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Research article

STUDIES ON THE RELATIONSHIP BETWEEN SEED QUALITY CHARACTERS IN SOYBEAN (*Glycine max* (L.) Merril) CULTIVARS

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ABSTRACT: Soybean (Glycine max (L.) Merril) is one of the most important oil seed crop in many regions of the world including India. Good quality seed is a basic need and fundamental requirement for production of good crop. The present investigation was conducted on the seeds of 28 Soybean cultivars presently in the multiplication programme of the country with the objective to study the relationship between various seed quality characteristics. The seed samples of each cultivar were subjected to seed quality evaluation for germination, storability and field emergence. Germination % had positive correlation with field emergence.

INTRODUCTION

Among the oil seed crops grown in India, Soybean has of late emerged as having high growth potential and occupies an important place after Groundnut and Rapeseed-Mustard. Non availability of good quality seed is one of the major constraints in the cultivation of Soybean. The first and foremost requirement in the production of good crop is seed which should be capable of exhibiting high germination capacity and should possess the capacity to utilize the inputs like fertilizer, water etc. One of the major problems associated with the seed production of soybean in India, is the maintenance of the seed viability up to the prescribed germination standard from harvest till next sowing season. Soybean seed is reported to have poor viability and field emergence as compared to other kharif oil seed /pulse crops due to its inherent seed structure and composition. The losses incurred for not maintaining the germination capacity up to the next growing season in Soybean are also huge, affecting the plant population, productivity and production. Keeping these aspects in view, the present study was undertaken to study the relationship between seed quality characteristics.

MATERIALS AND METHODS

Seeds of twenty eight soybean cultivars grown at IARI experimental farm, New Delhi, harvested and stored under ambient conditions of Delhi in brown paper envelops were used for the present study. Germination test was conducted in between paper substrate in four replicates of fifty seeds each. Storability was evaluated by testing germination percentage (ISTA procedure) of seeds after 9, 12 and 15 months of storage under ambient conditions of Delhi. The seed material was sown in the IARI experimental field for the evaluation of filed emergence and observations were recorded after 15 days of sowing on the number of seedlings emerged in each row and Field emergence index was calculated.

RESULTS AND DISCUSSION

The germination % of 28 Soybean cultivars after 9 months of storage varied from 54-90%, highest being in the case of MACS-473 (90%) and the lowest in case of NRC-7 (54%). Seeds of all the Soybean cultivars conformed to the seed standards of germination even after 9 months of storage except NRC-7. There was only one black seeded cultivar (JS 76-205) showing 83% germination after 9 months of storage. There were 15 cultivars showing better germination with yellow seeds. Thus black testa was not always associated with better storability. Germination % of Soybean seeds after 12 months of storage was found to be in the range of 50-79 %, highest being in case of Pusa 16 and Punjab 1 (79%), and the lowest in case of NRC-7 (50%).

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Germination % of Soybean seeds after 15 months of storage varied from 44-74 %, highest being in the case of MACS-473 (74 %) and the lowest in case of NRC-7 (44%). Eight Soybean cultivars retained seed viability upto 15 months of storage under ambient conditions of Delhi, thus could be considered as good storer. These cultivars were MACS 473, MACS 450, MACS 124, PK 327, PUSA 16, JS 72-280, PK 262 and PK 416. Soybean cultivar NRC 7 was found to be a poor store with a large no. of abnormal seedlings, thus more prone to mechanical injuries.

The average mean temperatures in Delhi during the months of storage varied from 12.4 to 31.9°C and R.H varied from 64 to 76%. The conditions of Delhi during winter season from November to February (12.4-18.9°C and 53-57% R.H.) is quite favourable for seed storage due to low temperature and low R.H. However, from April to July (Temp. 24.9-31.4C; R.H. 53-69%), the conditions are not suitable for storage.

The per cent reduction in germination in different cultivars was not uniform, in some cultivars it was fast (> 30%) while in the others, it was slow(<20%). Based on percent reduction, the cultivars were categorized in to good, medium and poor storer. In the present investigation percentage up to the prescribed standards for 15 months could be considered as better storer.

CULTIVAR	GERMINATI	GERMINATIO	GERMINATION	FIELD
00211111	ON% AFTER	N% AFTER	% AFTER	EMERGENCE
	9 MONTHS	12 MONTHS	15 MONTHS	%
PUSA 16	91	84	70	62.75
MACS 473	91	84	76	63.00
JS 335	91	82	63	61.50
JS 72-280	89	82	70	57.75
PK 327	88	76	71	74.25
JS 80-21	88	79	63	52.75
JS 79-81	88	80	66	57.00
MACS 124	87	76	71	50.75
PUSA 20	86	79	64	51.50
MACS 450	86	75	72	53.50
PUSA 24	86	75	64	58.75
PK 262	85	78	70	54.50
PK 416	85	77	70	60.25
PK 564	84	72	65	58.75
JS 71-05	83	77	66	53.50
JS 76-205	83	81	57	57.00
MONETTA	83	77	62	51.25
PK 472	82	74	69	33.00
KHSB 2	82	77	67	59.75
PUNJAB1	80	79	68	53.25
NRC 2	80	70	56	48.75
HARDEE	79	77	67	44.25
MACS 13	77	70	63	66.00
MACS 472	77	68	60	47.00
MACS 57	77	72	67	55.25
BRAGG	76	75	63	38.75
MACS 58	73	66	60	39.00
NRC 7	56	52	47	28.50
MEAN	80.39	72.71	62.25	52.39

Table-1: Germination % After 9, 12 and 15 MONTHS OF Storage, Field Emergence % in Soybean Cultivars

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The field emergence of the Soybean cultivars ranged from 28.50 % (NRC7) to 74.25 % (PK 327) and the overall mean emergence was 52.58 % indicating unfavourable seed bed conditions for field emergence. Six cultivars had good (more than 60 %) field emergence, 18 cultivars had medium (40 to 60 %) and 4 cultivars had very poor (<40 %) field emergence. All the cultivars with more than 83 % laboratory germination showed field emergence of 50 % or more. Germination % had significantly positive correlation with field emergence, thus field emergence depends on germination. Soybean seed is known to have poor field emergence of Soybean seedling is reported to be influenced by soil temperature and seed quality, conditions in the seed bed like water, oxygen, temperature, microorganisms and soil structure also influence the field emergence.

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