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Storage studies in dormant and nondormant cultivars of groundnut (*Arachis hypogaea* L.)

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Abstract : Storage studies in groundnut (*Arachis hypogaea* L.) was conducted in groundnut with an aim to compare the storage potential of dormant and nondormant cultivars. Fresh seeds of dormant cultivars like ALG 122, ALG 123, ALG 125, ALG 126 and ALG 127 were found to store better with good germination potential which ranged from 72 to 78 per cent associated with better root length, shoot length and vigour index even after 12 months of storage. Whereas nondormant cultivars like Co2 and VRI 2 maintained their germination potential (68 per cent) after 7 months of storage. The results of the study showed that the dormant cultivars proved their superiority in maintaining the vigour and viability of seeds in storage better than nondormant cultivars. (*Key words : Groundnut, Dormancy, Seed storage and viability, Arachis hypogaea*).

Dormancy, a natural evolutionary mechanism, is a boon or evil in groundnut. In general, bunch types are non-dormant, while spreading and semispreading types are having varied period of dormancy. In groundnut, dormancy appears to be associated with seed coat or presence of inhibitors or metabolic block. It can be either broken or induced by chemical treatment or storage conditions.

It was indicated by Nagarajan and Gopalakrishnan (1958) that the non-dormant nature of bunch type groundnut was related to the presence of water-soluble auxin in the seeds. Conditions during storage are of great value for reducing or inducing secondary dormancy. There was a sudden and rapid loss of dormancy when seeds were stored at 50°C for 8 days (Patil, 1967). It is evident that the period of storage and storage temperature is inversely related to the dormancy period of a cultivar. It is recognized that dormancy within early maturing groundnut cultivars is a desirable character (Ramachandran *et al.* 1967).

The objective of this study is to compare the storage potentiality of dormant cultivars and nondormant cultivars of groundnut.

Materials and Methods

Fresh pods of dormant cultivars of groundnut such as ALG 122, ALG 123, ALG 125, ALG 126, and ALG 127 along with nondormant cultivars like Co2 and VRI 2 were taken for the study. They were dried to a safe moisture content of 9 per cent and packed in clothbag and stored under ambient conditions. Pod samples were drawn at bimonthly interval upto 12 months and the kernels were shelled out from the pods and evaluated for germination percentage. For this, 4 x 25 kernels were germinated in sand medium. Seven days after sowing, normal seedlings were counted and germination was expressed in percentage (ISTA, 1993). The root and shoot length were measured and expressed in cm. The vigour index was derived as an integral of germination and seedling length.

The data were analysed statistically for testing the significance following the methods of Panse and Sukhatme (1978).

Results and Discussion

There was an appreciable amount of dormancy in the freshly harvested seeds of dormant cultivars (Table 1). Initially the dormant cultivars recorded a significant variation in germination, which ranged from 43-65 per cent. The germination of dormant cultivars was improved from second month onwards. The cultivars attained the germination ranged from 43-65 per cent. The cultivars ALG 122, ALG 123, ALG 125 and ALG 126 reached higher germination at 4 and 6 months of storage which ranged from 89 to 95 per cent. The nondormant cultivars like Co 2 and VRI 2 recorded 92 per cent and 91 per cent germination respectively during initial period of storage. The germination percentage was gradually reduced from its maximum value both in dormant and nondormant cultivars during the period of storage. The dormant cultivars showed germination percentage of 72-78 per cent even after 12 months of storage (Table 1). The same trend was observed for root and shoot

Table 1. Study on germination (%) of dormant and nondormant cultivars of groundnut in storage.

