



# Promotion of Drought Tolerant Groundnut Varieties in Tiruchirappalli District of Tamil Nadu through Interventions

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## ABSTRACT

The farmers of Tiruchirappalli District were found cultivating age old groundnut varieties VRI 2, TMV 7 and other local varieties and hence were getting lower productivity. An on farm research TRIAL was conducted during 2017-2018 with main objective to assess suitable drought tolerant groundnut variety in terms of yield, acceptability and adoption potential during *Kharif* season. The experiment was laid out in five replications in five locations with four treatments in Manapparai block of Tiruchirappalli district as a rainfed crop. The treatments were TO1-Farmers' Practice – Groundnut variety VRI2; TO2-varietyCO 7, TO3 – variety VRI 8 and TO4- variety Kadiri 9. The results revealed that the groundnut variety VRI8 gave higher yield (42% higher than local) followed by Kadiri 9 and CO7 compared to local or old varieties in use by the farmers. The plant population stand was higher in VRI 8 (23.2 no/m<sup>2</sup>) and the number of pods per plant (31) than in other varieties and performed well under drought situation, even it withstood delayed irrigation for 10-15 d. Through KVK interventions like conduct of on and off campus training, field days, focus group meetings, sponsored trainings and supply of improved groundnut technologies for getting higher yield. It could be concluded that the groundnut varieties VRI 8 and Kadiri 9 were almost on par in yield parameters and application of crop booster groundnut rich resulted in enhanced yield up to 25 per cent. Major constraints faced by the farmers were the pod size differed for all the varieties so the market rate, lack of knowledge to store the latest varieties and sell them separately and no timely supply of seeds from government/Institutions.

**Key Words:** Constraints, Feedback, Groundnut, Interventions, Plant population, Pod yield.

## INTRODUCTION

In India, groundnut is cultivated largely in *Kharif* season under rainfed conditions with low input use and high pressure of insect-pests and diseases including weeds, hence, the productivity is low. In *Rabi* season, the crop is grown on residual moisture in rice fallows with protective irrigation or in river bed areas. Summer groundnut grown under assured irrigation is generally practiced with high input application with low pressure of insect-pests, diseases and weeds hence, the productivity is quite high. More than 85% production of groundnut comes from 05 States namely Gujarat (38%), Andhra

Pradesh (16%), Tamil Nadu (14%), Rajasthan (9%) and Karnataka (8%). In Tamil Nadu, seven districts *viz.*, Thiruvanamalai, Villupuram, Vellore, Kancheepuram, Namakkal, Erode and Salem contribute for major groundnut growing area. The state average yield of 3751kg/ha of Tamil Nadu is much higher (122%) than world average yield (1689 kg/ha) mainly because groundnut is largely grown under sandy loam soils in Tamil Nadu, which are porous in structure and rich in organic matter. The total net cultivable area in Tiruchirappalli district is 1.65 lakh ha out of which 0.987 lakh ha (59.7%) is under irrigated condition and 0.623 lakh ha (41.3%)

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**Figure 1. Rainfall distribution Pattern in Tiruchirappalli district (2011-2019)**

under rainfed conditions. Manan and Sharma (2018) reported that application of both SSP and gypsum was must to get optimum yield of groundnut.

Groundnut is one the major rainfed oilseed crop grown in Tiruchirappalli district especially in *Kharif* season cultivated by 97% of small and marginal farmers. The district average rainfall received during past 10 years was only 582 mm as against normal rainfall of 818 mm (Figure 1). Farmers lack awareness on high yielding varieties, getting lower productivity due to use of local varieties (VRI 2, TMV 7 and other local varieties ) hence, farmers need to get a fair return which is possible through improved varieties and modern technologies. With this background, an on farm research trials and front line demonstrations were conducted to assess the potential of groundnut varieties for drought tolerance on growth and yield of Groundnut and popularize the same through various interventions by ICAR KVK, TNAU, Tiruchirappalli during 2017-2019 under rainfed conditions.

