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Response of groundnut to integrated pest and nutrient management technologies

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Abstract

Groundnut is an important oilseed crop cultivated over 20000 ha in Erode district of Tamil Nadu. 70 percent area comes under rainfed situations. The yield of groundnut was drastically reduced over the period of time in rainfed situation due to the compound problems such as leaf miner incidence and micronutrient deficiencies. ICAR - KVK, Erode made an attempt to manage pest and micronutrient deficiencies through Integrated Pest and Nutrient Management (IPNM) during 2018 – 19 and 2019 -20. The technologies comprised of seed treatment with *Pseudomonas fluorescens* @ 10 gram / kg seed, pheromone trap @ 8 no / ha, neem soap spray @ 0.25 kg /ha and groundnut rich @ 5 kg / ha. Adoption of IPNM practices reduces the pest incidence of 9.57 percent whereas in farmers practice it was recorded as 21.32 percent. The results showed that, number of filled pods was recorded as 33.51 numbers in IPNM practices and 24.40 filled pods recorded in farmers practices. The average yield of 21.35 qtl/ha pod yield was recorded in IPNM practices which was 13.06 percent yield advantage over farmers' practices. The average highest net returns of Rs. 51858.50 / ha was recorded in IPNM adopted field with the benefit cost ratio of 1.87. The results indicated that, adoption of IPNM practices reduces the pest incidence and increases the groundnut productivity at field level.

Keywords: Economics, groundnut, IPNM, micronutrient, pest management, yield

Introduction

Groundnut is a major oilseed crop cultivated in Asia, America and African countries contributes major sources for oil and protein. Generally groundnut is cultivated in resource poor and rainfed condition which ultimately yielded 800 to 1000 kg/ha. It is predominantly used for oil extraction in many countries and the oil cakes were used for cattle feed and manure purpose (Upadhyaya *et al.*, 2006) [6]. The harvested plants called “haulms” can be given to cattle as a green fodder. Roasted groundnut kernels are very delicious table dish and rich in protein. Groundnut kernel powder is an important cooking material to prepare various delicious sweets and savouries.

Groundnut seed contains about 45 per cent oil and 26 per cent protein. They are rich source of thiamin, riboflavin, nicotinic acid and vitamin E. It also contains phosphorus, calcium, and iron. The oilcake contains 7 to 8 per cent nitrogen, 1.5 per cent phosphorus and 1.5 per cent potash. The crop builds up soil fertility through nitrogen fixation and is an efficient cover crop especially for lands exposed to soil erosion. Groundnut is cultivated about 24.7 m.ha with a total production of 33 m. tonnes in worldwide. India occupies the first place in area and second position in production. In India, it is grown in about 6.73 m.ha with a production of 6.22 m. tonnes. The cultivation is mostly found in southern states like Gujarat, Andhra Pradesh, Karnataka, Tamil Nadu and Maharashtra. It is also grown in Madhya Pradesh, Rajasthan, Uttar Pradesh and Punjab. In Erode District, the groundnut crop is cultivated over 20,000 ha every year of which 70 percent of the area comes under the rain-fed situations.

The yield of groundnut under rainfed situations is mainly influenced by the pests and micronutrients. Leaf miner and micronutrient deficiency is the compound problem notified in this region which leads to 30 percent yield reduction. Farmers are not aware of the IPNM practices to manage the pests and micronutrients in a comprehensive manner. Keeping this view in mind, ICAR – Krishi Vigyan Kendra, MYRADA conducted frontline demonstrations on IPNM practices for managing pests, micronutrients and improving the productivity.

Materials and Methods

The present study was carried out in Erode District of Tamil Nadu during 2018 - 19 and 2019 - 20. The frontline demonstrations were designed and conducted at farmers' field. Each demonstration was conducted during the Rabi season in an area of 0.4 ha and adjacent to the farmers' fields in which the crop was cultivated with farmers practice/variety was taken as a local check. A total of 20 frontline demonstrations conducted on integrated pest and nutrient management in groundnut at Perundurai and Kodumudi Block of Erode District to study the production potential of the crop. Scientific interventions under frontline demonstrations were taken as mentioned in Table 1. The selected progressive farmers were trained on all scientific groundnut cultivation aspects before starting of frontline demonstrations. To study

the impact of frontline demonstrations, data from FLD and farmers practices were analyzed.

Incidence of leaf miner was calculated by counting of the number of plants infected and total number of plants in the plot by using the formula.

$$\text{Percent pest incidence (\%)} = \frac{\text{Number of plants infected in a row}}{\text{Total number of plants in a row}} \times 100$$

The demonstrated fields were regularly monitored and periodically observed by the scientists of KVK. At the time of harvest yield data were collected from both the IPNM demonstrated plot and conventional method of cultivation. The cost of cultivation and profit details of both the systems were collected from the farmers for working out the benefit cost ratio. The data's were analyzed by using standard formulas.

