

Yield improvement in groundnut through frontline demonstration under rainfed condition

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ABSTRACT

Groundnut productivity declines under rainfed situation mainly due to the moisture stress at flowering and pod formation stages. Also the lack of knowledge on the availability of drought tolerant varieties, occurrence of nutrient deficiency and incidence of pests and diseases leads to the reduction in pod yield of groundnut. Hence to overcome the problems faced by the groundnut growers frontline demonstrations on integrated crop management in groundnut were conducted in the farmers' holdings that were compared with the farmers' practice. The integrated crop management practices comprising introduction of drought tolerant short duration variety, seed treatment, integrated nutrient management and plant protection measures were demonstrated. The results showed that the higher pod yield of 1450 kg/ha in demonstration and the lower yield of 1240 kg/ha was recorded in farmers' practice. The higher net return of Rs 26063/ha and benefit:cost ratio of 1.81 was realized in demonstration plots compared to farmers' practice.

Keywords: Groundnut; moisture stress; integrated crop management; pod yield; net return

INTRODUCTION

Groundnut (*Arachis hypogaea* L) is the important oilseed crop as well as food and feed crop grown in India. Its kernel is rich in both oil (47-53%) and protein (25-36%) (Grandawa 2014). It is utilized as roasted nuts, salting and in confectionery. The haulm is important by-product used for livestock feed. The major groundnut producing countries in the world are India, China, Nigeria, Senegal, Sudan, Burma and the United States of America. India occupies

the first place both with regard to the area and the production in the world. About 7.5 Mha are put under it annually and the production is about 6 MT. Seventy per cent of the area and seventy five per cent of the production have been concentrated in the four states of Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka (Madhusudhana 2013).

Tamil Nadu is one of the leading groundnut producing states with an area, production and yield of 3.85 lakh hectares,

10.61 lakh tons and 2751 kg/hectare respectively. In Dharmapuri district groundnut is grown in 20000 ha area with a production of 28000 tons and a productivity of 1340 kg/ha. About 80 per cent of the area under groundnut is being cultivated under rainfed condition during Kharif season (Vindhiyavarman et al 2014). Under rainfed condition due to the uncertainty in rainfall occurrence and moisture stress at the time of flowering and pod formation it leads to reduction in pod yield of the crop. Apart from moisture stress lack of knowledge on the availability of drought tolerant varieties, prevalence of nutrient deficiency and pest and disease incidence also affect the productivity. Drought stress has adverse influence on water relations (Babu and Rao 1983), photosynthesis (Bhagsari et al 1976), mineral nutrition, metabolism, growth and yield of groundnut (Suther and Patel 1992).

Hence to overcome the problems of the farmers, frontline demonstrations were laid out to demonstrate the potential of the drought tolerant variety with improved package of practices in the farmers' holdings of Dharmapuri district in Andhra Pradesh.

MATERIAL and METHODS

Frontline demonstrations (FLDs) on integrated crop management in groundnut were conducted by Krishi Vigyan Kendra, Dharmapuri during the

Kharif season of 2015-16 in the ten farmers' holdings of the selected villages. Each demonstration was laid out in 0.2 ha area and adjacent 0.2 ha was considered as farmers' practice for comparison. The integrated crop management practices comprised the introduction of drought tolerant groundnut variety CO 7, seed treatment with bio-inoculants and biofertilizers, integrated nutrient management and integrated pest and disease management strategies which were taught to the farmers and followed as interventions during the course of FLD programme. The technological practices followed in farmers' practice and demonstrations are given in Table 1. Demonstration fields were periodically observed by the scientists of KVK. At the time of harvest yield data were collected from both the demonstrations and farmers' practice. Cost of cultivation, net income and cost:benefit ratio were worked out.

RESULTS and DISCUSSION

Results indicated that variety CO 7 with integrated crop management practices had higher plant population (29.3/m²), number of pods per plant (19.8) and pod yield (1450 kg/ha) (Table 2). Variety TMV 7 with farmers' practice recorded the lower plant population (22.5/m²), number of pods per plant (11.2) and pod yield (1240 kg/ha). The incidence of leaf miner (9%), tobacco caterpillar (14%) and leaf spot (4.5%) was lower in demonstrations and higher

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Table 1. Details of the technological practices followed under farmers' practice and demonstrations

Aspect	Farmers' practice	Demonstrations (recommended improved practices)
Farming situation	Rainfed	Rainfed
Variety	TMV 7	CO 7
Time of sowing	June-July	July-Aug
Seed treatment	No seed treatment	Treatment with <i>Trichoderma viride</i> @ 4 g/kg seed and <i>Rhizobium</i> @ 25g/kg seed
Method of sowing	Sowing behind country plough	Line sowing with seed drill
Fertilizer application	Irrational use of nitrogenous and less use of phosphate fertilizers	Recommended INM practices
Weed management	One hand weeding at 25-30 DAS	One hand weeding at 20-25 DAS followed by earthing up at 40-45 DAS
Gypsum application	One time basal application of gypsum @ 160 kg/acre	Split application of gypsum ie one as basal and another at 40-45 DAS along with earthing up operation
Plant protection	No prophylactic or control measures for managing pests and diseases	Need-based use of chemicals, placing of pheromone traps for the management of leaf miner and tobacco caterpillar

Table 2. Yield and economics of frontline demonstrations of groundnut

Parameter	Farmers' practice	Recommended improved practice
Plant population (#/m ²)	22.5	29.3
# pods /plant	11.2	19.8
Leaf miner damage (%)	31	9
Tobacco caterpillar damage (%)	36	14
Leaf spot (%)	13	4.5
Pod yield (kg/ha)	1240	1450
Per cent increase over farmers' practice	-	16.9
Gross cost (Rs/ha)	29700	32038
Gross income (Rs/ha)	49600	58100
Net income (Rs/ha)	19900	26063
B:C ratio	1.67	1.81

incidence of leaf miner (14%), tobacco caterpillar (36%) and leaf spot (13%) was noticed in farmers' practice. The per cent increase in yield of demonstration plots over

farmers' practice was 16.9. This might be due to the combined effect of high yielding and drought tolerant ability of the variety with integrated crop management practices

as compared to farmers' practice. Similar yield enhancement in different crops in frontline demonstrations has been documented by Patel and Tunver (2004), Poonia and Pithia (2011) and Raj et al (2013).

The higher net income (Rs 26063/ha) and benefit:cost ratio (1.81) were realized in demonstrations as compared to lower net income (Rs 19900/ha) and benefit:cost ratio (1.67) in farmers' practice. It might be due to the higher pod yield recorded in demonstrations compared to farmers' practice.

Thus it can be concluded that the demonstrations of drought tolerant variety with integrated crop management practices of groundnut cultivation can increase productivity of groundnut in the district under rainfed condition and motivate the farmers of the district to adopt the recommended technologies.

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