

Seed Quality Status in Groundnut (*Arachis hypogea* L.)

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ABSTRACT This paper gives an account of seed quality parameters of 140 seed samples of groundnut tested in the Central Seed Testing Laboratory under Collaborative Seed Testing programme with State Seed Testing Laboratories. Detailed examination of seedlings was done in order to distinguish critically those which have the potential to produce the normal plants (normal seedlings) from those, which are without planting value (abnormal seedlings). All the seed samples showed more than 70 % germination i.e. normal seedlings (above the Minimum Seed Certification Standard), except two. Seed quality in respect of its storability and quality of farmer's own saved seeds is also being discussed.

Keywords: *Arachis hypogea* L., seed quality, storability, abnormal seedlings

Groundnut (*Arachis hypogea* L.) is the most important oil seed crop and also a food crop of India. During the year 2001-02 it was grown in an area of 6.4 million hectare with annual production of 7.21 million tonnes [1]. Although there has been a steady increase in the quality seed production over years in majority of crops but the vertical seed replacement rate (SRR) for groundnut is quite low as it was found to be 15 % for the year 1996-1997 [2] and 6.25 % for the year ending 1999-2000 [3] compared to hybrid varieties of other crops, where it exceeds 50 per cent. The availability of quality groundnut seed for the year 1996-97 was about 6.82 per cent of the requirement, as 80,000 tonnes certified/quality seed was distributed against the requirement of 1.1715 million tonnes [2].

The aim of the present paper is to discuss the quality status of 140 seed samples in respect of per cent germination (i.e. percentage of normal seedlings, abnormal seedlings and dead seeds) received under Technical Collaborative Seed Testing Programme with the State Seed Testing Laboratories. Detailed examination of seedlings was done in order to distinguish critically those, which have the potential to produce the normal plants (normal seedlings) from those, which are without planting value (abnormal seedlings). Seed quality status in respect of its storability and farmer's saved seed is also being discussed from the review.

MATERIALS AND METHODS

Seed samples received during 1999, 2000, 2001 and 2002 (up to October) from different state seed testing laboratories (Table 1) were tested in BP (between paper) method in the Central Seed Testing Laboratory, Division of Seed Science & Technology, Indian Agricultural Research Institute, New Delhi following the protocols of ISTA [4]. Seedlings were evaluated at a stage when all their essential structures have developed to an extent sufficient for their accurate assessment for normal and abnormal seedlings.

RESULTS AND DISCUSSION

Perusal of data in Table 1 revealed that all the seed samples exhibited more than 70 % germination i.e. more than the Minimum Seed Standard [5], except two samples i.e. one each from Nagpur (1999) and Allapughza (2002) with 69 and 68 %, respectively. Although less germination in these two samples may also be due to the time lapse between the tests. Germination ranged from 90-99 % in 72 samples (i.e. > 50 % of total samples received), while it ranged from 80-89 % in 57 samples (i.e. > 40 % of the samples received). Germination in remaining 11 samples ranged from 70-79%.

Storability of seeds: Maintenance of desired level of germination and vigour in seeds during storage is

Table 1. Mean germination per cent ($\pm$ S. D.) of seed samples of groundnut received from different State Seed Testing labs during 1999-2002.

Name of lab.	Per cent germination			
	1999	2000	2001	2002
Amarawati	87 $\pm$ 1.4 (6)*	88 $\pm$ 0.8 (2)	-	-
Akola	92 $\pm$ 1.3 (2)	84 $\pm$ 0.6(1)	90 $\pm$ 1.6(1)	84 $\pm$ 1.8(1)
Allapughza	-	-	-	68 $\pm$ 0.6(1)
Bhubaneswer	-	75 $\pm$ 1.3(3)	96 $\pm$ 1.6 (4)	95 $\pm$ 1.2(12)
Coimbatore	86 $\pm$ 0.3(1)	88 $\pm$ 12 (3)	94 $\pm$ 1.8 (9)	95 $\pm$ 1.2 (3)
Cuddaph	-	-	92 $\pm$ 1.0(1)	90 $\pm$ 1.4(4)
Delhi (NSC)	86 $\pm$ 1.2(1)	88 $\pm$ 1.7 (3)	85 $\pm$ 1.0 (2)	-
Dharwad	84 $\pm$ 1.9(1)	89 $\pm$ 0.8(2)	84 $\pm$ 1.2(1)	86 $\pm$ 0.5(1)
Dharmapuri	-	-	96 $\pm$ 1.2(3)	98 $\pm$ 1.6(1)
Durgapur	84 $\pm$ 0.6(1)	74 $\pm$ 1.6(1)	-	78 $\pm$ 1.7(1)
Hyderabad	90 $\pm$ 1.3(2)	99 $\pm$ 0.8(1)	-	-
Jabalpur	82 $\pm$ 1.3(1)	92 $\pm$ 1.2(5)	77 $\pm$ 1.6(5)	90 $\pm$ 1.5(3)
Junagarh	94 $\pm$ 1.3(1)	-	-	96 $\pm$ 1.5(2)
Madurai	95 $\pm$ 1.2(6)	90 $\pm$ 0.5(2)	-	-
Nagpur	69 $\pm$ 0.7(1)	90 $\pm$ 1.6(1)	81 $\pm$ 1.2(2)	88 $\pm$ 1.5(1)
Pune	84 $\pm$ 0.5(3)	80 $\pm$ 1.6(1)	85 $\pm$ 1.2(4)	-
Prabhani	-	82 $\pm$ 1.5(2)	-	-
Raipur	-	88 $\pm$ 1.3(1)	-	-
Secundrabad	91 $\pm$ 1.2(1)	88 $\pm$ 1.6(2)	-	-
Tadepalligudam	86 $\pm$ 1.3(1)	84 $\pm$ 1.2(1)	-	-
Thanjavur	90 $\pm$ 1.6(3)	90 $\pm$ 1.4(3)	-	84 $\pm$ 0.8(1)
Trichi	-	-	96 $\pm$ 1.5(2)	88 $\pm$ 1.6(10)
Total 22 labs	31	34	34	41

