

Performance of Groundnut var. Dharani under Rainfed conditions in western mandals of Chittoor district

Sahaja Deva^{1*}, Prasanna Lakshmi Ravuri¹, M. Mallikarjun² and M.K. Jyosthna¹

¹ *Krishi Vigyan Kendra., Kalikiri, Chittoor District 517 234, Andhra Pradesh*

² *SMS (Agro met), KVK, Nellore 524 132, Andhra Pradesh*

Received 09 June 2022; received in revised form 11 November 2022; accepted 05 December 2022

Abstract

Front Line Demonstrations were conducted in sandy loam soils under rainfed conditions in western mandals of Chittoor dist. during 2017-18, 2018-19, and 2019-20 by Krishi Vigyan Kendra, Kalikiri to demonstrate the new Groundnut variety Dharani. The data pooled over three successive years revealed that significantly higher number of pods per plant (28.7 and 24.3 in Dharani and Kadiri 6, respectively), 100 fresh pod weight 188.2 and 144.2 g in Dharani and Kadiri 6, respectively) and 100 seed 76.6 and 49.8 g in Dharani and Kadiri 6, respectively) weight, 100 dry pods (104.0 and 94.3 in Dharani and Kadiri 6, respectively) and seed (42.6 and 38.8 in Dharani and Kadiri 6, respectively) weight, yield (28.7 and 24.3 q ha⁻¹ in Dharani and Kadiri 6, respectively), net returns 12.45 and 10.7 Rs ha⁻¹ in Dharani and Kadiri 6, respectively) and B: C ratio (1.23 and 1.09 in Dharani and Kadiri 6, respectively) were recorded in Dharani compared to local variety Kadiri 6, and Dharani proved best for western mandals of Chittoor dist. during *Kharif*.

Keywords: Economics, Groundnut, Varieties, and Yield.

Introduction

Groundnut is India's major oilseed crop, accounting for 25 per cent of total oilseed production in the country. 22.98 per cent of the total oilseed area and 14.52 per cent of the total production of oilseeds is from groundnut. It occupies an area of 5.30 million ha with a production of 5.50 million tonnes and productivity of 1040 kg ha⁻¹ (www.indiastat.com). In Andhra Pradesh, groundnut occupied an area of 7.48 lakh ha with a production of 4.62 lakh tonnes production and productivity of 618 kg ha⁻¹ during 2019-20 (www.indiastat.com). In the Chittoor district, groundnut is one of the major oilseeds crops. It ranks first in the area and production of oilseeds. The crop is cultivated in 123268 ha during *Kharif*, 2020-21, and 2124 ha during *Rabi*, 2020-21 in Chittoor district (O/o Joint Director of Agriculture, Chittoor). Groundnut is cultivated in diverse agro-

climatic environments characterized by soils of varying holding capacity under rainfed and irrigated conditions (Priya et al., 2016). In western mandals of Chittoor district, farmers are growing varieties that cannot tolerate drought conditions, are susceptible to pests and diseases, and also have low yield potential. Even though it is fairly drought tolerant, production fluctuates considerably due to rainfall variability. Besides moisture stress, lack of knowledge on the availability of drought-tolerant varieties, the prevalence of nutrient deficiency, improper weed management, pest and disease also affect groundnut under rainfed conditions (Pachamuthu et al., 2020). So there is a need to introduce a new variety that can tolerate drought conditions and has high water use efficiency. As a part of this, TCGS 1043 (Dharani) released by RARS, Tirupati, which is drought tolerant, withstands up to 35 days dry spell, water

*Author for Correspondences: Phone:7259009930, Email: sahajareddy.deva@gmail.com

use efficient, tolerant to stem and dry root rots, Pea Nut Bud Necrosis Disease and Pea Nut Stem Necrosis Disease was introduced in the district. Promoting groundnut variety TCGS 1043 (Dharani) will help the farmers to gain higher returns even under prevailing drought conditions.

Materials and Methods

Front Line Demonstrations on Groundnut variety Dharani were conducted in sandy loam soils in western mandals of Chittoor district during *Kharif* season in farmers fields at Guttapalem (Kalikiri) in 10 farmer's fields in an area of 4.0 ha during each year from 2017-18 to 2019-20. Details of treatments and varietal characteristics are mentioned in Table 1 and 2. Sowings were done with seed drill during *Kharif* in the month of July at 5 cm depth, maintaining a row-to-row spacing of 30 cm. Pre emergence spraying of Pendimethalin @1.0 lt ac⁻¹ was done within 24 hours after sowing. Farmers applied FYM @ 20 q ac⁻¹, urea @ 25 kg ac⁻¹, SSP @ 100 kg ac⁻¹ and MOP @ 35 kg ac⁻¹. The data recorded on various parameters like plant height, number of pods per plant, number of seeds per pod, fresh 100 pod weight, fresh 100 seed weight, dry 100 pod weight, dry 100 seed weight and yield were analyzed. Cost of cultivation (Rs. ha⁻¹), Gross returns (Rs. ha⁻¹), Net returns (Rs. ha⁻¹) and Cost: Benefit ratio were calculated.

