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Impact analysis of demonstration on integrated nutrient management in Green gram

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Abstract
Green gram (*Vigna radiata*) is an important and traditional pulse crop of Odisha. Green gram is the major source of protein and fibre. It is eaten both in raw form (sprouted green gram) and cooked form (dal).It can be grown in all the seasons i.e during kharif, pre-rabi, rabi and summer season in Bargarh district of Odisha. A Demonsration was undertaken during *Rabi 2015-16 &*2016-17 in the farmer's field of Bargarh District of Odisha to find out the response of integrated nutrient management on plant growth, yield in green gram cv.TARM-1. In this Demonsration, INM includes Soil application of Zn (25kg zinc sulphate/ha) and B (10 kg borax/ha), seed treatment of Rhizobium and PSB (200g/10kg of seed) with recommended dose of NPK. Applications of 25kg $ZnSO_4$/ha, 10 kg borax/ha and seed treatment with Rhizobium (200g/10kg of seed) and PSB (200g/10kg of seed) resulted in enhancement of plant growth and yield characteristics.23% & 20% increase in yield was obtained with application of integrated nutrient management in farmer's field during 2015-16 and 2016-17 respectively.

Keywords: Green gram, micronutrients, rhizobiums, PSM and yield

Introduction
Green gram (*Vigna radiata* L.) is one of the oldest pulse crops and is the most nutritious. Apart from high level of protein (25%), green gram also contains fat (1.3%), dietary fibre (3.2%) and carbohydrate (57%) is well adapted to a range of soil conditions including light soils and can thrive even under limited irrigation, and more over it is suited for crop rotation and crop mixtures.

As the legume crops have self-nitrogen fixing capacity, their contribution has an added advantage in the present day of fertilizer crisis in the country. In Odisha low yield level is due to the fact that the crops are generally grown under poor management condition without application of nutrients, irrigation and plant protection measures, whereas these factors are reported to greatly affect seed yield in different crops (Agarwal, 2010). The use of micronutrients in crop production is gaining importance now a day. Significant effect of application of micronutrients *viz.* zinc, molybdenum, cobalt, boron, iron, manganese etc. in crop growth, yield in green gram have been reported in literature (Singh, 2010).

Frontline Demonstration (FLD) is one of the most powerful tools for transfer of technology. FLD is a long term educational activity conducted in a systematic manner in farmer's fields to worth of a new practice/technology.

Materials and Method
The present demonstration conducted in bargarh district of Odish during 2015-16 and 2016-17. In each year 13 no of farmers from 6 village's viz. Sardhapali, Grinjel, Bara, Khaliapali, Bolanda, Kapasira of Bargarh district selected. The crop was grown in *Rabi,* 2015-16 and 2016-17 using TARM-1 variety of green gram. In this Demonsration, Integrated Nutrient Management includes Soil application of Zn (25kg zinc sulphate/ha) and B (10 kg borax/ha), seed treatment of Rhizobium (200g/10kg of seed) and PSB (200g/10kg of seed) with recommended dose of NPK. The extension gap and technology gap were work out with the help of formulas given by Samui *et al* (2000) as mentioned below:

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

Result and Discussion

Seed yield is an important consideration in any study relating to commercial cultivation. The results indicated that application of Biofertilizer, Zinc Sulphate and Borax had enhancing effect of yield in green gram. Bio fertilizers are low cost and eco-friendly inputs, which have tremendous potential of fixing atmospheric nitrogen and can reduce the chemical fertilizer. Boron affects fertilisation by increasing the pollen producing capacity of anthers and pollen viability and also help in pollen tube growth. In Zn deficient plants, protein synthesis is markedly reduced, besides amino acids and amides are accumulated. Zinc is the structural component of ribosomes and is essential for their structural integrity. Price *et al.,* (1972) showed that early stage of zinc deficiency is indicated by sharp decrease in the level of RNA and ribosome content of cell.

Year	No. Of trials	Yield(q/ha)		Percent increase in yield	Cost of cultivation		Gross Return (Rs/ha)		Net Returns		Benefit-Cost Ratio		Extension Gap (q/ha)	Technology Gap (q/ha)
		Control	Demon		Control	Demon	Control	Demon	Control	Demon	Control	Demon		
2015-16	13	5.2	6.4	23%	13700	15600	31200	38400	17500	22800	2.27	2.48	1.2	1.6
2016-17	13	4.5	5.4	20%	18120	20000	27000	32400	8879	12400	1.49	1.62	0.9	2.6

Yield of the Front Line Demonstration trials and potential yield of the crop was compared to estimate the yield gaps which was further categorised into technology and extension gaps. The technology gap was 1.6q/ha and 2.6q/ha during 2015-16 and 2016-17 respectively. The technology gap observed may be attributed to dissimilarity in the soil fertility status, agricultural practices and local climatic situation. The extension gap was 1.2q/ha and 0.9 q/ha during 2015-16 and2016-17respectively.The extension gap emphasized the needs to upgrade the knowledge of farmer through different extension means like training, FLD.

The cultivation of green gram with integrated nutrient management gave higher average net return of Rs 22800 and Rs 12400 per ha as compared to Rs 17500 per ha in farmers practices. The benefit: cost ratio of green gram under demonstrated practices was as compared to under farmer practices.

The results of the present investigation are in agreement with the findings of a number of workers in a number of crops.

Conclusion

The result of frontline demonstration showed that the yield of green gram increased with the help of integrated nutrient management coupled with the proper management.

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