## MATERIALS AND METHODS

The selection of block, villages and farmers' field were selected using purposive and random sampling methods. The field experiment was laid out in five replications in three locations with four treatments in Manapparai block of Tiruchirappalli district as a rainfed crop. A baseline survey was conducted in the villages of Manapparai block and conducted many group discussions, meetings with village panchayat leader and other progressive

farmers along with the officials of Department of Agriculture. Based on the interest and imitativeness of the farmers, five farmers' fields were selected located in four different hamlets of Puthanatham revenue panchayat. The replications R1 located in North Idayapatti village, R2 & R3 in Kanavaipatti village, R4 & R5 in Puthanatham village. Treatments were T1-Farmers' Practice – Groundnut variety VRI2; T2-variety CO 7, T3 – variety VRI 8 and T4- variety Kadiri 9. The farmers each were provided with groundnut seeds, *Trichoderma viride*, *Pseudomonas*, *Rhizobium* for seed treatment for laying out of T2, T3, T4 and the T1 laid out.

Sowing operation of groundnut in the trial fields was taken up during *Kharif* 2017. A group discussion was made on soil test based fertilizer application, the importance of seed treatment, weed management and sulphur availability its importance on groundnut yield through gypsum application along with earthing up was taught to the farmers by conducting off campus meetings. Method demonstration of seed treatment with bio control agents and bio fertilizers was demonstrated lively and explained elaborately to the farmers in all the locations before sowing and ensured the correct usage and method. Apart from this, three on campus training on “Improved Groundnut Cultivation Technologies” was imparted to the farmers of Tiruchirappalli district including the trial farmers at KVK, Sirugamani, Tiruchirappalli. Further, five off campus trainings were conducted at the selected villages. Field days were conducted at the time

## Promotion of Drought Tolerant Groundnut Varieties

**Table 1. Extension methods used to disseminate Improved Groundnut cultivation Technologies.**

| Sr. No. | Extension Methods   | Frequency | Number of farmer |
|---------|---|-----------|------------------|
|         | Focus Group meeting   | 05        | 85               |
|         | On campus training  | 03        | 63               |
|         | Off campus training   | 05        | 115              |
|         | ATMA sponsored training   | 06        | 240              |
|         | Method demonstration on bio control and <i>Rhizobium</i> seed treatment | 08        | 178              |
|         | Field day   | 03        | 46               |
|         | Technology assessment   | 03        | 15               |
|         | Frontline demonstration   | 05        | 50               |
|         | Farm Field School   | 02        | 50               |
|         | Up scaling (seed production).   | 01        | 02               |
|         | Exhibition  | 07        | Mass             |
|         | Extension literature - booklet  | 04        | 1500             |
|         | All India Radio talk  | 02        | Mass             |
|         | TV talk   | 01        | Mass             |
|         | You tube channel  | 02        | Mass             |

of harvest involving farmers and Department of Agriculture officials. (Table 3).

In the consecutive years 2018-19 and 2019-20, frontline demonstrations were conducted to popularise the promising groundnut variety VRI 8. In 2018-19, the groundnut variety was promoted in the same block of Manapparai in the villages of Pannapatti East, Pannapatti West, Pannakombu, Palakaruthampatti and Palavarapatti in an area of 10 acres. In 2019-2020, to promote the same variety in other blocks, front line demonstration under farmer participatory seed production mode was conducted in villages of Mangaraipettai and Seventhalingapuram in Musiri block of Tiruchirappalli district. Two farmers were registered under seed certification department and 150q of pods were segregated and stored. The various KVK interventions applied in field for promotion of drought tolerant groundnut variety VRI 8 are tabulated in the table 1.

The various growth and yield parameters recorded in on farm research trials and frontline demonstrations were gathered, analysed and tabulated for its growth and yield parameters.