Table 1. Technological Options

Technological options	Variety	Source of technology
TO1	Dharani	RARS, Tirupati
TO2 (farmers practice)	Kadiri 6	ARS, Kadiri

Table 2. Salient features of Dharani (TCGS 1043) and Kadiri 6

Variety	Duration	Pod yield (qha ⁻¹)		Shelling %	100 seed weight (g)	Oil content (%)	Special features
		<i>Kharif</i>	<i>Rabi</i>				
Dharani	100-105	16-26	37-43	75-77	40-43	50	Drought tolerant, withstands up to 35 days dry spell, Uniform maturity, High SMK%, Attractive pods, Moderate stature, Tolerant to low light conditions
Kadiri6	100-105	8-8.8	16-17	72	40-45	48	Popular among farmers for its quality attributes

Table 3. Rainfall during the period of study from 2017-18 to 2019-20

Month/Year	Rainfall (mm)
June, 2017	96.1
July, 2017	70.1
August, 2017	209.3
September, 2017	213.3
October, 2017	262.2
June, 2018	75.4
July, 2018	49.0
August, 2018	57.5
September, 2018	129.1
October, 2018	69.5
June, 2019	66.8
July, 2019	104.1
August, 2019	154.3
September, 2019	251.3
October, 2019	59.2

Results and Discussion

Yield attributes

Higher plant height and number of pods per plant were recorded in Dharani variety. The number of pods per plant in Dharani and Kadiri 6 was 28.7 and 24.3, respectively (Table 3). Table 4 revealed that Dharani recorded significantly higher fresh 100 pod weight (188.2 g), dry 100 pod weight (104.0 g), fresh 100 seed weight (76.6 g), and dry 100 seed weight (42.6 g). Whereas, Kadiri 6 recorded lower fresh 100 pod weight (144.2 g), dry 100 pod weight (94.3 g), fresh 100 seed weight (49.8 g), and dry 100 seed weight (38.8 g). It has been concluded that there is significant difference between Dharani and Kadiri 6 with regard to no. of pods per plant and dry 100 seed weight during three years pooled data (Table 6). Higher plant height in Dharani may be attributed to the variety which tends to germinate and establish early compared to farmer practice

Table 4. Yield attributes of improved variety Dharani and check variety Kadiri 6

Year	Plant height (cm)		No. of pods per plant		No. of seeds per pod	
	Dharani	Kadiri 6	Dharani	Kadiri 6	Dharani	Kadiri 6
2017-18	42.2	42.0	28	22	2	2
2018-19	40.0	41.0	30	26	2	2
2019-20	41.4	38.6	28	25	2	2
Mean	41.2	40.5	28.7	24.3	2	2

Table 5. Pod and seed weight of improved variety Dharani and check variety Kadiri 6

Year	Fresh 100 pod weight (g)		Dry 100 pod weight (g)		Fresh 100 seed weight (g)		Dry 100 seed weight (g)	
	Dharani	Kadiri 6	Dharani	Kadiri 6	Dharani	Kadiri 6	Dharani	Kadiri 6
2017-18	187.5	142	103.5	94	77.0	52	42.7	38.7
2018-19	189.2	145	104.6	94.2	76.0	49	43.0	38.9
2019-20	187.9	145.6	104.0	94.6	76.9	48.4	42.2	38.8
Mean	188.2	144.2	104.0	94.3	76.6	49.8	42.6	38.8

Table 6. Yield and economics of improved variety Dharani and check variety Kadiri 6

Year	Yield (q ha ⁻¹)		% increase in yield over check	Gross returns (Rs ha ⁻¹)		Net returns (Rs ha ⁻¹)		B: C ratio	
	Dharani	Kadiri 6		Dharani	Kadiri 6	Dharani	Kadiri 6	Dharani	Kadiri 6
2017-18	13.5	10.4	30.0	51300	39520	11587	2936	1.29	1.08
2018-19	12.04	11.14	8.02	48160	44560	9709	6110	1.25	1.16
2019-20	11.80	10.60	11.3	47158	42580	6247	1580	1.15	1.04
Mean	12.45	10.7	16.5	48873	42220	9181	3542	1.23	1.09

variety Kadiri 6 with medium seed. Similar increase in plant height with large seeds was also observed by Singh et al., 1998 and Nandania et al., 1992. Menash and Okpere (2000) showed the significant differences among the varieties of groundnut for plant height throughout the growth period. Higher number of pods per plant, pod weight and seed weight is Dharani might be due to drought tolerating capacity of the variety.

