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Impact assessment of trainings and front-line demonstrations in black gram (*Vigna mungo*) cultivation of Tirap district of Arunachal Pradesh

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Abstract
In the five adopted villages, in Tirap district of Arunachal Pradesh, an impact assessment was conducted to determine the improved knowledge levels of farmers with reference to the scientific package of practices, the degree of selected technology acceptance, and the percentage of production technology adoption by K.V.K. In findings, the overall knowledge level of farmers rose by 8% at the low level, 52% at the middle level, and 28% at the high level. Cultural approaches (48%), weed control (41%), integrated nutrition management (35%), pest and disease management (32%) and IPM (2%) were found to have the highest levels of knowledge relating various scientific advancements. The technology index (20.97) showed that it was possible for farmers to use evolving technologies in their fields.

Keywords: FLD, black gram, training, B: C ratio

Introduction

The black gram (*Vigna mungo*), is a popular pulse crop that is important for global food and nutritional security. It belongs to fabaceae family. Because the crop has a brief lifespan, it is a natural survivor that can be used as a sole or an intercrop in any season. India contributes around 25% in global pulses production, it however, consumes 30% and imports around 14% of its pulses requirements (Singh *et al*., 2017a) [15].

India's pulse yield is just 806 kg/ha, which may be the result of various factors as well as a lack of policy attention (Anonymous, 2019) [1]. The issue of low pulse production is further exacerbated by the unavailability of high-quality pulse seeds, a lack of technical expertise, a failure to apply plant protection measures, and a failure to implement integrated nutrition management (Kumar *et al*. 2010; Kumar *et al*. 2014) [10, 11]. India's food grain production, which was 264 million tons in 2013–14 and is predicted to reach 280 million tons in 2020-21, has increased steadily and significantly as a result of the green revolution. However, because pulses are now cultivated in marginal dry lands and the fertile belts are primarily used for major crops like paddy etc. The productivity of pulses has decreased during the past few decades.

Roughly 10% of all pulses produced in India are black grams. Therefore, it is necessary to assess the technological gap in production and also to know the problems and constraints in adopting modern black gram production technologies; Islam *et al.,* (2011) [7]. With all of this in mind, the current study was conducted to determine the existing level of knowledge among black gram growers regarding the adoption scale of improved methods, yield gap and other related topics.

Materials and Methods

The current study was carried out in the Tirap district of Arunachal Pradesh during the Kharif season of 2016, 2017 and 2018. Twenty-five farmers were chosen from five different villages: Nutan Basti, Lekhi Basti, Makat, Doidam, and Noitong. The personnel interviews were used to gather data, which was then tabulated, analyzed and a conclusion was reached. To examine the data, a statistical instrument such as percentage was used. According to Meena and Sisodiya (2004) [12], respondents' perceptions of the constraints were rated based on the severity of the issue. The replies were noted, translated into a mean percent score, and then rated in accordance with Warde *et al*. (1991) [17]. The formula given by Samui *et al.,* (2000) [13] were used to calculate the extension gap, technology gap and the technology index; as mentioned below:

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

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

Table 1: Overall knowledge of scientific package of practices of blackgram

Category	Before intervention of KVK	After intervention of KVK
Low level of knowledge	44	08
Medium level of knowledge	38	52
High level of knowledge	9	28

Table 2: Knowledge regarding different technologies for black gram cultivation

Sr.	Technology	Low	Medium	High
1.	Cultural Practices	36	16	48
2.	Pest and disease control	25	43	32
3.	Integrated pest management	34	41	25
4.	Weed management	21	38	41

Table 3: Overall adoption of scientific package of practices of blackgram (percentage)

Category	Before intervention of KVK	After intervention of KVK
Low level of knowledge	26	7
Medium level of knowledge	48	22
High level of knowledge	26	71

Table 4: Adoption of Technologies

S. No.	Name of Technology	Adoption %
1.	Cultural practices	64
2.	Pest & Disease management	59
3.	Integrated Pest Management	56
4.	Weed management	53
5.	Integrated Nutrient Management	47

Table 5: Productivity, Yield gaps and Technology Index of Black gram

Year	Area (ha)	No of Demos.	Yield (q/ha)		% Increase in yield	B:C ratio		Extension gap (q/ha)	Technology gap (q/ha)	Technology Index
			Demos	Control		Demos	Control			
2016	10	24	6.58	4.80	37	3.26	2.67	1.78	2016	10
2017	10	25	7.93	6.39	19	2.96	2.48	1.54	2017	10
2018	10	25	8.77	5.26	40	3.84	2.30	3.51	2018	10
	Average		7.76	5.48	32	3.35	2.48	2.27	2.06	20.97

