



Suitability of Drought Tolerant and High Yielding Groundnut Varieties for Davanagere District

B O Mallikarjuna*, T N Devaraja, J Raghuraj and M G Basavangowda
ICAR -Talarabalu Krishi Vigyan Kendra, Davanagere 577004

ABSTRACT

Groundnut (*Arachis hypogaea* L.) is an important oil seed crop mainly grown under rainfed condition. The normal rainfall of the Davanagere district is about 665 mm and crop is grown in red, black and sandy soils. The groundnut yields were low under rainfed farming due to erratic rainfall and long dry spells during the crop growth period. ICAR-Talarabalu Krishi Vigyan Kendra (KVK), Davanagere conducted the on farm trial on the assessment of the three groundnut varieties for higher yield and drought tolerant at Rameshwara village of Nymathi taluk. The varieties used were TMV-2, GPBD-4 and G2-52 for yield potential and drought tolerance. The study was conducted for two years and results revealed that groundnut variety G2-52 recorded higher pod yield of 2785 kg/ha Haulm yield (37.06 q/ha) and plant height of 79.24 cm as compared to the farmer's practice. The highest shelling percentage recorded in G2-52 (73%) and lowest recorded in farmer's practice (TMV-2) 68%. Gross return and Net return were ₹136876/ha and ₹82075/ha respectively by growing G2-52 as against ₹108427/ha and ₹46478/ha in farmer's practice (TMV-2). The Haulm yield (37.06 q/ha) and Benefit cost ratio (2.39) were recorded highest in G2-52 as against the farmer's practice. Groundnut varieties G2-52 and GPBD-4 were better option for the rainfed farming of the Davanagere district.

Key Words: Drought, Groundnut, Varieties Rain fed, Plant height.

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is commonly called as the poor man's nut. It is a legume crop widely grown in rain fed conditions in the tropical and sub-tropical countries including India. Groundnut grown in an area of 85 lakh hectares in India with production of 84 lakh tonnes. It is rich source of oil, carbohydrates and protein (Pasupuleti *et al*, 2016; Ondulla, 2020). The groundnut is an important oilseed and food crop, seeds are mainly used for edible oil purpose and it contains with goodness of vitamins and minerals such as vitamin E, Magnesium, Folate, Copper and Arginine which are good for health. (Fonte *et al*, 2019). About 25% of groundnut kernels are protein-rich, which is 1.3 times more than meat, 2.5 times more than eggs, and 8 times more than fruit. The oil content in kernels ranges from 40 to 50 percent, and it is frequently utilized for both making vegetable oil

(vanaspati) and for use in cooking. Additionally, soaps, cosmetics, cold cream, and a number of industrial applications all employ this oil. A key benefit of groundnuts is its 26% protein level. Thus, groundnut is crucial to the farmers who are resource poor in terms of ensuring their nutritional security. Similar findings were observed by Meena *et al* (2007); Chris *et al* (2020).

Globally, Groundnut covers 327 lakh hectares with the production of 539 lakh tonnes and the productivity of 1648kg/ha (FAO (2021)). The average productivity is 1400 kg/ha. Groundnut production is 5.9 million MT grown in an area 4.8 Mha and accounts for shares 22% (India) of the world production (Madhusudhana, 2013). In Karnataka according to 2nd advance estimates during 2021-22, groundnut was grown in 8.09 lakh hectares with a production of 5.35 lakh tonnes and productivity

was 661 kg/ha. Tropics and subtropics are the area where the groundnut is grown predominately and even it is grown where the availability of water is a major constraint on yield by Viramani and Singh (1986). The groundnut crop if subjected to water stress or drought one or another stage there will be reduction in the yield. Flowering, peg initiation, pod and seed formation stages are most critical stages of the crop growth if there is any drought during the pod and seed formation stages as shown reduction in pod yield of groundnut by 56-85%. Similar findings were also revealed by Nageswara Rao *et al* (1989); Vincent and Pasala (2016). The main objective of the study was to assess suitability for drought and high yielding varieties for Davangere district through the on farm trials.

MATERIALS AND METHOD

On farm trial (OFT) was conducted at ten farmers field of Rameshwara village of latitude 14°79'83"N and longitude 75.53167° E during 2021 and 2022. Three genotypes of groundnut were selected for the experiment. The experiment was conducted in Randomised Block Design (RBD) with an area of 0.4 ha with three replications. After the first shower in the month of may end the land was prepared and brought to the fine tilth with repeated harrowing. The land was free from weeds and clods were broken. The complete production technology was followed for raising the crop. The sowing was taken up in the first week of June with bullock drawn seed cum fertiliser drill with seed

rate of 45 kg/ha with spacing of 30x10 cm² for maintaining the optimum plant population. The soil was black loamy soil and samples were collected and analysed. Medium organic carbon content (0.57%), medium in nitrogen (387.5 kg/ha), high in phosphorus (80.75 kg/ha) and medium in potassium (134.4 kg/ha) contents. The recommended dose of fertilisers were applied as per the soil report. The crop was mainly grown under rain fed condition with protective irrigation through the bore well. The treatment viz., T1: Farmer's practice (TMV-2), T2: GPBD-4 and T3: G2-52. Five plant samples were selected randomly from each trial. The observations on number of pods per plant, test weight, pod yield, haulm yield and economics of all the varieties were recorded. The growth parameters like germination percentage at initial stage and plant height (cm) at time of harvest were recorded from five randomly selected plants from each trial. Based on the net plot yield the yield calculated (q/ha). The cost of cultivation and gross returns were worked out by using present market prices of inputs during the period of experiment (Table 1 and 2). Benefit-cost ratio (BCR) was worked out by using the following formula.

