

# Success Stories ...2016



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# **Tractor Drawn Planter cum Herbicide Applicator for Groundnut**

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## **Introduction**

Groundnut (*Arachis Hypogaea* L) is one of the five most important oilseed crops grown in the world. It ranks third in oilseed production in the world. Groundnut is also one of the most important oilseed crops in India grown in an area of 8.4 million hectare with a production of 8.20 million tonne. It accounts for 45% of the area and 55% of the production of total oilseeds in the country. Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Tamil Nadu are the major groundnut growing states in India. In the combine state of Andhra Pradesh, groundnut is grown in an area of 1.88 million hectare with a total production of 1.33 million tonne. In Anantapur district of Andhra Pradesh state, the groundnut crop is grown in 0.80 million hectare with a production of 0.64 million tonne. The farmers struggle to maintain timeliness in different unit operations e.g. seedbed preparation, sowing, intercultivation, spraying, harvesting and threshing of groundnut to take advantage of favorable situation in dryland conditions of Andhra Pradesh state. Improved equipment with higher field capacity and better utilization of inputs need to be promoted for enhancing the productivity of groundnut crop in the region. Hence, mechanizing the unit operations for cultivation of groundnut crop was felt for groundnut growing farmers of the state specially in the districts of Ananthapur, Guntur, Prakasam of Andhra Pradesh and Mahabubnagar in Telangana state. It is estimated that cost of production can be reduced by 30-40% by introducing mechanization in groundnut cultivation under dryland conditions.

Ananta Planter developed at Agricultural Research Station, Anantapur can be used for timely sowing of groundnut under red rocky soils. Weed menace is one of the serious constraints that affect the yield of groundnut. The chemical weed control using herbicides is more effective and economical in initial stages of crop growth. Taking in view of these factors, a tractor operated planter cum boom sprayer was developed by PJTSAU, Hyderabad for simultaneously sowing and herbicide spraying.

## **Traditional Practice**

The groundnut farmers are utilizing available bullock drawn traditional implements for different unit operations which are labour intensive. Two interculture operations are performed after sowing. One manual weeding is done to control weeds within the rows (intra rows) after 20 days and second weeding is performed 40-45 days after sowing. Spraying of pendimethalin @ 2.5 l/ha as pre-emergence herbicide is a common practice to control

weeds during the initial stages of crop growth. The cost of cultivation of groundnut crop is high in traditional system. This needs to be minimized for the benefit of farming community through promotion of combine operation by improved equipment.

### Salient Features of the Machine

A tractor drawn planter with four nozzles herbicide spraying attachment has been designed and developed for groundnut crop. The tractor drawn planter cum boom sprayer consists of piston type pump, flat pattern nozzles on the boom, two drums of 220 litre capacity each, seed box of 40 kg capacity and inclined plate metering mechanism for planting of seeds (Fig. 1). The piston type pump receives power from PTO shaft of tractor to pump the chemical from tank into nozzles through inlet and outlet pipes. The spraying attachment is fitted at the back of planter which sprays the chemical uniformly after the furrow is closed by the covering blade. This planter cum boom sprayer helped in planting seeds in 8 rows at a time and in spraying the herbicide at the recommended application rate. The specifications and performance of tractor drawn planter cum boom sprayer are given in Table 1 and schematic diagram of the equipment is shown in Fig. 2.

