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Study on constraints and adoption of black gram seed production technologies by the farmers of Cauvery delta zone of Tamil Nadu

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Abstract
The field demonstration on IPT for quality seed production in blackgram was conducted in 4 villages comprising of 76 locations of Nagapattinam District in Cauvery delta zone under Tamil Nadu – Irrigated Agriculture Modernization and Water Bodies Restoration and Management Project (TN-IAMP) during April 2018 – June 2018 by Tamil Nadu Rice Research Institute, Aduthurai, Thanjavur District, Tamil Nadu. The impact assessment with reference to increase in knowledge levels of farmers regarding scientific package of practices, extent of adoption of selected technology and percent adoption of production technology was carried out in all five blocks. The data on overall adoption level of black gram grower about recommended cultivation practices revealed that majority of the respondent had medium level of adoption of the cultivation practices (55.26%) while 31.58 and 13.16 % of them adopted of recommended cultivation practices in low and high level adoption respectively. The productivity achieved under demonstration over farmer's practices created awareness and motivated the other farmers to adopt critical innovations for blackgram cultivation *viz*., selection of high yielding varieties, integrated nutrient management particularly post flowering nutrient management, integrated pest management and other technology of blackgram.

Keywords: Adoption, Integrated nutrient management, integrated pest management, technology index

Introduction
Pulses belong to one of the largest family Leguminosae. Black gram is mainly cultivated in Indian subcontinent. Black lentil is nothing but the split black gram and after removing black skin it is sold as white lentil. In India Black gram is popular as "Urad dal" and it is highly prized pulse among all the pulses. Apart from India it is also cultivated in Pakistan, Afghanistan, Bangladesh and Myanmar. Most suitable climate to cultivate Black gram is 27-30º C with heavy rainfall. This annual crop prefers loamy soil which has high water preservation capability. Black gram grows normally in 90-120 days and it also enriches the soil with nitrogen. India is major producer and consumer country of black gram. Black gram best source of protein, fat and carbohydrates and also contains iron, folic acid, calcium, magnesium, potassium and vitamin B which are necessary for our body It has two types of fibers: soluble and insoluble. Insoluble fiber helps to prevent constipation and soluble fiber helps in our digestion system. It also helps to reduce cholesterol which ultimately improves cardiovascular health. High amount of magnesium and folate of black gram supports blood circulation. Black gram has medical properties which help to Rheumatic pains, stiff shoulder and contracted knees. In India, the area, production and productivity of Pulses were 24.91 million hectares, 16.35 million tonnes and 733 kg per hectare, respectively during 2015-2016. The area under pulses has increased from 19 million ha. in 1950-51 to 24.91 million ha. in 2015-2016. However, the per capita daily availability of pulses has come down significantly from 51.1 gram per day in 1971 to about 42.00 gram in 2015-2016 as against WHO recommendation of 80 gram per day.

Mainly due to stagnation in the production of pulses was over the last three decades. In general, pulses give lower yield than cereals. This led to the assumption that pulses may have a lower genetic potential for yield than cereals. However, available evidence shows that grain legumes have as high or even higher genetic potential for yield as the cereal crops (DAC & FW, 2015-16). Black gram popularly known as Urd bean, Urid or mash is an important pulse crop in India. Black gram (*Vigna mungo* L.) reported being originated in India. Its references have also been found in Vedic texts such as Kautilya"s Arthasasthra "and in,, Charak Samhita" lends support to the presumption of its origin in India. India is the largest producer and consumer of a Black gram in the world. Black gram is a rich protein food. In Black gram contains 26.2 percent crude protein 1.2 percent Fat and 56.6 percent carbohydrate.

The pods are long and cylindrical and about 4 to 6 centimeters in length four to ten seeds in a pod. The seeds are generally black or very dark brown. The crop is suitable for intercropping with different crops such as cotton, sorghum, pearl millet, green gram, maize, soybean, groundnut, for increasing production and maintaining soil fertility. It is extensively grown under varying climatic conditions and soil types in India. It is also cultivated in many tropical and sub-tropical countries of Asia, Africa and Central America, although, India, Pakistan, Bangladesh, Burma and Sri Lanka are the principal countries contributing to the world production. The black gram in India is mainly grown in the states of Madhya Pradesh, Uttar Pradesh, Bihar, Punjab, Maharashtra, West Bengal and Tamil Nadu. Black gram is mostly grown as a rainfed crop during summers in Northern India and in winters in Peninsular and Southern India.

