

AN EARLY MATURING GROUNDNUT WITH FOLIACEOUS STIPULE MARKER

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ABSTRACT

Trombay Groundnut Early-1 (TGE-1) selected in a cross between Tall mutant and TG-9, matured in 95 days. Pod yield was superior to an early maturing variety, Chico with larger number of three seeded pods, high shelling percentage and normal oil content. TGE-1 with foliaceous stipules in all the leaves is a good identifying marker.

VARIETIES of groundnut (*Arachis hypogaea*, L) maturing in less than 100 days are, in general, considered early maturing. Such varieties are preferred for cultivation in drought-prone areas. Early maturing cultivars viz, Chico¹, Ah-316/S, EC-cultivars and Phule-pragati² were utilized in groundnut breeding to incorporate "earliness" in potentially high yielding varieties. Except Phule-pragati, other varieties were low in pod yield and had either small size kernels and low shelling percentage or less oil content.

In our mutation research programme³, a culture, Trombay Groundnut Early-1 (TGE-1), maturing in 95 days was selected with improved kernel size over Chico, high shelling out-turn and oil content. Besides, it had a marker foliaceous stipule^{4,5}. This describes selection of TGE-1, nature of the marker and its comparative characteristics with Spanish type varieties, TG-3 and Chico with different maturity periods.

TG-9a Spanish bunch variety maturing in 125 days having dark green foliage, medium size kernels and high oil content⁶ was crossed to tall mutant⁴ in, *Kharif*, 1974. In the F₃, a plant which matured in 95 days was selected. It had dark green foliage of TG-9 and a high proportion of three kernel pods characteristics of the tall mutant⁴. Subsequent selections in the progenies of the plant led to development of TGE-1 in, *Kharif*, 1978. During seed multiplication of TGE-1, in *Rabi* 1979, a plant with foliaceous stipules for all the leaves was observed. The plant progeny had variation only in size and expression of foliaceous stipules. Therefore, selection was continued for two more seasons and a true breeding line was obtained in *Rabi*, 1980, with the following characteristics.

The foliaceous stipule in the basal two leaves of TGE-1 were similar to fol-1 and fol-3 reported earlier⁷, however, showed developmental variation ranging from partial to complete modification (figure 1a). All the remaining leaves on the stem and branches had leaflet like stipules and appeared like three-paired leaflets⁸. These foliaceous stipules varied in size and shape and were elliptical, elongated and some-times

club-shaped (figure 1b) differing from the fol-1, 2 and 3 mutants (figure 1c). Occasionally they had stiplets (figure. 1b) TGE-1 had leaflet size stipules in large number of leaves compared to fol-3⁷.



Figure 1. a. Stipules of basal leaves, extreme left normal and remaining of TGE-1, b. Variation of foliaceous stipules in TGE-1, c. Stipules of top leaves on stem (left to right), normal fol-2, 1, 3 and TGE-1.

TABLE I
Comparative characteristics in Rabi 1980

Characters	TG-3	Chico	TGE-1
Plant Height (cm)	55.6 ± 2.2	36.2 ± 2.2	41.9 ± 2.9
Number of branches (Primary + Secondary)	6 + 5	6 + 3	8 + 9
Foliage colour	Normal green	Light green	Dark green
Leaflet size (cm)			
Length	6.5 ± 0.1	5.3 ± 0.1	5.2 ± 0.1
Breadth	3.8 ± 0.1	3.0 ± 0.1	2.9 ± 0.1
Stipule size at maturity (cm)			
Length	4.7 ± 0.1	3.5 ± 0.1	3.6 ± 0.1
Breadth	0.8 ± 0.01	0.8 ± 0.01	1.6 ± 0.03
Flowering habit	Sequential	Sequential	Sequential
Days to maturity	115	85	95
No. of pods/plant (1 + 2 + 3 seeded)	5 + 31	8 + 30 + 1	15 + 18 + 10
% Oil at maturity	51.0 ± 0.4	47.0 ± 0.1	50.9 ± 0.2

Comparative characteristics of TGE-1 and the Spanish types studied by the usual methods⁴ are presented in table 1. TGE-1 and Chico were similar in plant height and were shorter than TG-3. TGE-1 was weak and slow in plant growth, however, attained normal vigour subsequently. It had more number of primary and secondary branches compared to the other varieties. The leaves were dark green in TGE-1, green in TG-3 and light green in Chico. Despite more number of branches, TGE-1 had sequential flowering habit like Spanish types. The pods were without constriction and had smooth surface with reticulation.