* Figure in parenthesis shows number of samples.

Varieties: JL-24, TMV-7, TMV-2, TMV-1-2, VRL-2, C-S-3078, Western-44, TAG-44, C-2097, AK 12-24, S-320, JPR-24, G-CO-10

an active area of research and many workers have determined suitable technologies for enhancing the storage life by using moisture impervious containers like polythene lined gunny bags with or without desiccating agents and treatment of seeds with fungicide at the time of storage (Table 2). Maximum storability of 24 months using GI bins was found by Rao *et al.* [6] under Hyderabad condition after treatment of seeds with thiram or captafol. Studies conducted at IARI, New Delhi revealed that storability of seeds could be enhanced from 5-10 months to 8-15 months using polylined bags [7]. However, seeds produced in summer loose viability within 3-4 months of storage [8] and this can be prolonged by shade drying using methods evolved

at NRC Groundnut, Junagarh and Directorate of Oil Seed Research, Hyderabad [9-12]. Halogenation of seeds (i.e. groundnut pods treated with herbal based non-toxic halogen formulation, Hitron @ 3g/kg of pod) has been found to enhance the storability of seeds [13]. Significant increase in field emergence as well as seedling vigour and yield has also been observed due to Hitron treatment after six months of seed storage in various locations [13].

Surveys have also been conducted to determine the status of seed quality in farmer's own saved seed. For example, 100 samples collected from Jamnagar, Gujrat revealed that all the seed samples exhibited more than 70 % germination although seeds were infected by various fungi viz. *Aspergillus*

Table 2. Relative storability of groundnut seeds in different regions/containers for maintaining > 70 % germination.

Location	Storage materials/methods	Period of storability* (month)	References
Akola (Maharashtra)	Seed stored in metal bins		
	i) Kharif	11	Patil & Zode [17]
	ii) Rabi	9	
Banglore (Karnataka)	Polylined gunny bags	12	Swamy <i>et al.</i> [18]
Coimbatore (Tamil Nadu)	Seed stored in cloth bag		
	i) Dormant cultivars	12	Manonmani [19]
	ii) Non-dormant cultivars	6	
Delhi	i) Cloth bag / gunny bag	5-12	Sharma & Dadlani [7]
	ii) Polylined cloth bag	8-15	
Dharwad (Karnataka)	Cloth bag; treated with chemicals	15	Kurdikeri <i>et al.</i> [20]
Hyderabad (Andhra-Pradesh)	i) GI bins; seeds treated with fungicide	24	Rao <i>et al.</i> [6]
	ii) Polythene bags	18	Savitri <i>et al.</i> [21]
Junagarh (Rajasthan)	Polylined bags+CaCl ₂	12	Nautiyal <i>et al.</i> [10]
Kalyani (Maharashtra)	1. Cloth bag	3	Patra <i>et al.</i> [22]
	2. Plastic silo	6	
	3. Polylined gunny bags with CaCl ₂	6	

*Period up to which germination standard of >70% was maintained.

spp., *Rhizopus* spp., *Penicillium* and *Fusarium* spp. [14]. Survey conducted through National Seed Project (Crops) during 1999-2000 and 2001-2002 [15, 16] showed that majority of farmer's saved seed samples (> 98 % samples), exhibited germination up to desired level suggesting that seed quality of groundnut is satisfactory in farmer's own saved seed. Higher seed rate of 150 kg/ha and unpredictable weather conditions, especially under rain grown condition, appears to be a major negative factor for its wide and popular adaptability under semi-arid situations.

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