Agriculture Update | February & May 2010 | Vol. 5 | Issue 1 & 2| 32-35 | *RESEARCH ARTICLE*

Effective way of transfer of technology to boost the groundnut yield under rainfed condition through frontline demonstration in Salem, Tamil Nadu

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ABSTRACT

Groundnut is a major oilseed crop grown under rainfed condition in Salem district. The majority of the farmers could not able to get high yield. Even sometime severe yield loss and cent per cent failure of crop occurred in some areas due to occurrence of severe drought and poor awareness on drought management technologies. Considering the importance of groundnut and other constraints, Krishi Vigyan Kendra, Salem facilitated front line demonstration (FLD) funded by ICAR (TOT) New Delhi with performing improved technologies in different villages of Salem district during 1995-2007. 372 front line demonstrations were conducted in 90 hectares. Farmers were selected randomly and demonstration done in their field itself. Critical inputs were distributed to the farmers. In case of local check plots existing practices being used by farmers were followed. During the period under study, it was observed that the average yield of demonstration was significantly higher (1748kg/ha) than local check plots (1430kg/ha). However, fluctuations were observed mainly an account of variation in rainfall in terms of percentage yield improvement in demonstration was recorded from 14.7-29.5 % over local check. In field days, FLD farmers well explained the drought management practices followed for groundnut and experiences also shared among the farmers. Groundnut yield potential can be increased to a great extent by conducting effective front line demonstrations with proven technologies. The technologies suitable for the Tamil Nadu similar to Salem district of Tamil Nadu should be evolved and brought to the access of farmers transfer centres like KVKs.

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Key words : Groundnut, Drought, FLD, Field days, Yield

Accepted : ***September, 2009***

INTRODUCTION

Groundnut (*Arachis hypogea* L.) also known as peanut and earthnut, is one of the major oilseeds in the world. India is amongst the largest producer, consumer and importer of vegetable oils in the world. India plays a major role in global oilseeds and vegetable oil economy contributing about 16% of world's oilseed crop area, 7% of world's oilseeds production and 6.7% of vegetable oils production. However, the productivity in India is only 1148 kg/ha as compared to the world average of 2593 kg/ha (FAOSTAT). In the domestic agricultural sector, oilseeds occupy a distinct position after cereals sharing 15% of the country's gross cropped area and accounting for nearly 3% of the gross national product and 9% of the value of all agricultural products. India has the largest area in groundnut. It is an annual soil enriching legume cum oil seeds crop. Groundnut oil is edible and oil content of groundnut seed varies form 44 to 50 per cent depending on varieties and agronomic practices. Groundnut oil finds extensive use as a cooking both as refined oil and Vanaspathi ghee. It is rich in protein, vitamin A, B and B2. The coloritic value is 349/100g of nut weight.

In Salem district, Groundnut is a main oilseed crop gown under rain fed condition in vast areas. All the fields are not getting same yield. Even sometime severe yield loss and cent per cent failure of crop occur in some areas. Keeping these things in mind, KVK, Salem scientists were approached, the farmers were surveyed, group discussions were held etc. and the problems related to yield gap were put before. Then KVK short listed such problems related to low productivity as follows:

– Occurrence of severe drought during cropping period

– Non adoption of drought tolerant varieties and management practices *viz., in situ* moisture conservation and recommended fertilizer application.

To improve the productivity in groundnut, KVK have initiated front line demonstration programme funded by ICAR since 1995. In view of the encouraging results, demonstrations were continued in following years at farmers fields of Salem district.

METHODOLOGY

The present studies (FLD) were conducted in farmers of Salem district, Tamil Nadu under GOI- Oilseed Mission scheme through ICAR in different villages of Eriadikkarai, Moolakurchi, Pallipatty, Thirumalaigiri and Karuppur of the operational area of KVK for elevan years (1995-2007). The data were collected, compiled and analyzed. In total 372 demonstrations in 90 hectare area in different villages were conducted. Complete package of recommended practices were adopted in front line demonstration plots as far as possible. Existing practices being used by the farmers were followed in the local check plots. For the front line demonstrations, a few critical inputs in the form of seeds, fertilizers, agrochemicals etc. were provided and non-monetary inputs like timely sowing, maintenance of plant population and timely weeding were also performed. Where as traditional practices were maintained in case of local checks. The demonstration farmers were facilitated by KVK scientists in performing field operations like sowing, spraying, weeding, harvesting etc., during the course of training and visits.

Demonstrated technologies:

Compartmental bunding:

Compartmental bunding acts as rain water harvesting (reservoir) structure during rainy season and it also acts as a drainage channel during heavy rain, compartmental bunding will increase the soil water status. It will be more useful during long dry spells. If dry spell occurs then the stored water in soil may reach the root zone of crop by capillary forces (Hand book of Agricultlure ICAR, New Delhi).

Sr. No.	Varieties	Year	Parents	Duration (days)
1.	VRI 2	1989	JL 24 x CO2	105
2.	VRI 3	1990	J11 x R33-1	95
3.	VRI 4	1996	V.G.5x N.C.AC170/90	110

Popularization of drought tolerant varieties (VRI varieties released from Virudhachalam):

Seed hardening treatment:

The graded seeds hardened by soaking in 0.5% $CaCl_2$ (50% seed volume) for 6 hrs. After 9 hrs soaking the seeds were spread over moist gunny bag and covered with another moist gunny bag for 24 hrs. After 24 hrs the seeds with sprouted radical were separated and dried under shade. It was repeated for 2 to 3 times with 2 hrs interval and all the viable seeds with expressed radical emergence were separated and dried under shade. The viable and dead seeds were separated by the process which ensured planting value. While seed hardening, the process of seed germination started and stopped, mean while the protoplasm of the seeds also get hardened. If such a hardened seed is sown in the field it can be able to withstand early drought as well as mid season dry spells.