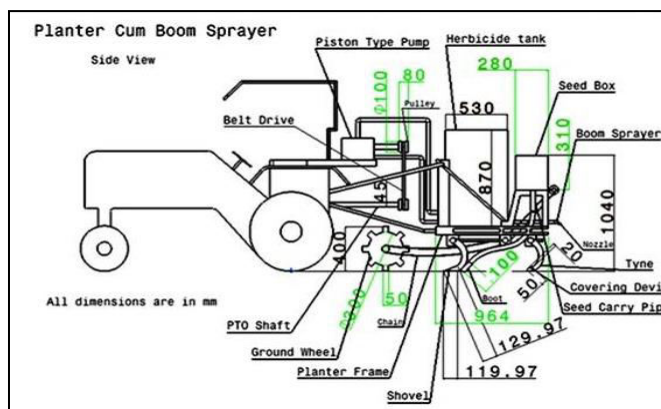


**Fig. 1. Testing of planter cum boom Sprayer for groundnut crop.**

**Table 1 Specifications and performance of planter-cum-boom sprayer for groundnut crop**

S. No.	Parameters	Values
<b>Planter</b>		
1.	Power source	26 kW tractor
2.	Number of rows	8
3.	Row to row spacing, mm	300
4.	Effective working width, m	2.4
5.	Type of seed metering mechanism	Inclined plate type
6.	Type of frame	Spring type
7.	Seed box capacity (8 nos. of hoppers), kg	40
8.	Weight, kg	450
9.	Depth of sowing, mm	40 – 50
10.	Seed to seed spacing, mm	100
12.	Field capacity, ha/h	0.5-0.6

S. No.	Parameters	Values
<b>Herbicide sprayer</b>		
1.	Number of nozzles on boom	4
2.	Nozzle to nozzle spacing on boom, mm	600
3.	Nozzle diameter, mm	2
4.	Effective working width of spraying, m	2.40
5.	Boom height from ground, mm	600
6.	Type of pump for spraying	Piston type
7.	Pump power, kW	1.0 – 1.5
8.	Pump speed, rpm	800 – 1200
9.	Pump operating pressure, kPa	200 – 500
10.	Application rate of sprayer, l/ha	494- 612
11.	Herbicide tank capacity, l	440 (2 nos. of plastic drums)



**Fig.2.Schematic drawing of tractor drawn planter cum herbicide sprayer for groundnut crop.**

### **Evaluation of Tractor Drawn Planter cum Herbicide Sprayer**

A groundnut planter with four nozzles herbicide spraying attachment was evaluated under laboratory and field conditions. The initial experimental trial of the machine was conducted in field and herbicide application rate of 870 l/ha was observed. The weed population was 78% less in treatment with herbicide application as compared to without herbicide application. Similarly, the weed population was 31% less in treatment with herbicide application as compared to without herbicide application at the time of harvesting. The pod yield was increased by 20% with herbicide application.

During Kharif 2013, further modification was carried out in the equipment for recommended herbicide application rate of 500 l/ha. The modified unit was evaluated in the laboratory (Fig. 3) and results are given in Table 2. It was observed that the application rate of herbicide was 494 l/ha at tractor forward speed of 2.5 km/h and at HTP sprayer pressure of 200 kPa. It was

observed that there was a linear relationship between pressure of sprayer and herbicide application. The machine was evaluated in the field and weed population was 54% less with herbicide application as compared to without herbicide application (Fig. 4). The field capacity of the machine was 0.62 ha/h at forward speed of 2.5 km/h. The planter cum herbicide sprayer was suitable for simultaneous sowing and spraying of herbicide in groundnut crop.

**Table 2 Calibration of herbicide sprayer attachment under laboratory condition**

S.No	Pressure, kPa	Nozzle discharge, l/min	Application rate, l/ha
1	200	4.46	494.44
2	300	4.98	552.01
3	400	5.18	574.25
4	500	5.52	611.95



**Fig. 3. Calibration of the nozzle rate**



**(a) With herbicide applicator**



**(a) without herbicide application**

**Fig.4. Groundnut crop sown by tractor drawn planter cum herbicide applicator**



## **Status of the Technology**

The machine was extensively tested for its feasibility at Agricultural Research Station (ARS), Ananthapuram and at farmer's fields. The machine was demonstrated to more than 1000 farmers during Kisan Melas organized at ARS, Ananthapuram. It was also demonstrated in farmer's fields at Narpala, Rekulakunta and B. Samudram villages located nearby ARS, Ananthapuram. The performance of the machine was appreciated by farmers for both planting and herbicide applications.

Two machines were supplied to PJTSAU research stations after getting fabricated by local manufacturers for frontline demonstrations to farmers and about 50 ha of groundnut crop was sown with the machine. The equipment is commercialized and is being manufactured by different manufacturers who supplied units to farmers in Ananthapur, Kurnool and Ongole districts of Andhra Pradesh and Mahabubnagar in Telangana. The design was released by PJTSAU, Hyderabad (formerly known as ANGRAU) to State Agricultural Department in 2014.

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3. Sri Venkata Naga Industries  
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