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Performance of Groundnut sown with Ferti cum Seed Drill in Farmers Fields of Vizianagram District of North Coastal Zone of Andhra Pradesh

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A B S T R A C T

Seed drill is a sowing device that precisely positions seeds in the soil and then covers them. Before the introduction of the seed drill, the common practice was to plant seeds by hand. Planting density is one of the main factors that have an important role on growth, yield and quality of groundnut. It is important to accommodate the most appropriate number of plants per unit area of land to obtain better yield. Scientists in DAATT Centre, Vizianagaram District of ANGRAU in collaboration with Department of Agriculture, Vizianagaram District has tested the feasibility of sowing of Groundnut with Ferti Cum Seed Drill technology with comparing normal sowing method of cultivation through organizing On-Farm Trial (OFT) during Kharif, 2015 and Kharif,2016 in 3 locations each. Sowing with seed drill observed 33 of plants/sq.mt in comparison with farmer's practice 23 of plants/sq.mt with 43.47% of reduction plant population. In ferti cum seed drill plots 30.33% more number of pods(23 pods/plant) recorded when compared to farmers practice(18 pods/plant). Pod yield increase was achieved to a tune of 15.62% in sowing of groundnut with Ferti Cum Seed Drill method (1121 kgha^{-1}) over normal method of cultivation (970 kgha^{-1}). The gross income (Rs.56075 ha^{-1}) was recorded 15.62% more in Ferti cum seed drill plots in comparison with farmers practice. The net returns also recorded 64.86% higher in Ferti cum Seed drill sown plots along with reduction of 7.93% reduction of cost of cultivation realized over normal sowing method. It was observed that the benefit cost ratio was higher in sowing of groundnut with Ferti cum Seed drill (1.60) which is higher than in conventional method(1.27). Increases in crop yield and crop returns depend on the uniform and timely establishment of optimum plant population.

Introduction

Groundnut is the sixth most important oilseed crop in the world. It contains 48- 50% oil and 26-28% protein, and is a rich source of dietary fiber, minerals, and vitamins (Mvumi *et al*., 2019). India is one of the largest producers of oilseeds in the world and occupies an important position in the Indian agricultural economy. Groundnut is called as the "King"

of oilseeds. It is one of the most important food and cash crops of our country (Gulluoglu, 2011).

The sowing operation is one of the most important cultural practices associated with crop production. Increases in crop yield, cropping reliability, cropping frequency and crop returns all depend on the uniform and timely establishment of optimum plant population. The conventional process of sowing is very tedious, time consuming, costly, labour intensive and less productive. The conventional process of sowing groundnut is separate two operations of fertilizer placement and seed sowing while walking behind the bullock drawn plough. These two different operations take separate time and cost. So there is a need to promote of sowing equipment like Ferti cum Seed drill which can perform these two operations simultaneously. The farmers are carrying out all the operations related to sowing one by one, in order to reduce the efforts and to carry out all the operations simultaneously.

Limitations of Traditional Sowing Methods

In manual seeding, it is not possible to achieve uniformity in distribution of seeds. A farmer may sow at desired seed rate but inter-row and intra-row distribution of seeds is likely to be uneven resulting in bunching and gaps in field.

Poor control over depth of seed placement.

It is necessary sow seed at high rates and bring the plant population to a desired level by thinning.

Labor requirement is high because two persons are required for dropping seed and fertilizer.

The effect of accuracies in seed placement on plant stand is greater in case of crops sown under rainfed conditions.

During *Kharif* sowing, placement seeds uneven depth this may result in poor emergence because subsequent rains bring additional soil cover over the seed and affect plant emergence.

Details and advantages of Sowing of Groundnut with Ferti Cum Seed Drill technology

The Seed Drill Consists

Furrow Opener: A furrow opener is used to prepare furrow for sowing of seed.

Seed Box: A seed box is used as a storage compartment for the seed.

Seed Metering Device: A seed metering device is used to maintain a proper seed to seed spacing.

The Ferti cum seed drill is provided with seed and fertilizer boxes along with seed metering mechanism (trough feed) and mounted on 9 tynes cultivator (Rigid and spring tyned optional based on soil type) (Fig.1). The depth control system was provided to maintain uniform depth through two guage wheels. The row spacing of the sowing can be adjusted as per the season/requirement. The covering device is placed behind the implement to close the furrows immediately after sowing (with rear plank). Similarly the same seed drill can be used for any type of seed sowing for which seed metering scoop wheels need to be changed. Fertilizer drilling qualities also can be monitored by changing sliding door at the bottom of fertilizer box and beginning of the fertilizer spout.

Sowing of Groundnut with Ferti Cum Seed Drill is big equipment for sowing Groundnut seed directly in well prepared field is fabricated and it is used for demonstration.

It is a tractor drawn implement. It covers 8 rows of 30cm row-to-row spacing at a time. It is made up of iron and plastic materials used for demonstrations in farmers fields of Vizianagaram District.

Fig.1 Tractor Drawn Ferti Cum Seed drill

Now every field in this world is moving towards less effort and less time consuming processes, scientist of DAATT Centre made to reduce the complexity and criticality in the sowing operations with following objectives include to test the feasibility of sowing of Groundnut with Ferti Cum Seed Drill in the Vizianagaram District through On Farm Trial (OFT). To record the yield in sowing of Groundnut with Ferti Cum Seed Drill technology in comparison with normal method of farmers practice.

And to analyze the economics of Groundnut cultivation in Vizianagaram District.