Cultivars	P0	P2	P4	P6	P8	P10	P12	C Mean
Dormant								
ALG 122	56 (48.83d)	62 (52.33d)	87 (69.16c)	90 (72.24ab)	83 (65.91b)	84 (66.95ab)	72 (57.63)	65.37
ALG 123	43 (41.17e)	71 (57.62c)	94.7 (72.23b)	87 (69.16cd)	82 (65.40b)	84 (67.49ab)	78 (58.06ab)	65.86
ALG 125	65 (53.74b)	64 (53.73d)	89 (70.95b)	88 (70.34ba)	86 (68.59a)	85 (67.49ab)	73 (59.78a)	66.75
ALG 126	64 (52.62bc)	70 (57.21c)	86 (68.59c)	91 (72.90a)	84 (66.95ab)	82 (65.40b)	72 (57.21b)	65.72
ALG 127	61 (51.16cd)	93 (75.07a)	93 (75.07a)	85 (67.49d)	82 (65.40b)	87 (69.16a)	78 (57.63ab)	66.58
Nondormant								
Co2	92 (73.65a)	92 (72.90ab)	91 (72.00)	78 (62.26c)	68 (55.96c)	65 (53.50e)	55 (48.43c)	62.41
VRI 2	91 (72.22a)	91 (72.22b)	91 (72.22ab)	77 (61.80c)	68 (55.75e)	64 (53.33e)	55 (48.43e)	61.50
P Mean	56.19	62.97	72.00	68.02	63.42	63.34	55.59	64.89

Figures in parenthesis indicate arcsine transformed values.
In a column, mean followed by a common letter is not significantly different at the 5 % level by DMRT.

Table 2. Root length (cm) of dormant and nondormant groundnut cultivars in storage.

Cultivars	P0	P2	P4	P6	P8	P10	P12	C Mean
Dormant								
ALG 122	16.50a	17.23c	22.20c	23.27a	21.10b	21.17a	16.23b	21.03
ALG 123	17.10c	17.17c	24.57b	20.73bc	21.00	20.30a	17.83a	21.07
ALG 125	22.20b	17.06c	23.30bc	19.30a	23.67a	20.00a	17.63a	21.58
ALG 126	20.73c	16.80c	28.20a	24.53a	22.17b	19.70a	17.87a	21.96
ALG 127	23.73a	18.67b	28.60a	21.23b	21.00b	20.57a	18.33a	22.43
Nondormant								
Co2	14.87f	21.17a	22.57c	20.67bc	14.23c	10.70b	8.2c	16.57
VRI 2	18.73d	21.93a	23.67bc	21.63b	14.20c	10.93b	9.0c	17.52
P MEAN	12.11	18.58	24.72	21.62	19.72	17.62	15.01	20.30

In a column, mean followed by a common letter is not significantly different at the 5 % level by DMRT.

Table 3. Shoot length (cm) of dormant and nondormant groundnut cultivars in storage

Cultivars	P0	P2	P4	P6	P8	P10	P12	C Mean
Dormant								
ALG 122	11.10cd	10.20ab	10.10b	11.10a	11.53b	7.67b	11.53a	21.03
ALG 123	10.16c	9.77b	11.20ab	11.40a	11.60b	11.87a	11.40a	21.07
ALG 125	10.16dc	9.73b	10.80ab	11.10a	14.37a	11.90a	11.93a	21.58
ALG 126	13.63ab	9.83b	12.07a	11.10a	14.27a	11.77a	11.73a	21.96
ALG 127	14.10a	11.53a	11.23ab	10.47a	13.87a	11.80a	11.43a	22.43
Nondormant								
Co2	12.53bc	10.50ab	10.23b	10.23a	9.10c	8.23b	7.87b	16.57
VRI 2	12.47bc	10.23ab	10.47ab	10.17a	9.33a	8.20b	7.90b	17.52
P MEAN	11.20	10.36	10.87	10.79	12.01	10.21	10.54	20.30

In a column, mean followed by a common letter is not significantly different at the 5 % level by DMRT.

Table 4. Vigour index of dormant and nondormant groundnut cultivars in storage.