Table 1: Technological interventions adopted in demonstration plots

Particulars	Demonstration	Farmer practice
Variety	CO -2	CO - 2
Seed treatment	Treat the seeds with carbendazim @ 2 g kg ⁻¹ seed or <i>Pseudomonas fluorescens</i> @ 10 g kg ⁻¹ seed.	No seed treatment practices
Pest management	<ul style="list-style-type: none"> Installation of pheromone trap @ 8 / ha Spraying of neem soap @ 250 gram / ha 	Spraying of fungicides @ 15 days interval
Nutrient management	<ul style="list-style-type: none"> Recommended dose of fertilizer application Foliar application of 5 kg groundnut rich/ha at the time of flowering and pod formation stage 	Improper application of fertilizers

Groundnut Rich is a combination of micronutrients developed by TamilNadu Agricultural University, Coimbatore, TamilNadu which was recommended to spray at the time of flowering and pod development stage

Results and Discussion

The results of the demonstrations conducted on the farmer's field are presented in Table 2. The pest incidence was reduced from 33.6 to 9.57 percent in the demonstrated field where as 21.32 % pest incidence was recorded in the farmers practice. Adoption of IPNM practices reduces the pest incidence significantly when compared to the farmers' practices. Similarly, on an average 29.1 adult moths trapped in the

pheromone trap. Table 3 indicated that, adoption of integrated disease and nutrient management technologies recorded an average of 33.51 filled pods with the highest pod filling number of 34.50. Similarly 21.32 number of filled pods observed in the farmers practices. The findings of the present study are in line with the findings of Saravanakumar (2018)^[4] and Dhaka *et al.*, (2010)^[11].

Table 2: Percent pest incidence and insects trapped as influenced by IPNM practices

Year	Number of Demonstrations	Pest incidence before spray	Percent Pest incidence after spray		Number of insects trapped / trap
			Demonstration	Farmers practice	
2018 - 19	10	32.7	9.76	21.16	29.6
2019 - 2020	10	34.5	9.38	21.49	28.6
Average	10	33.6	9.57	21.32	29.1

Table 3: Number of filled pods as influenced by IPNM practices

Year	Number of filled pods	
	Demonstration	Farmers practice
2018 - 19	33.31	24.75
2019 - 2020	33.71	24.04
Average	33.51	24.40

Table 4: Yield of Groundnut as influenced by IPNM practices

Year	Yield (qtl/ha)		Percent yield increase
	Demonstrations	Farmers practice	
2018 - 19	21.30	18.99	12.16
2019 - 2020	21.39	19.00	13.95
Average	21.35	18.99	13.06

The average yield of groundnut under demonstration was 21.35 qtl / ha (Table 4) which was higher than the average yield of farmers practice (18.99 qtl / ha). The integrated pest and nutrient management practices showed that 13.06 percent yield increase over the farmers practice. The findings of the present study are in line with Jyothi Swaroopa *et al.*, (2016)^[3] and Hiremath and Nagaraju (2009)^[12].

It was found that the average cost of cultivation IPNM practices was Rs. 59122.50 / ha (Table 5) and an average cost of Rs. 57565.00 / ha in conventional method of cultivation. The IPNM practices recorded the higher mean gross return of Rs. 110981.00/ha and the net return of Rs. 51858.50 / ha with the high benefit cost ratio of 1.875. These findings are in line with the findings of Hiremath and Nagaraju (2009)^[12] and Sreelakkshmi *et al.* (2012)^[5].

Table 5: Economics of groundnut as influenced by IPNM practices

Year	Economics of Demonstrations (Rs/ha)				Economics for farmers practice (Rs/ha)			
	Gross Cost	Gross Return	Net Return	BCR	Gross Cost	Gross Return	Net Return	BCR
2018 – 19	59047.80	110734.00	51686.20	1.88	57490.00	85477.50	27987.50	1.49
2019 – 2020	59197.20	111228.00	52030.80	1.87	57640.00	84501.00	26861.00	1.47
Average	59122.50	110981.00	51858.50	1.875	57565.00	84989.25	27424.25	1.48

Conclusion

There was a 13.06 percent yield increase was noticed over conventional method in the IPNM practices. This improved production technology helped the farmers with reduced and pest and disease infestation percent. Thus it can be concluded that the frontline demonstrations gave good impact for the farming community in Erode district as they were motivated by the adoption of integrated pest and nutrient management technologies applied in the demonstration plots.

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