Materials and Methods

Scientists in DAATT Centre, Vizianagaram District of ANGRAU in collaboration with Department of Agriculture, Vizianagaram District has tested the feasibility of sowing of Groundnut with Ferti Cum Seed Drill technology with comparing normal sowing method of cultivation through organizing On-Farm Trial (OFT) during *Kharif*, 2015 and *Kharif*,2016 in 3 locations respectively (Fig.2).

Flow chart of handed over of sowing of groundnut with ferti cum seed drill technology to the farmers

Wide publicity through Press & Media

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Selection of farmers

↓

Training

↓

Method Demonstrations & On Farm Trials

↓

Monitoring & Supervision

↓

Data recording & Analysis & Evaluation

Fig.2 Demonstration with Tractor Drawn Ferti Cum Seed drill

Salient Features of Sowing with Ferti cum seed drill

Cost of cultivation is reduced die to reduction in manual labour involvement.

Uniformity in seed sowing and Plant population.

An area of 3-4 hectare per day can be shown.

Farmer fields are selected to conduct On Farm Trials (OFTs) with proper drainage facility and regulation of water. The variety cultivated in sowing of Groundnut with Ferti Cum Seed Drill technology is K-6.

Since sowing of groundnut with Ferti Cum Seed Drill technology and Normal transplanting method data pertaining to crop stand followed by yield contributing parameter like pods per plant were recorded. Yield per $5x5m^2$ was collected and calculated per hectare area.

Mean of yield attributes, yield and cost of cultivation were calculated in demonstrations and farmers practice methods. The statistical tools like average yield, percentage increase, average cost of cultivation was used. Percentage yield increase over normal method was caliculated and comparative analysis of cost benefit ratio per hectare was arrived and presented in the tables.

Results and Discussion

The On-Farm Trial on sowing of Groundnut with Ferti Cum Seed Drill technology is conducted for two seasons both in *Kharif*, 2015 and *Kharif*, 2016 in innovative farmer fields and plant stand, yield attributes and yield are depicted in table.1.

No.of plants/Sq.mt

No. of plants/sq.mt (Table.1) were recorded, it was observed that there is uniformity in sowing with seed drill and observed 33 of plants/sq.mt in comparison with farmers practice 23 of plants/sq.mt. There is 43.47% of less population was observed in farmers practice. The results were corroborates with the Chandrasekhara Rao *et al.,* 2013 and Awal and Aktar (2015).

No. of Pods/plant

During both the seasons of two years of demonstrations and in all the locations recorded 30.33% more number of pods *i.e.,* 23 pods per plant in plots sowing with ferti cum seed drill when compared to farmers practice *i.e.,* 18 pods per plant. The results are corroborates with Onat *et al.*,2016.

Pod Yield

Pod yield (Table.1) increase was achieved to a tune of 15.62% in sowing of groundnut with Ferti Cum Seed Drill method (1121 $kgha^{-1}$) over normal method of cultivation (970 $kgha^{-1}$). The use of sowing of groundnut with Ferti Cum Seed Drill is superior to normal method of raising the groundnut crop. Higher yield in sowing of groundnut with Ferti Cum Seed Drill is attributed to optimum number of plants along more number of pods per plant. Increases in crop yield and crop returns depend on the uniform and timely establishment of optimum plant populations. These results have showed that pod yield has increased by plant density. Similar results were reported by other researchers Prasad *et al*. (2000) and El Naim and Jabereldar, 2010 and also Kouassi and Zoro, 2010.

Economics

Higher gross income, Net income and BC ratio were recorded in sowing of groundnut with Ferti Cum Seed Drill in comparison with normal farmers practice. The gross income

(Rs.56075 ha^{-1}) was recorded 15.62% more in Ferti cum seed drill plots in comparison with farmers practice. The net returns also recorded 64.86% higher in Ferti cum Seed drill sown plots along with reduction of 7.93% reduction of cost of cultivation realized over normal sowing method. It was observed that the cost-benefit ration was higher in sowing of groundnut with Ferti cum Seed drill (1.60) which is higher than in conventional method (1.27).

Optimum plant population is one of the main factor that have an important role on growth, yield and quality of groundnut. Establishment of optimum population per unit area of the field is possible with sowing of seeds with Ferti cum Seed drill only rather than manual sowing. Hence, sowing of seeds with Ferti cum seed drill is to be widely popularized through Front Line Demonstration and field days in collaboration with the Department of Agriculture.

Table 1: Mean data on Yield and Yield attributes of On-Farm Trial on sowing of Groundnut with Ferti Cum Seed Drill technology vs Farmers practice conducted during *Kharif*-2015 and *Kharif*, 2016

Sl.No	Season	No.of Locations	Variety	No.of Plants/Sq.mt		No.of Pods/plant		Yield Kg/ha		Percentage Increase in yield over check
				Demo	Control	Demo	Control	Demo	Control	
1	*Kharif* 2015	3	K-6	32	24	25	20	1050	943	11.35
2	*Kharif* 2016	3	K-6	34	22	22	16	1193	997	19.66
	Average			33	23	23	18	1121	970	15.62
	Percentage Increase in yield over check				**43.47**		**30.55**		**15.62**	

Table 2: Economics of the sowing of Groundnut with Ferti Cum Seed Drill technology vs Farmers practice recorded during *Kharif*-2015 and *Kharif*,2016

Sl.No	Particulars	Sowing of Groundnut with Ferti Cum Seed Drill Method	Conventional farmers Practice	Percentage Increase in yield over farmers practice
1	Pod Yield Kg/ha	1122	970	15.62
2	Pod Value (Rs.50/kg)	56075	48500	15.62
3	Gross income Rs./ha	56075	48500	15.62
4	Total cost of cultivation Rs./ha	35125	38150	-7.93
5	Net income Rs./ha	20950	12708	64.86
6	C:B ratio	1.60	1.27	25.59

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