Cultivars	P0	P2	P4	P6	P8	P10	P12	C Mean
Dormant								
ALG 122	1546c	1719c	2820c	3116a	2719d	2680ab	2519ab	2767
ALG 123	810d	1921b	3243a	2806b	2696d	2744ab	2522ab	2753
ALG 125	2327b	1697c	2710c	2695b	3296a	2722ab	2602a	2892
ALG 126	2772b	1882b	3490b	3254a	3084b	2601b	2417b	2949
ALG 127	3546a	2818a	3716a	2705b	2882c	2779a	2520ab	3007
Nondormant								
Co2	2796b	2892a	3075d	2420c	1602e	1224c	944c	2110
VRI 2	2822b	2957a	3118cd	2470c	1651a	1231c	957c	2156
P MEAN	2440	2269	3168	2781	2561	2283	2061	2662

In a column, mean followed by a common letter is not significantly different at the 5 % level by DMRT.

length and vigour index (Table 2, 3, & 4). The present study clearly indicated that the dormant cultivars maintained their vigour and viability and showed slow deterioration in storage. Whereas nondormant cultivars deteriorated faster during storage. Patil (1967) also reported a loss of viability of both dormant and nondormant cultivars in storage.

The good germination and vigour potential of dormant cultivars in storage is proved to be evident in the present study. The reason attributed to this may be due to the presence of high level of amino acids in the seeds of dormant cultivars. Vaithialingam and Rao (1973) also found out the high level of amino acid in dormant TMV. 1 groundnut cultivar.

In general, with advancement of storage period, a drop in germination and seedling vigour were discernible both in dormant and nondormant cultivars of groundnut. Soliya and Chakrabarty(1990) and

Bindu (1997) obtained similar result in groundnut crop.

The result of the present study concluded that dormant cultivars proved their superiority in storage based on the yardsticks of maintenance of seed germination and seedling vigour for a longer period over nondormant cultivars.

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Table 1. Effect of different carbon sources on multiplication of *B. japonicum.*

Carbon sources	Carbon content %	Qty. used (g l^{-1}) media	Cost (Rs/kg)	Cell count of *Bradyrhizobium* in broth (CFU x 10^9/ml)
Mannitol	39.52	10.00	740.0	8.97
Molasses	32.77	12.05	2.0	43.70
Jaggary	47.73	8.27	12.0	8.80
Sucrose	42.06	9.39	120.0	14.45
Wheat flour	51.33	7.69	10.0	20.37
Control	—	—	—	—
S.E. -+	—	—	—	5.14
C.D. at 5%	—	—	—	15.83

carbon sources of *Rhizobium* inoculants. *Sci. Cult.* **30** : 56-57

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Research Notes

Integrated nutrient management for summer irrigated cotton - greengram cropping system

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Extensive work has been done on the fertilizer management for cotton under summer irrigated conditions. However, work on INM for system as a whole is lacking. Besides, the increasing cost of chemical fertilizers coupled with its adverse effect on soil health has necessitated the researchers to evolve INM with reduced use of inorganic fertilizers, particularly N. The response of cotton to Azospirillum and greengram to Rhizobium (Shukla and Dixit, 1996) has been well documented. So far attempts were made to study the effect of combined use of chemical fertilizers and biofertilizer on crops individually. Hence, a need was felt to study the combined application of inorganic and biofertilizers in cotton based cropping system as a whole.

Field experiments were carried out in 1995-97 with cotton (SVPR-1) as summer irrigated crop followed by greengram (KM 2) to study the response of these crops to the combined application of inorganic and biofertilizers on the productivity of the system as a whole unit. The treatments combination of inorganic and biofertilizers are shown below.

The experiment was laid out in randomized complete block design with three replications. The experimental field was clay loam with medium in available N and P and high in available K with a pH of 8.2. The yield attributing characters and yield were recorded at harvest.

In the first year study, the data on growth, yield attributing characters and yield revealed that all characters studied except seed index was not influenced by various treatment (Table 1). The control plot registered the lowest seed cotton yield of 592 kg ha^{-1} as compared to that of full dose of N,