TGE-1, TG-3 and Chico were harvested at 10-day intervals from a randomised plot after 65 days of sowing to determine the duration of maturity. Chico, TGE-1 and TG-3 matured in 85, 95 and 115 days after sowing respectively. Maximum pod yield, shelling %, kernel weight and oil content were observed in each variety only at the respective optimum maturity periods (figure 2). TGE-1 and Chico harvested later than the optimum maturity period did not reveal any significant change in these characteristics (figure 2). Further, days to maturity could also be confirmed from browning of pods in Chico and TGE-1 at 85 and 95 days respectively, whereas, pods of TG-3 did not express until they reached maturity period. In addition, the moisture content of the pods was minimum (35 to 39%), and a high proportion of well-developed kernels was found during these periods. The proportion of underdeveloped kernels at 65 day was maximum which gradually decreased to minimum with developed kernels at the optimum period. Later no further variation in the proportion of these kernels was observed in the varieties (figure 3). These characteristics were used as maturity index (MI)^{9,10} and were

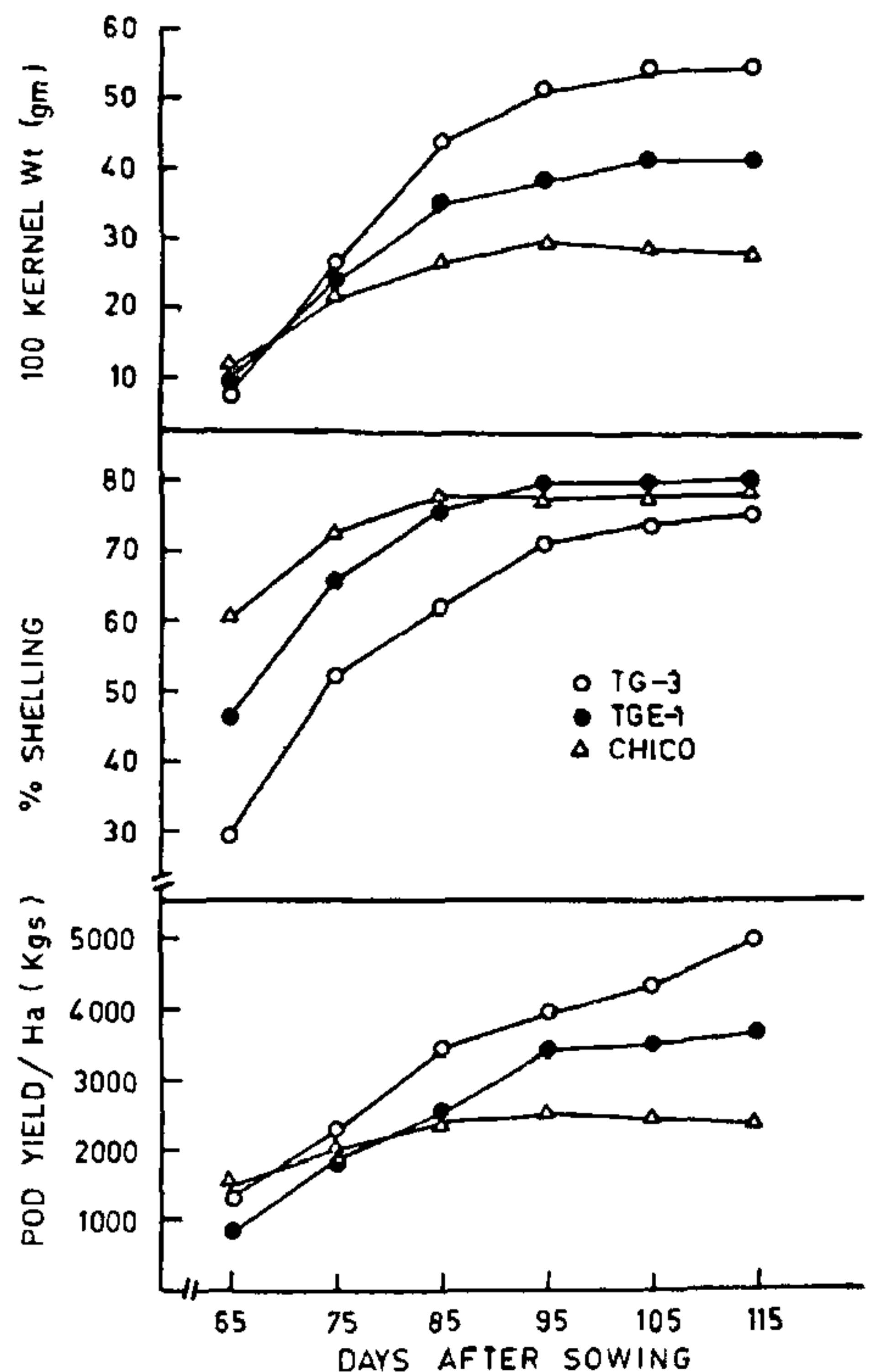


Figure 2. Comparative pod yields, shelling percentage and kernel-size in TGE-1, Chico and TG-3.