Benefit: Cost ratio (BCR) = Gross return (₹/ha) / Gross Cost (₹/ha)

RESULTS AND DISCUSSION

Growth parameter

Groundnut genotypes observed the better germination in G2-52 with 93.7% against the

Table 1. Details of practices in Davangere district

Sr. No.	Cultural operation	Existing practice	Improved production technology
1.	Variety	TMV-2	GPBD-4, G2-52
2.	Seed rate	130 kg/ha ⁻¹	100 kg/ha ⁻¹
3.	Seed treatment	No	Bio fertilisers and Bio pesticides (<i>Rhizobium</i> and <i>Trichoderma</i>)
4.	Sowing	Seed drill	Seed cum fertiliser drill
5.	Nutrient Management	DAP-75 kg/ha	DAP-100 kg/ha and MOP - 41.5 Gypsum-500 kg/ha
6.	Harvesting and threshing	Manual	Mechanical

Suitability of Drought Tolerant and High Yielding Groundnut Varieties

Table 2. Characteristics of selected varieties

Particular	Source of technology	Duration Days	Shelling percentage (%)	Oil Content (%)	Potential Yield (q/ha)
TMV-2	UAS, Bangalore	110-115	68	48	18.00
GPBD-4	UAS, Dharawad	110-115	73	47	28.00
G2-52	UAS, Dharawad	110-115	73	49	28-30

farmer's practice 82.4%. Significance difference among the genotypes were observed with respect to plant height at time of harvest. G2 -52 recorded the highest value of plant height of 79.24 cm followed by GPBD-4 with 78.83cm and lowest was recorded in the farmer's practice (TMV-2) with 73.73cm at time of harvesting stage (Table-3). The plant height recorded in the G2-52 was mainly due to tolerance of leaf spot and highest shelling percentage with bold seeds and lower in farmer practice due to small and shrivelled seeds. Singh *et al* (1998) and Nandania *et al* (1992) reported that the seeds which bold and large recoded the higher plant height.

Yield and Yield Attributes

The results revealed that there was a significance difference among the groundnut varieties on test weight. The groundnut variety G2-52 recorded the highest test weight 2.37g and lowest in farmer's practice (TMV- 2.02g). In addition the groundnut variety G2-52 recorded the highest pod yield of 27.85 q/ha and lowest was recorded in the farmer's practice (TMV-2) 22.67 q/ha. (Punithavathi *et al*, 2021; Sreenivasulu *et al*, 2021). The highest haulm yield was obtained about 35.92, 37.28 and 18.72 q/ha in groundnut varieties of G2-52, GPBD-4 and TMV-2 respectively. The varieties G2-52 and

Table 3. Growth performance on groundnut varieties in farmer's field (Average of 5 trials and 2 years)

Treatment	Germination Percentage (%)	Plant Height (cm)
T1: Farmer's Practice-TMV-2	82.4	73.73
T2: GPBD-4	92.2	78.83
T3: G2-52	93.7	79.24
SE m $\pm$	0.545	0.17
CD (p-0.05%)	1.678	0.49
	S	S

Table 4. Growth performance on groundnut varieties in farmer's field (Average of 5 trials and 2 years)

Treatment	No. of pods per plant	Test weight (g)	Oil Percentage	Pod Yield (q/ha)	Haulm yield (q/ha)
T1: Farmer's practice – TMV-2	20.6	2.02	48.2	22.67	18.72
T2: GPBD-4	30.2	2.35	48.15	26.2	37.28
T3: G2-52	31.5	2.37	48.88	27.85	35.92
S.Em $\pm$	0.827	0.012	0.136	0.22	0.12
CD (p=0.05)	2.547	0.037	0.409	0.67	0.39

Table 5. Economics of groundnut varieties in the farmers field (Average of 5 trials and 2 years)

Treatment	Gross Cost (₹/ha)	Gross return (₹/ha)	Net return (₹/ha)	B:C
T1: Farmer's practice – TMV-2	53267	108427	55185	2.02
T2: GPBD-4	54800	130852	71052	2.35
T3: G2-52	57300	136876	82075	2.38

GPBD-4 were tolerant to leaf spot diseases and remains green at time of harvest. So these varieties were well suited for both pod and fodder. Gross and net returns were ₹ 136876 q/ha and ₹ 82075 q/ha respectively by cultivating G2-52 as against ₹108427 q/ha and ₹ 33484 q/ha in the farmer's variety (Murugan and Nisha, 2016). Benefit cost ratio of 2.38, 2.35 and 2.02 were recorded in G2-52, GPBD-4 and farmer's practice (TMV-2) varieties respectively (Table-4). The probable reason were drought withstand genotype and lesser incidence of leaf spot diseases coupled with higher number of pods/plant resulting in higher pod and haulm yield, these results were in agreement with the findings of Hanif Noorjehan *et al* (2021), Vindhiyavarman *et al* (2010) and Saravanan *et al* (2018).

