

A High-yielding Drought-tolerant Groundnut Variety Abhaya

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Groundnut (*Arachis hypogaea*), an important oilseed and food crop of Andhra Pradesh, India is grown largely as a rainfed crop during the rainy season. Drought is the major abiotic stress affecting yield and quality of rainfed groundnut in the state. Yield losses due to drought are highly variable depending on its timing, intensity and duration coupled with other location specific environmental factors such as irradiance and temperature (Nigam et al. 2001). Thus the groundnut productivity in rainy season in the state ranges between 500 kg ha⁻¹ and 1200 kg ha⁻¹ (Reddy et al. 2003). To stabilize yield under rainfed conditions, it is necessary to develop varieties that tolerate moisture stress at different stages of crop growth. To achieve this objective, research was initiated to identify donor parents for drought tolerance traits such as low specific leaf area (SLA), high SPAD chlorophyll meter reading (SCMR) and high harvest index (HI) that confer advantage under drought conditions. Through principal component analysis, ICGV 86031, CSMG 84-1, ICGS 76 and TAG 24 were identified as genotypes with most of the useful traits for drought tolerance (Nageswara Rao and Wright 2003). Hybridization was effected in 1998 involving these genotypes as male parents. From K 134 ×

TAG 24 cross, TPT 25 was developed through modified pedigree method with focus on drought tolerance traits in segregating generations. It belongs to subspecies *fastigiata* and variety *vulgaris*. TPT 25 is a short-statured, drought-tolerant, high-yielding Spanish bunch groundnut variety (Fig. 1). Its special attributes are: plant height 27–34 cm, sequential branching pattern, short internodes, narrow dark green leaflets, 4–6 primary branches, decumbent plant type, slender pods without beak, higher frequency of three-seeded pods, thin shell, higher shelling outturn, and high oil content of 52% (Table 1). It matures 105–110 days in the rainy season.

TPT 25 was tested in yield trials at Regional Agricultural Research Station (RARS), Tirupati, in different All India Coordinated Research Project (AICRP) centers and on farmers' holdings in Chittoor, Kadapa and Anantapur districts extensively (Table 2). It was also tested in state

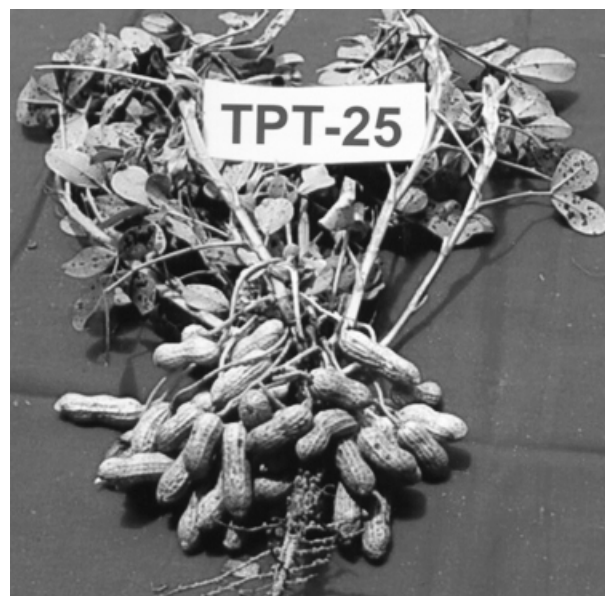


Figure 1. A mature plant of groundnut variety TPT 25.

Table 1. Morphological and physiological traits of groundnut variety TPT 25¹.

Variety	Plant height (cm)	Time to maturity (days)	SCMR	SLA (cm ² g ⁻¹)	RWC (%)	Shelling outturn (%)	SMS (%)	Oil content (%)
TPT 25	30.7	105.6	42.5	167	83.3	72.2	84.5	52.3
Narayani (check)	52.5	90.0	40.9	217	77.9	70.6	82.0	48.3

1. Mean of values recorded during rainy season 2003, 2004 and 2005.

SCMR = SPAD chlorophyll meter reading; SLA = Specific leaf area; RWC = Relative water content in leaf; SMS = Sound mature seed.

Table 2. Pod yield (kg ha⁻¹) of groundnut variety TPT 25 in different trials during rainy season at Regional Agricultural Research Station, Tirupati, AICRP centers and on farmers' holdings in Andhra Pradesh, India.

Variety	Station trials			AICRP trials (early season stress)			Mimikit trials (mid-season stress)			Mean	
	2003	2004	Mean	2004-05	2004	2005	2004	2005	Mean	2004	2005
TPT 25	2741	1945	2343	3756	1235	1203	1134	1545	1340	1191	890
Narayani/TMV 2/Local (check) ¹	2257	1302	1780	3444	1065	932	860	1353	1107	810	710
Increase over control (%)	17	49	29	10	16	29	32	14	21	47	14
CD at 50%	580	204									
CV (%)	15	21									261

1. Narayani in station trials, TMV 2 in AICRP trials, and Local in mimikit trials.

multilocational varietal trials at different research stations of Acharya NG Ranga Agricultural University (ANGRAU) for two years covering different agroclimatic situations of Andhra Pradesh. It outperformed the existing varieties JL 24 and TMV 2 at many locations with additional attributes of tolerance to drought and late leaf spot. Based on these results, the Andhra Pradesh State Varietal Release Committee released TPT 25 as Abhaya in June 2006 for general cultivation in the state. It is recommended for both rainy and post-rainy season cultivation throughout Andhra Pradesh. Due to its compact nature, TPT 25 is also suitable for high rainfall areas where excess vegetative growth in the existing varieties leads to drastic reduction in yield and the quality of the produce during the rainy season.

In trials at RARS, Tirupati during rainy season 2003 and 2004, TPT 25 produced an average pod yield of 2343 kg ha⁻¹ that was 29% higher than Narayani and 13% higher than Vemana, the two recently released varieties in the state. Its seed yield was 1608 kg ha⁻¹, which was 34% higher than Narayani and 15% higher than Vemana. It was tested at AICRP centers identified for their drought pattern – early season drought stress (Tirupati, Anantapur and Vriddhachalam) and mid-season drought stress (Jalgaon, Chintamani and Raichur). The average pod yield of TPT 25 under early season drought stress was 1219 kg ha⁻¹ (mean of rainy season 2004 and 2005) with an overall increase of 22% over the check variety TMV 2. In the mid-season drought stress situation, the average pod yield of TPT 25 was 1340 kg ha⁻¹ which was 21% higher than the check variety TMV 2 (Table 2). In end-of-season drought stress situation, the pod yield of TPT 25 was limited to that of check variety (data not given).

References

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