During 2015-16, blackgram accounted for an area of 3.19 million hectare, production 1.95 million tones and average productivity 596 kg per hectare. The production of pulses, in general and black gram in particular, has not been able to keep pace with the rapid increase in demand by ever increasing population. The lower production and productivity are mostly due to several problems with the blackgram growing farmer's particularly improper knowledge on package of practices. Therefore, it is necessary to assess the technological gap in production and also to know the problems and constraints in adopting improved black gram production technologies (Islam *et al.*, 2011) [6]. Keeping this in view, the present investigation through demonstration was undertaken on the level of knowledge of farmers regarding black gram cultivation, extent of adoption of improved practices, to find out the yield gap in black gram production technology.

Methodology

The field demonstration on IPT for quality seed production in blackgram was conducted in 4 villages comprising of 76 locations of Nagapattinam District in Cauvery delta zone under Tamil Nadu – Irrigated Agriculture Modernization and Water Bodies Restoration and Management Project (TN-IAMWARM) during April 2018 – June 2018 by Tamil Nadu Rice Research Institute, Aduthurai, Thanjavur District, Tamil Nadu. A multistage sampling design was adopted to select sample for data collection. In total 76 farmers of the four villages of Thiruvelankadu, Gangadharapuram, Nakkambadi and Sendieruppu selected randomly after making a list of the villages having black gram cultivation. An interview schedule was prepared so as to collect the information in line with the objective of the study. Personal interview technique was used for data collection Based on the cumulative knowledge score obtained the respondents were categorized into three categories *viz*., low, medium and high. Percentile was used to find out the adoption level of the farmers.

The data were collected through personnel interview, tabulated and analyzed to find out the results and draw the conclusion. The statistical tool like percentage was employed to analyze the data. The constraints as perceived by respondents were scored on the basis of magnitude of the problem as per Meena and Sisodiya (2004) [10]. The responses were recorded and converted in to mean per cent score and ranked accordingly as per Warde *et al.* (1991) [15]. The extension gap, technology gap and the technology index were work out with the help of formulas given by Samui *et al.* (2000) [13] as mentioned below:

Extension gap = Demonstration yield - farmers' yield (control)
Technology gap = Potential yield- demonstration yield

$$\text{Technology index} = \frac{\text{Technology gap}}{\text{Potential Yield}} \text{x} 100$$

The component of demonstrations comprises of full package of practices compared with farmer's practices. The improved production technologies adopted as follows:

1. **Field preparation:** Prepare the land to fine tilth and form beds and channels. Amendments for soil surface crusting: To tide over the soil surface crusting apply lime at the rate of 2t /ha along with FYM at 12.5 t/ha or composted coirpith at 12.5 t/ha to get an additional yield of about 15 - 20%.
2. **Seed treatment:** Treat the seeds with Carbendazim or Thiram @ 2 g/kg of seed 24 hours before sowing (or) with talc formulation of *Trichoderma viride* @ 4g/kg of seed (or) *Pseudomonas fluorescens* @ 10 g/kg seed. Bio control agents are compatible with biofertilizers. First treat the seeds with Biocontrol agents and then with Rhizobium. Fungicides and biocontrol agents are incompatible.
3. **Seed treatment with biofertilizer:** Treat the seeds with 3 packets (600 g/ha) of Rhizobial culture CRU-7 + 3 packets (600 g/ha) of PGPR and 3 packets (600 g/ha) of Phosphobacteria developed at TNAU using rice kanji as binder. If the seed treatment is not carried out apply 10packets of Rhizobium (2000 g/ha) + 10 packets of PGPR (2000 g/ha) and 10 packets (2000 g) of Phosphobacteria with 25 kg of FYM and 25 kg of soil before sowing.
4. **Fertilizer application:** Apply fertilizers basally before sowing. Rainfed: 12.5 kg N + 25 kg P2O5 + 12.5 kg K2O +10 kg S*/ha; Irrigated: 25 kg N + 50 kg P2O5 + 25 kg K2O + 20 kg S*/ha; *Note: Applied in the form of gypsum if Single Super Phospate is not applied as a source of phosphorus; Soil application of 25 kg ZnSo4/ha under irrigated condition; Soil application of TNAU micronutrient mixture @ 5 kg/ha as Enriched FYM (Prepare enriched FYM at 1:10 ratio of MN mixture & FYM; mix at friable moisture &incubate for one month in shade).