### RESULTS AND DISCUSSION

The results revealed (Table 2) that the groundnut TNAU variety VRI 8 yielded higher (26.2 /ha) followed by Kadiri 9 (22.5 /ha) and TNAU variety CO 7 (20.7 q/ha). The percentage of increase in yield over farmers' variety was 42.0. The net return realized was highest for VRI 8 (Rs.46250/- ha) over farmers' practice variety (Rs. 19272/- ha). The number of pods per plant in VRI 8 groundnut recorded was 31 as against 15.8 in farmers' practice. Similarly, the plant population was also high in VRI 8 showing its drought tolerance compared to other varieties. In 2018-19, result of frontline demonstration conducted also confirmed high yield

**Table 2. Assessment of Drought Resistant Groundnut Varieties suitable for Tiruchirappalli District (2017-18).**

| Parameter                                       | Farmer practice | Groundnut |       |          |
|---|-----------------|-----------|-------|----------|
|   |                 | CO 7      | VRI 8 | Kadiri 9 |
| Yield (q/ha)                                    | 15.2            | 20.7      | 26.2  | 22.5     |
| Net returns (Rs/ha)                             | 19272           | 29900     | 46250 | 35300    |
| BCR   | 1.74            | 1.93      | 2.44  | 2.10     |
| Plant population (No.of plants/m <sup>2</sup> ) | 18.2            | 19.6      | 23.2  | 22.0     |
| No. of pods/plant                               | 15.8            | 22.2      | 31.0  | 28.8     |

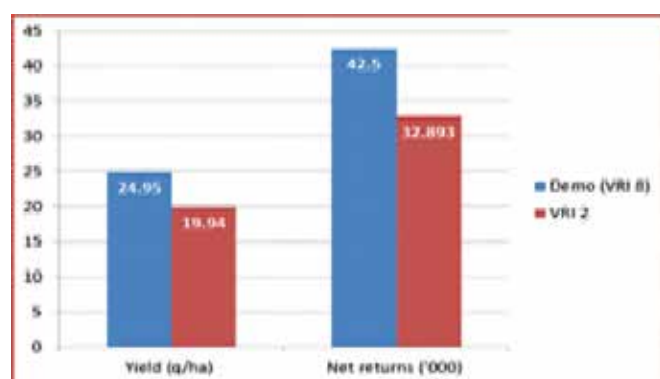


Figure 1. Results of FLD on Demonstration of groundnut variety VRI 8 (2018-19)



Figure 2. Yield Performance of Groundnut variety VRI 8 in different seasons (q/ha)

of variety VRI 8 (24.95 q/ha) compared to farmers' practice VRI 2 variety (19.94 q/ha) with an increase of 25.13 per cent and of the net returns, even under less rainy days in the area of operation. (Figure 1). The yield of demonstration variety (VRI 8) recorded was 24.2 q/ha, 24.95 q/ha and 27.4 q/ha compared to local age old variety of VRI 2 which gave only 17.4 q/ha, 19.94 q/ha and 20.6 q/ha in the respective seasons.

### Impact of KVK Interventions

A total of 50 farmers involved in various OFTs and FLDs were interacted for their knowledge gain and action converted to adoption were recorded and simple percentage analysis was carried out. The various technologies demonstrated and popularized to the farmers includes introduction

of high yielding varieties– TMV 7, CO 7, Kadiri 9, VRI 8; Seed treatment with bio control agents – *T.viride*, *Pseudomonas*; Application of bio fertilizers – *Rhizobium*; Gypsum application – basal and at 45 days after sowing; Earthing up of soil after second hand weeding (45<sup>th</sup> day); Application of TNAU crop booster – groundnut rich; Use of pheromone traps for pest management and use of bio pesticides like neem oil, neem seed kernel extract (Table 3).