CONCLUSION

Groundnut variety, G2-52 recorded more number of pods per plant, less incidence of leaf spot diseases, higher pod yield, good withstand under drought and performed very well compared to GPBD-4 and farmer practice variety under rain fed condition. The varieties G2-52 and GPBD-4 performed well under drought condition and they did not suffer from dry spells of 12-15 days without rain. These two varieties were well suited for both pod and fodder purposes in the rain fed cultivation during *kharif* season in Davangere district of Karnataka.

REFERENCES

- Food and Agriculture Organisations of United Nations (2021). *Statistical yearbook world food and agriculture*.
- Fonte H Marta F CitelliGeorgia C AtellaHelena F R Zago L Thamiris de S Simone Vargas da S Christina B F (2019). *Oil supplementation changes body composition and*
- activates insulin signaling cascade in skeletal muscle tissue of obese animals. Nutri* **58**(1): 167–174.
- Hanif Noorjehan A K A Dhanushkodi V Amuthaselvi G and Ravi M (2021). Promotion of drought tolerant groundnut varieties in Tiruchirappalli district of Tamil Nadu through interventions. *J Krishi Vigyan* **9**(2): 177 : 182.
- Madhusudhan K V and Sudhakar C (2014). Alteration in proline metabolism in groundnut (*Arachis Hypogae* L.) under soil water deficits. *Int J Sci Rea* **3**: 3.
- Meena S Malarkodi M Senthilvalavan P (2007). Secondary and micronutrients for groundnut. *Agric Rev* **28**(4): 295–300.
- Murugan P and Nisha P R (2016). Evaluation of High Yielding Groundnut Varieties for North Eastern Zone of Tamil Nadu *J Krishi Vigyan* **5**(1): 64- 66.
- Nageswara Rao R C Williams J H Singh M (1989). Genotypic sensitivity to drought and yield potential of peanut. *Agron* **81**:887–883.
- Nandania V A Modhawadia M M Patel J C Sadaria S G Patel B S (1992). Response of rainy season bunch groundnut to row spacing and seed rate. *Indian J Agron* **37**(3): 597–599.
- Nautiyal P C Zala P V Tomar R K Sodayadiya P and Tavethia B (2011). Evaluation of water use efficiency newly developed varieties of groundnut in on-farm trials in two different rainfall areas in Gujarat, India. *SAT eJournal / eJournal.icrisat.org* (9):1-6.
- Ondulla T T (2020). A comprehensive review of the value added uses of peanut skins and by-products. *Critical Rev Food Sci and Nutri* **60**(2):341–350.
- Pasupuleti J Pandey K M Yaduru S Murali T V Manda S Khera P Surendra S Nagesh P Vishwakarma K M Mishra G P Radhakrishnan T Manivannan N Dobariya K L Vasanthi R P Rajeev K V (2016). Molecular breeding for introgression of fatty acid denatures mutant alleles (ahFAD2A and ahFAD2B) enhances oil quality in high and low oil containing peanut genotypes. *Pl Sci* **242**:203–213.
- Punithavathi M Vasanthakumar R and Nethaji Mariappan V(2021). Studies on Drought Tolerant and High Yielding

Suitability of Drought Tolerant and High Yielding Groundnut Varieties

- Groundnut Varieties in Perambalur District. *IJBSM* **12**(1):064-067.
- Saravanan M Rajkala A and Alagukannan G (2018). Assessment of Drought Tolerant and High Yielding Groundnut Varieties in Ariyalur District, India. *Int J Curr Microbiol App Sci* **7**(5): 3492-3499.
- Sreenivasulu S Divya V Sudhakar P S Kumar T Ramu, Prasad J V Prasad Y G Prasad J V N S (2021). Performance of drought tolerant groundnut variety in chittoor district of Andhra Pradesh *J Krishi Vigyan* **10**(1) :196 – 199.
- Singh P Thakur D Vaish C P Katiyar R P Gupta P K (1998). Studies on packing materials for storage of soybean seeds under ambient conditions. *IS Seed Tech* **28**(4): 75.
- Vincent V Pasal R (2016). High transpiration efficiency increases pod yield under intermittent drought in dry and hot atmospheric conditions but less so under wetter and cooler conditions in groundnut (*Arachis hypogaea* (L.). *Field Crops Res* **193**:16–23.
- Vindhiyavarman P Manivannan N Nigam S N and Muralidharan V (2010). Farmers' Participatory Varietal Selection in Groundnut: A Case Study from Tamil Nadu, India. *Electronic J of Pl Breeding* **1**(4):878- 881.
- Received on 14/7/2023 Accepted on 5/10/2023