   Foliar spray of 1% urea for yield improvement in black gram: For yield improvement through increasing the physiological, biochemical attributes, foliar spray of urea 1% on 30 and 45 days after sowing is recommended. For rice fallow pulses in Delta area, the present recommendation of foliar spray of 2% DAP may be continued.

   Foliar spraying to mitigate moisture stress: Foliar spraying of 2% KCl + 100 ppm Boron during dry spell as mid season management practice in black gram during *Rabi* season is recommended to increase the yield over KCl spray alone. Economizing the use of micronutrients through seed treatment for blackgram: Seed coating with biofertilizers and micronutrients *viz*., Zn, Mo & Co @ 4, 1, 0.5 g/kg of seed is recommended. Nitrogen substitution by organic sources for pulses: 50 per cent nitrogen can be substituted through organic source (850 kg of vermicompost per hectare). Lime application is recommended for pulses with soil pH less than 6.0.

5. **Sowing of seeds:** For irrigated crop dibble the seeds adopting 30 x 10 cm cm spacing and For rainfed crop dibble the seeds adopting 25 cm x 10 cm spacing
6. **Water management:** Irrigate immediately after sowing, followed by life irrigation on the third day. Irrigate at intervals of 7to 10 days depending upon soil and climatic conditions. Flowering and pod formation stages are critical periods when irrigation is a must. Avoid water stagnation at all stages. Apply KCl at 0.5 per cent as foliar spray during vegetative stage if there is moisture stress.
7. **Spraying of diammonium phosphate or urea, naa and salicylic acid:** Foliar spray of Spray of NAA 40 mg/lt and Salicylic acid 100 mg/lt once at pre-flowering and another at 15 days thereafter; b. i) For rice fallow crops foliar spray of DAP 20 g/lt once at flowering and another at 15 days thereafter ii) For irrigated and rainfed crops, foliar spray of DAP 20 g/litre or Urea 20 g/litre once at flowering and another at 15 days thereafter.; c. Foliar spray of salicylic acid 100 mg/litre once at preflowering and another at 15 days thereafter.
8. **Weed management:** Pre emergence application of Pendimethalin 3.3 litres/ha under irrigated condition 2.5 litres/ha under rainfed condition on 3 days after sowing using Backpack/ Knapsack/Rocker sprayer fitted with flat fan nozzle using 500 litres of water for spraying one ha followed by one hand weeding at 20 DAS (or) EPOE application of quizalofop ethyl @ 50 g ai/ha-1 and imazethapyr @ 50 g ai ha-1 on 15 – 20 DAS. If herbicides are not applied give two hand weedings on 15 and 30 days after sowing. For the irrigated blackgram PE isoprotwron @ 0.5 kg ha-1 followed by one hand weeding on 30 DAS.
9. **harvesting:** Picking the matured pods, drying and processing; Uprooting or cutting the whole plants, heaping, drying and processing

Results and Discussion

Overall adoption level of black gram grower about recommended cultivation practices

The analysis on overall adoption level of black gram grower about recommended cultivation practices revealed that majority of the respondent had medium level of adoption of the cultivation practices (55.26%) while 31.58 and 13.16 % of them adopted of recommended cultivation practices in low and high level adoption respectively.

