 indicate that majority (59%) of the CFLD beneficiary farmers had medium knowledge gain on pulse technologies provided through CFLD followed by High (28%) and Low (13%) knowledge gain, whereas in CFLD non-beneficiary farmers, (50%) had medium knowledge followed by low (36.6%) and High (13.3%) knowledge. The results were in line with Pokar *et al.* (2014), Bhavani.(2021), Abhishek *et al.* (2023), Swati *et al.*(2022).

**Table 4: Rank ordering of knowledge test items on Cluster Frontline Demonstration** (n=160)

Sr. No.	Statements	Beneficiaries (n <sub>i</sub> =100)		Non-beneficiaries (n <sub>j</sub> =60)		
		Frequency & percentage	Rank	F	%	Rank
1	Recommended improved varieties of pulses for Kharif and Rabi.	75	X	16	26.6	XVII
2	Seed rate of recommended improved variety of pulse (Red gram/ green gram in (kg ha <sup>-1</sup> ))	89	II	54	80	II
3	Fungicide used for seed treatment and at what dose?	82	V	47	78	V
4	Recommended season and time of sowing for Pulse	92	I	56	83	I
5	Recommended dose for foliar nutrient spray?	35	XXI	12	20	XX
6	Recommended insecticide to use against Red gram pod borer	50	XV	27	45	XI
7	Recommended fungicide to use against Red gram Wilt	70	XIII	25	41.6	XII
8	Name sucking pests in green gram and insecticides to control it	45	XVIII	28	46.6	X
9	Non-insecticidal method of pest management in green gram?	86	IV	34	56.6	IX
10	Multi-k is applied at which stage of the crop?	32	XXII	11	18.3	XXI
11	Dosage of Multi-k?	48	XVI	15	25	XVIII
12	13-0-45 is applied as	80	VI	48	80	IV
13	At what stage of the crop, field day is conducted?	78	VII	20	33.3	XV
14	Main purpose of Conducting Field day	78	VII	20	33.3	XV
15	Stakeholders involved in field day	72	XII	22	36.6	XIV
16	Stage of the pulse crop, more sensitive to irrigation	65	XIV	40	66	VII
17	Stage of the Red gram is more susceptible to wilt	43	XIX	35	58	VIII
18	Chemical used to control flower drop	40	XX	13	21.6	XIX
19	Wilt tolerant variety of Red gram is	76	IX	10	16.6	XXII
20	Pheromone traps are used against which of the following pest	74	XI	45	75	VI
21	Major pest and how do you identify them in Red gram, Green gram.	46	XVII	23	38.3	XIII
22	Do you know any health benefits derived from consuming pulses? If yes, what are they	87	III	50	83.3	III

It could be observed from the table 4 that more than (50%) of beneficiaries and non-beneficiaries had knowledge on what is the recommended time of sowing for pulse as it is the most common season based item where farmers had prior knowledge; followed by about 90 percent of beneficiaries and 80 percent of non-beneficiaries had knowledge on seed rate of improved pulse varieties, as per the observation improved varieties of pulse was diffused among non-beneficiaries through neighboring farmers and such both CFLD beneficiary and non-beneficiaries had good knowledge on them; 87 percent of CFLD beneficiaries had good knowledge on health

benefits associated with consuming pulses compared to 83.3 percent non-beneficiaries, as beneficiaries were exposed to trainings from KVKs prior to programme and such through observation, it was found that their nutritional progress is also enhanced. From the survey, it was observed that less than 50 percent of beneficiaries had knowledge retention on foliar nutrient spray dosage, chemical used to control flower drop even though they were aware of spray from trainings, the possible reason for this might be due to the cost associated with nutrient spray and delay in input distribution to beneficiary farmers. Majority of the questions were on aspects

such as varietal, pests and their control managements. The items/statements could be answered correctly only when the respondents have understood and learnt from the programme by attending trainings and field visits and the results obtained inferred the same. The medium level of knowledge by majority of the beneficiaries might have flashed this trend. The statements that have received more than 70 percent of the response were related to knowledge regarding basic and important aspects of pulse crop production. while below 50% were specific and thought based questions.

## CONCLUSION

Programme resulted in knowledge gain among beneficiaries in comparison to non-beneficiaries and this might have created greater awareness and motivation among other farmers to adopt the improved package of practices. These demonstrations also built the relationship and confidence between beneficiaries and scientist. The beneficiary farmers also played an important role as source of information for quality seed availability for wider dissemination of green gram variety MGG 347 and red gram variety WRG 65 in Mahabubabad and Khammam districts respectively.

## POLICY IMPLICATION

For the success of cluster frontline demonstration programme, information retainment of farmers is crucial and this paper suggest decision makers the area of improvement in terms of information and trainings required

## CONFLICT OF INTEREST

Authors have no conflict of interest . We certify that the submission is original work and is not under review at any other publication.

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