Yield and Economics

Perusal of the data presented in table 5 and fig.1 revealed that yield in demo plot was significantly higher than in control (farmers practice) during all

the years (2017-18 to 2019-20) as well as in pooled data. Dharani. It has been concluded there is a significant difference between Dharani and Kadiri 6 in terms of yield with three years of pooled data (Table 6). The higher yield was due to more number of pods per plant and 100 pod and seed weight as it is one of the important yield attributing character. Gross returns, net returns, and B:C ratio was substantially higher in the demo plot (TCGS 1043) compared to farmers practice-check variety (Kadiri 6) (Table 5). Mean gross returns of Dharani were 48873Rs ha⁻¹. Whereas, in the check plot, gross returns were 42220 Rs ha⁻¹. The mean net returns of Dharani were 9181Rs ha⁻¹. Mean B:C ratio of

Table 7. Summary of t-test in comparing no. of pods per plant, dry 100 seed weight, yield and B: C ratio in treatment and farmers practice for three years pooled data

Particulars	Treatments	N	Mean	Std.Deviation	t-value	p-value
No. of pods per plant	Dharani	10	28.7	2.68	2.16**	0.0009
	Kadiri 6	10	24.3	1.69	2.16**	0.0009
100 seed weight (dry)	Dharani	10	42.6	2.37	2.14**	0.0004
	Kadiri 6	10	38.8	1.23	2.14**	0.0004
Yield	Dharani	10	12.45	1.51	2.17**	0.0008
	Kadiri 6	10	10.7	0.64	2.17**	0.0008
B: C ratio	Dharani	10	1.23	0.11	2.10*	0.003
	Kadiri 6	10	1.09	0.12	2.10*	0.003

**Significant at 1% level *Significant at 5% level

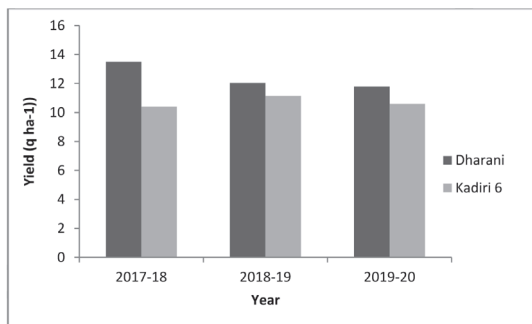


Figure 1. Performance of Dharani over Kadiri 6 in Western mandals of Chittoor dt.

Dharani was 1.23. The net returns in the control plot were 3542 Rs ha⁻¹ and the B:C ratio was 1.09. It has been concluded that there is significant difference between Dharani and Kadiri 6 in terms of B: C ratio with three years pooled data (Table 6). Higher net returns and B:C ratio in Dharani were due to higher yields. The probable reason might be due to genotype, lesser incidence of root rot disease coupled with higher number of pods per plant resulting higher pod yield, these results were in agreement with the findings of Aruna et al., 2017 and Kumari and Reddy, 2019.

Dharani (TCGS 1043) performed well in rainfed conditions and gave higher yield, net returns, and C: B ratio over Kadiri 6. Number of pods per plant, pod and seed size and 100 pod and seed weight were higher in Dharani, which in turn gave higher yields. A significant difference in yield and B:C ratio was observed in Dharani compared to Kadiri 6.

Acknowledgement

The authors are thankful to the Associate Director of Research, ANGRAU, RARS, Tirupati and the

Director of Extension, ANGRAU, for providing the necessary facilities and the Director of ATARI zone X, Hyderabad, for providing financial support in carrying out the present investigation.

References

- Aruna, K.T., Kumar, S.U., Ayyana Gowdar, M. S., Srinivasa Reddy, G. V. and Shanwad, U. K. 2017. Water Use Efficiency, Yield and Crop Coefficient (Kc) of Groundnut crop under different Water Regimes. *Int. J. Adv Sci Res.*, 3(09): 110-114. <http://indiastat.com>. O/o Joint Director of Agriculture, Chittoor, Andhra Pradesh.
- Kumari, C. and Reddy, B.S. 2019. Evaluation of groundnut varieties for drought tolerance under imposed moisture stress conditions. *J. of Oilseeds Res.*, 36(1):24-29.
- Menash, J.K. and Okpere, V.E. 2000. Screening of four groundnut cultivars from Nigeria for drought resistant. *Leg. Res.*, 23(1): 37-41.
- Nandania, V.A., Modhawadia, M.M., Patel, J.C., Sadaria, S.G. and Patel, B.S. 1992. Response of rainy season bunch groundnut to row spacing and seed rate. *Ind. J. of Agronomy*. 37(3): 597-599.
- Pachamuthu, A., Vennila, M.A., Sangeetha, M. and Shanmugam, P.S. 2020. Demonstration of integrated crop management in groundnut through cluster approach for enhancing the yield. Conference: ISWS Golden Jubilee International Conference on "Weeds and Society: Challenges and Opportunities.
- Priya, T., Subramanyam, D. and Sumathi, V. 2016. Performance of Groundnut (*Arachis hypogaea* L.) cultivars under different plant populations during early *Kharif*. *Ind. J. Agril Res.*, 50-51.
- Singh, P., Thakur, D., Vaish, C.P., Katiyar, R.P. and Gupta, P.K., 1998. Studies on packing materials for storage of soybean seeds under ambient conditions. *J. Ind. Soc. Seed Tech.*, 28(4):75