Adoption of recommended cultivation practices of black gram growers by individual

The individual adoption level was assessed with the packages of practices for enhancing the higher seed production in blackgram under Cauvery delta zone of Tamil Nadu such as high yield varieties, land preparation, seed treatment practices, spacing, sowing time, manuring, recommended NPK, cultural practices, water management, disease management, pest management and foliar application of nutrients. It is evident from table 2 that 100 percent of the respondent adopted the good land preparation and timely sowing for maintaining optimum plant density which was followed by 98.68 percent of the respondent adopted the water management practices. The same level of respondent recorded in cultural practices and disease management by 92.11 per cent. The level of respondent adopted other recommended practices such as high yield varieties (52.63 per cent), seed treatment practices (59.21 per cent), spacing (65.79 per cent), manuring (65.79 per cent), recommended NPK (78.95 per cent), pest management (89.47 per cent) and foliar application of nutrients (59.21 per cent). The level of individual respondent in adoption of recommended practices showed that all the blackgram growers were known the technologies with a level of more than 50 per cent and they were motivated in adoption of technologies through training and demonstration so as to achieved maximum adoption level. The similar findings were reported by Shani Kumar Singh *et al*, (2017) [1].

Constraints faced by farmers

Table 3 revealed that majority of the respondent constraints faced by not existing of the market (100 %), it was also fallowed by lack of technical guidance (94.74%), complexity (92.11%), lack of marketing facilities (78.95%), lack of financial support (68.42%).non-availability of skilled labour (55.26%), and monopoly of merchant in the market (47.37%)

Table 1: Overall adoption of Black gram seed grower about improved cultivation practices (N =76)

S. No.	Categories	Frequency	Percentage
1	Low	24	31.58
2	Medium	42	55.26
3	High	10	13.16

Table 2: Adoption of individual recommended cultivation practices of Black gram seed growers

S. No.	Particular	Frequency	Percentage
1.	High yield varieties	40	52.63
2.	Land preparation	76	100.00
3.	Seed treatment practices	45	59.21
4.	Spacing	50	65.79
5.	Sowing time	76	100.00
6.	Manuring	50	65.79
7.	Recommended NPK	60	78.95
8.	Cultural practices	70	92.11
9.	Water management	75	98.68
10.	Disease management	70	92.11
11.	Pest management	68	89.47
12.	Foliar application of nutrients	45	59.21

Table 3: Constraints faced by farmer

S. No.	Constraints	Frequency	Percentage
1.	Lack of technical guidance	72	94.74
2.	Complexity	70	92.11
3.	Lack of financial support	52	68.42
4.	Not existing of the potential market	76	100.00
5.	Monopoly of Merchant in the market	36	47.37
6.	Non-availability of skilled labour	42	55.26
7.	Lack of marketing facilities	60	78.95

Table 4: Exploitable productivity, extension gap, technology gap and technology index of black gram as grown under demonstrations and existing package of practices.

Location	Yield (kg/ha)		% increase in yield	C:B ratio		Extension gap (kg/ha)	Tech. Gap (kg/ha)	Tech. Index
	Demo	Control		Demo	Control			
Thiruvelankadu	887	603	47.15	3.04	1.88	284.4	162.5	15.48
Gangadharapuram	919	616	49.03	3.32	2.06	302.3	131	12.48
Nakkambadi	813	618	31.39	2.92	1.80	194.3	237	22.57
Sendieruppu	750	625	20.00	2.83	1.64	125.0	300	28.57
Average	842	611	37.90	3.03	1.84	231.4	207.6	19.77