Results and Discussion

The findings showed that prior to the KVK's intervention, the general level of knowledge regarding black gram cultivation was 44, 38 and 9% (low level, medium level, and high level) respectively. However, following the KVK's intervention through various training programs, kisan gosthis, field visits and front-line demonstrations (FLDs), the overall knowledge increased to 08, 52, and 28% (Table 1). The comparable results published by Javat *et al*. (2011) [9].

Regarding the various aspcets of scientific black gram cultivation, 48% of farmers reported having a good degree of knowledge of cultural practices, which was followed by integrated nutrient management (35%), weed management (41%) and other areas. In contrast, just 25% of people knew the bare minimum regarding IPM and 32% knew about pest and disease control (Table 2).

Prior to the KVK's involvement, 48% of farmers had a medium level of understanding about scientific black gram production. This substantially changed following the KVK's intervention, as 71% of farmers had a high level of knowledge (Table 3). When it came to the percentage of various technologies used, the cultural practices sector had the highest adoption rate (64%) followed by IPM (56%) and pest and disease control (59%), respectively. The lowest adoption percentage was found with INM (47%) and Weed management (53%) (Table 4).

Yield gap analysis of black gram cultivation

Table 5 unequivocally demonstrates that farmers' plots reported the lowest yield (5.4 q/ha) while FLD plots reported the maximum yield (7.76 q/ha). In the FLD plot, the cost-benefit ratio (1: 3.35) was greater than in the control (1: 2.48). These results unequivocally demonstrate that the yield of black grams may be raised by 37%, 19%, and 40% above the yield attained under farmers' methods as a result of understanding and adoption of scientific practices. The findings of Dubey *et al*. (2010) [5] corroborate these conclusions.

In order to quantify the yield gaps, which were further divided into technological and extension gaps, the yield of the front-line demonstration trials and the crop's potential yield were compared (Hiremath and Nagaraju, 2009) [6].

The average extension gap was 2.27 q/ha, indicating that farmers were receiving more thorough and advanced instruction through various channels, such as field visits, kisan gosthi, FLD, and trainings. The range of the technology gap was 1.05 q/ha to 3.24 q/ha, with an average of 2.06 q/ha. After three years of the FLDs initiative, the average technology gap was 25q/ha. A number of factors, including soil fertility, agricultural practices and microclimate; may contribute to the observed difference in the technology gap.

The technology index revealed the significance difference between the demonstration field and the farmer's field. There are scope of scientific technologies at the farmer field. Lower the value of technology index, more is the feasibility of technology demonstrated, (Arunachalam, 2011 and Kumar *et al.*, 2014) [2, 11].

The technology index dropped from 32.9 percent in 2016 to 10.69 percent in 2018, demonstrating the viability of the technology. Similarly, Kumar *et al.* (2010) [10] has provided extensive documentation of the yield boost in many crops in front line demonstration.

The FLD produced very encouraging findings, inspiring researchers to show farmers' fields' productivity potential and feasibility in more detail. Similar results were reported in black grams by Chauhan and Pandya (2012) [3].

After receiving training, FLD, kisan gosthi, and field visits from KVK scientists in the Tirap district of Arunachal Pradesh, five adopted villages saw a positive change in the scientific knowledge and acceptance of various technologies related to black gram growing. The finding has also supported by Jat *et al.* (2017) [7], Singh *et al.*, (2017b) [8] and Singh *et al.* (2019) [14].

The district's other farmers were encouraged to adopt scientific knowledge for blackgram cultivation, such as cultural practices, integrated pest management, integrated nutrient management, integrated weed management, etc., by the higher productivity reported under FLD over farmers practices.

Conclusion

The conclusion drawn from the study indicates a significant positive impact of the Krishi Vigyan Kendra's (KVK) interventions on the knowledge, adoption of technologies, and yield of black gram cultivation among farmers. Before KVK's engagement, there was a notable deficiency in the knowledge levels and adoption of scientific practices among the farmers. However, through comprehensive training programs, Kisan Gosthis, field visits, and front-line demonstrations (FLDs), there was a substantial improvement in the farmers' understanding and application of scientific practices in black gram cultivation.

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