The knowledge gain in percentage was highest for earthing up of soil after second hand weeding (100%) followed by Gypsum application (98%), seed treatment with bio control agents (82 %), application of bio fertilizers (78%) and use of bio pesticides like neem oil, neem seed kernel extract (70%). Other technologies like High yielding

## Promotion of Drought Tolerant Groundnut Varieties

**Table 3. Knowledge and adoption of groundnut farmers**

(n=50).

| Sr. No. | Technology  | Knowledge |          | Adoption |          |
|---------|---|-----------|----------|----------|----------|
|         |   | Number    | Per cent | Number   | Per cent |
| 1.      | High yielding Varieties                                       | 24        | 48       | 19       | 38       |
| 2.      | Seed treatment with bio control agents                        | 41        | 82       | 34       | 68       |
| 3.      | Application of bio fertilizers                                | 39        | 78       | 35       | 70       |
| 4.      | Gypsum application  | 49        | 98       | 39       | 78       |
| 5.      | Earthing up of soil after second hand weeding                 | 50        | 100      | 42       | 84       |
| 6.      | Application of TNAU crop booster – groundnut rich             | 14        | 28       | 09       | 18       |
| 7.      | Use of pheromone traps for pest management                    | 11        | 22       | 05       | 10       |
| 8.      | Use of bio pesticides like neem oil, neem seed kernel extract | 35        | 70       | 37       | 74       |

Varieties, application of TNAU crop booster – groundnut rich and use of pheromone traps for pest management recorded lesser knowledge may be due to their lesser interest and growing crop in rainfed situation.

The farmers showed keen interest in adoption of earthing up of soil after second hand weeding (84%) followed by gypsum application (78%), use of bio pesticides like neem oil, neem seed kernel extract (74%), application of bio fertilizers (70 %) and seed treatment with bio control agents (68 %), The reason might be that these practices were known to the farmers by ancestry and were

organically very effective. The technologies like High yielding Varieties, application of TNAU crop booster – groundnut rich and use of pheromone traps for pest management recorded least adoption percentage for the reason that farmers invested low capital for rainfed groundnut and are least bothered unlike other crops. The findings of this study were in agreement with Nath and Barik (2011); Anitha *et al* (2014); Jatinder and Sharma (2018); Murugan and Nisha (2016). During the period from 2017-18 to 2019-20, the groundnut variety VRI 8 has given higher yield by 28.4% over the local

**Table 4. Physical and financial impact of KVK interventions in dissemination of Yield enhancing technologies in groundnut in Tiruchirappalli district (2017-2019).**

| Parameter   | Demo  | Check  |              |
|---|-------|--------|--------------|
| <b>Output</b>   |       |        |              |
| Productivity (q/ha) in demonstration                    | 25.7  | 18.4   |              |
| Per cent increase in yield over check                   | 28.4  |        |              |
| Gross returns (Rs/ha)                                   | 41115 | 34298  |              |
| Net Returns (Rs / ha)                                   | 22829 | 18878  |              |
| Additional Net Returns in demo (demo – check)           | 3951  |        |              |
| B:C ratio   | 2.4   | 2.1    |              |
| <b>Outcome</b>  |       |        |              |
| Area spread (ha)  |       | 120    |              |
| <b>Economic impact of KVK intervention (Rs in lakh)</b> |       |        | <b>12.03</b> |
| Area spread in district through convergence (ha)        |       | 1753.6 |              |

varieties with additional net return of R.3951/- ha. With Department of Agriculture in convergence, an area of 120 ha was spread with new high yielding varieties of groundnut with economic impact of KVK intervention to the tune of Rs 12.03/- lakh.

### CONCLUSION

The groundnut technologies were disseminated through various KVK interventions revealed a remarkable knowledge gain in earthing up of soil after second hand weeding (100%) followed by gypsum application (98%), seed treatment with bio control agents (82%), application of bio fertilizers (78%) and use of bio pesticides like neem oil, neem seed kernel extract (70%). The farmers showed keen interest in adoption of earthing up of soil after second hand weeding (84%) followed by gypsum application (78%), use of bio pesticides like neem oil, neem seed kernel extract (74%), application of bio fertilizers (70 %) and seed treatment with bio control agents (68 %). The groundnut variety VRI 8 has given higher yield of 28.4% over the local varieties with additional net return of R.3951/- per ha. With Department of Agriculture in convergence, an area of 120 ha was spread with new high yielding varieties of groundnut with economic impact of KVK intervention to the tune of Rs. 12.03/- lakh.

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