Seed treatment with Rhizobium:

Rhizobium is a root nodulating bacterium, it can fix the nitrogen in the root nodules which in turn improves yield (Turkhede and Giri, 1982)

Split application of gypsum (50% basal and 50% at 45 DAS):

Gypsum in a cheapest source of calcium and sulphate at the rate of 29.2 per cent calcium and 18.6 per cent sulphate, respectively. Ca and S are taken up from fruiting zone by the peg and developing pods

Application of borax 10kg at 45 DAS:

Boron present in borax involves in keeping stigma in wet condition that leads to increase adhering capacity of pollen and germination of pollen also high ultimately effective fertilization high pegging ratio and yield increase are obtained.

Foliar spray of nutrient mixture and DAP (1%) +borax (0.3%) +$ZnSo_4$ (0.25%) +$FeSo_4$ (0.5%) +NAA (40ppm) at peg stage:

Phosphorus leads to early flowering and pegging (Dimri and Dwivedi, 1994). 0.3 per cent borax favourably affects the increasing number of effective pegs (Golakiya and Patel, 1986), 0.2 per cent $ZnSO_4$ increases the nodulation, chlorophyll content and pod yield (Saini, 1975) and 0.5 per cent $FeSO_4$ improves pod yield. NAA (Naphthalene acetic acid 40ppm) increases flower production and yield improvement.

Trainings were conducted for extension officials and FLD farmers. Demonstrations were also conducted in different villages for each technology. Field days were celebrated in each location to show the result of FLDs to other farmers and feed back also collected from the FLD farmers.

RESULTS AND DISCUSSION

Average pod yield of demonstration was significantly higher (1748kg/ha) than local check (1422) plots during the period of study from 1995 to 2007, However, year wise fluctuations in yield were observed mainly on account of variation in rainfall and mid season dry spells (Table 1). Average yield levels varied form 1175 to 1720 kg/ha

in local checks and 1400 to 2240 kg/ha in demonstration plots. In terms of percentage, yield improvement in demonstration was recorded from 14.70 to 29.50 over local check. Kalarani *et al*. (2001) reported that combination of seed soaking treatment of KCl (1%) +$CaCl_2$ (1%) increased 19.6 per cent yield in finger millet. They also suggested that potassium and calicum chlorides act as an osmoticum and induce protoplasm hardening which in turn confer drought tolerance in seedlings. Devakumar and Giri (1998) reported that application of gypsum in the pegging zone (500kg/ha) increased the number of developed pods per plant and pod yield and they suggested that the split application of gypsum is an important component for the synthesis of fats. The 'S' helps in biological orientation and reduction processes of dry matter and 'N' content increased in nodule which in turn helps the yield improvement. Pal (1986) reported that mixture of these four nutrients and NAA sprayed at peg stage increased yield 40 per cent over control.

Yield improvement to the extent of 29.5 per cent was due to combined effect of drought tolerant variety (VRI 1, 2 and 3) appropriate drought management technologies adopted under the demonstrations. It was also observed that low productivity of groundnut under local check was mainly due to non-adoption of drought management technologies.

On an average, there was 22.24 per cent increase in pod yield over local checks. This economic viability of the demonstrations convinced farmers of the area easily.

Extension activities conducted during groundnut FLDs are presented in Table 2 with maximum number of field visits followed by trainings and field days.

Feedback:

– The farmers very much appreciated that they got more than 80 per cent population only due to the seed hardening technology. They were also noticed that the tolerant capacity of hardened plant in mid season drought than non treated one.

– Many of the farmers expressed that spraying of micronutrients increased pegging per cent in the field.

– After harvest, the farmers showed that the groundnut shell became very hard due to gypsum application. This hardened shell ensures the great escape form seed borne diseases, pest and also it will increase the storage capacity.

Table 1 : Yield of groundnut (VRI Variety) under demonstration and local check practices

Year	Area (ha)	No of demos	Average yield kg/ha		% increase over local check
			Demo	Local	
1995	5	12	2240	1720	22.4
1997	5	12	1813	1400	29.5
1998	5	12	1625	1400	20.0
1999	5	12	1667	1420	17.4
2000	5	12	1728	1432	20.8
2001	5	12	1450	1200	20.8
2003	5	25	1400	1175	19.1
2004	10	50	1867	1628	14.7
2005	20	100	1755	1424	23.2
2006	15	75	1820	1450	21.9
2007	10	50	1865	1480	26.0
Total	90	372	1748	1430	22.24

Table 2 : Extension activities conducted during groundnut FLDs (1995 to 2007)

Extension activities	No of programme	Beneficiaries
Trainings	410	9525
Field days	382	17250
Kisan mela	6	20000
Field visits	520	520
Booklets and CD on groundnut production technologies in folk media Villupattu	Distributed to the farmers at the time of trainings	

– Farmers suggested that the VRI 2 variety was very much suited for rain fed conditions of Salem district. There was no stagnation of pods in the soil. They previously experienced such problems in spreading /semi spreading varieties of groundnut.

Since last 6-7 years, the variety has replaced almost 70 per cent of local seed and is expected to cover 90 per cent area in three years to come. By conducting effective frontline demonstrations of proven technologies, yield potential of crops can be increased to a great extent. The

technologies suitable for the other areas similar to Salem district of Tamil Nadu should be evolved and brought to the access of farmers through transfer of technology centre.

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