Yield gap analysis of Black gram cultivation

The mean data indicated that the highest yield (842 kg/ha) was found in demonstration plots and lower yield (611 kg/ha) under farmers' plots (Table 4). The cost benefit ratio was higher in demonstration plot (1: 3.03) than control (1: 1.84). The results clearly showed that due to knowledge and adoption of scientific practices, the yield of black gram could be increased by 37.90 per cent over the yield obtained under farmers' practices. Similar findings were reported by Dubey *et al.* (2010) [10]. Yield of the demonstration trials and potential yield of the crop was compared to estimate the yield gaps which were further categorized into technology and extension gaps (Hiremath and Nagaraju, 2009) [5]. Average extension gap was 231.4 kg/ha, which emphasized the need to educate the farmers through various extension means like demonstration. The average technology gap of four location was 207.6 kg/ ha. The average technology gap observed may be attributed to dissimilarity in soil fertility status, agricultural practices and local climate conditions. The technology index indicated the feasibility of evolved technology at the farmer field. Lower the value of technology index, more is the feasibility of technology demonstrated, (Sagar and Chandra, 2004; Arunachalam, 2011 and Kumar *et al*, 2014) [12, 1, 9]. As such reduction of technology index varying from location to location which exhibited the feasibility of technology demonstrated. Similar yield enhancement in different crops in front line demonstration has amply been documented by Haque (2000) [4], Mishra *et al.* (2009) [11] and Kumar *et al.* (2010) [8]. The demonstration obtained significantly positive results and also provided researcher an opportunity to demonstrate the productivity potential and profitability of improved production technologies under normal farm situation which could be sustain the yield for long period without affecting the soil productivity.

Conclusion

It is concluded that the productivity achieved under demonstration over farmers practices created awareness and motivated the other farmers to adopt critical innovations for blackgram cultivation *viz*., selection of high yielding varieties, integrated nutrient management particularly post flowering nutrient management, integrated pest management and other technology of black gram in the Districts.

References

1. Arunachalam R. Spread and acceptance of recommended production technologies in green gram and black gram: a comparative analysis. Legume Res - An Int. 2011; 34(1):8-13.
2. Das Mamoni, Puzari NN, Ray BK. Impact of training of skill and knowledge development of rural women. Agric Extn Rev. 2010; 1(1):29-30.
3. Dubey S, Tripathi S, Singh P, Sharma RK. Yield gap analysis of black gram production through frontline demonstration. J Prog Agric. 2010; 1(1):42-44.
4. Haque MS. Impact of compact block demonstration on increase in productivity of rice. Maharashtra J Extn Edu. 2000; 19(1):22-27.
5. Hiremath SM, Nagaraju MV. Evaluation of front line demonstration trials on onion in Haveri district of Karnataka. Karnataka J Agric Sci. 2009; 22(5):1092-1093.
6. Islam M, Mohanty AK, Kumar S. Correlation growth yield and adoption of urdbean technologies. Indian Res J Ext Edu. 2011; 11(2):20-24.
7. Javat H, Patel MM, Kumar KS, Saxena A. Impact of front line demonstrations on scientiic temperament of wheat growers Rajasthan J Extn Edu. 2011; 17(18):115-117.
8. Kumar A, Kumar R, Yadav VPS, Kumar R. Impact assessment of Frontline demonstrations of Bajra in Haryana State. Indian Res J Extn Edu. 2010; 10(1):105-108.
9. Kumar S, Singh R, Singh A. Assessment of gaps in pulse production in Hamipur district of Himachal Pradesh. Indian Res J Ext Edu. 2014; 14(2):20-24.
10. Meena SR, Sisodiya SS. Constraints as perceived by the respondents in adoption of recommended guava production technology. Rajasthan J Extn Edu. 2004; 12(13):146-153.
11. Mishra DK, Paliwal DK, Tailor RS, Deshwal AK. Impact of Frontline demonstrations on yield enhancement of potato. Indian Res J Extn Edu. 2009; 9(3):26-28.
12. Sagar RL, Chandra G. Frontline demonstration on sesame in West Bengal. Agric Extn Rev. 2004; 16(2):7-10.
13. Samui SK, Maitra S, Roy DK, Mandal AK, Saha D. Evaluation of frontline demonstration on groundnut. J Indian Soc Costal Agric Res. 2000; 18(2):180-183.

14. Shani Kumar Singh, Arun Kumar Singh, Kailash Jakhar. Study on Constraints and Adoption of Black Gram Production Technology by the Farmers in Mirzapur District of Uttar Pradesh, India. Int. J Curr. Microbiol. App. Sci. 2017; 6(10):174-178.
15. Warde PN, Bhope RS, Chudhary DP. Adoption of dry land horticulture technology. Maharastra J Extn Edu. 1991; 10(2):108-111.