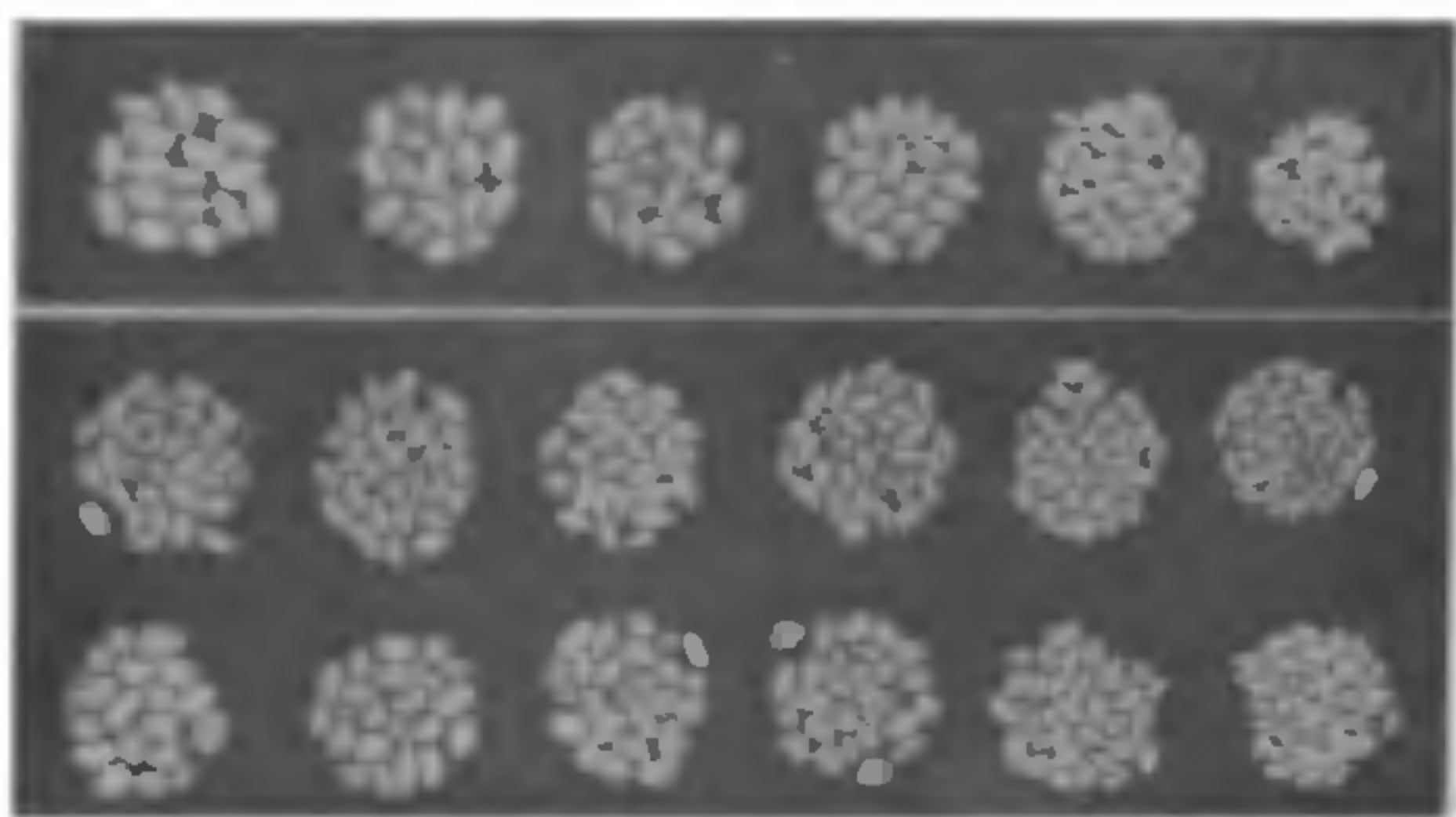


Figure 3. Kernel development at different days of harvest.

correlated to Arginine maturity index (AM)¹¹. Phule-pragati in Maharashtra released² as early variety was similar to TG-3 in maturity period and other characteristics but inferior in pods yields at Trombay³. Therefore, it was not included here. TGE-1 and Chico, which matured early had 20-25% and 10 to 12% ill-filled pods respectively, while, TG-3 later maturing had not. Improvement of this character in early maturing varieties might result in higher pod yields. TGE-1 was superior to Chico not only in yield but also in other characteristics. Although it was inferior to TG-3 in yield its shells were thin like paper and therefore showed 80% shelling. The oil content of 50% in TGE-1 was an improvement in the early maturing

variety.

Presence of foliaceous stipule in TGE-1 would facilitate easy identification of the culture and hybrids during hybridization programme.

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