Int.J.Curr.Microbiol.App.Sci (2018) Special Issue-6: 492-496

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-6 pp. 492-496**
Journal homepage: http://www.ijcmas.com

Original Research Article

Effect of Various Storage Techniques on Field Performance of Soybean

Priti A. Sonkamble*, Snehal K. Wakode and V. N. Mate

Seed Technology Research Unit, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola (M.S.), India
**Corresponding author*

A B S T R A C T

Soybean is one of the important oil seed crop and the seeds are stored after harvest till the next sowing or until further use. Therefore the effective seed storage techniques prevent loss during storage and enhance seed quality and seed yield. Keeping in view of these factors, the soybean seed (var.JS-335) stored in Cloth bag, Polythene bag, air tight container along with Silica gel and Desiccant beads under ambient condition up to next sowing season. The bimonthly observations were recorded on seed quality parameters in laboratory during storage. Airtight container found significantly superior over other packaging materials during storage. Field experiment was carried out on same stored seed to study the effect of different seed storage technique on field performance of soybean during 2015-16 at the field of Seed Technology Research Unit, Dr. PDKV, Akola. The observations on the morphological and yield attributing characters were recorded for evaluating the effect of different techniques. Among the treatments, the seed stored in airtight container along with silica gel performed better in field and found significantly superior in plant stand, number pods per plant and seed yield.

Keywords

Soybean, Storage, Seed quality, Airtight container, Plant stand, Yield

Introduction

Soybean [*Glycine max* (L.) Merrill] is an important grain crop legume, belongs to the family Leguminosae, sub family Papilionaceae and genus glycine. Being legume crop, it fixes atmospheric nitrogen and improves the soil fertility. It is a unique crop of versatile nutritional attribute, yielding both oil and protein. It is truly a "Wonder crop" as its vast multiplicity uses as food, fodder, industrial products and residues in soil. It is self-pollinated and short day plant. In India, Soybean occupied about 11.00 Mha areas and 10.50 MT productions. India is fifth largest producer of soybean in the world after USA, Brazil, China and Argentina. In Maharashtra, Soybean occupied an area of about 3.80 Mha with 3.07MT production (Annual Report, AICRP on Soybean 2014-2015).

Soybean has proved to be highly promising oilseed crop under different agro-climatic zones of India because of its high yielding potential, wide adoptability, drought resistance and short duration. The crop has been therefore, popularized among the farmers with higher demand. It is therefore necessary to increase the production of this crop continuously to meet the requirements of ever increasing population. But the lack of availability of quality seed at proper time is one of the important reasons for low

productivity in soybean. Seed can store satisfactorily under control condition with low temperature and low moisture. Therefore, rapid loss of seed viability and vigour takes place during storage at ambient temperature.

Several factors causing seed deterioration such as harvesting, processing, transportation, etc. Soybean does not store well at high seed moisture and high temperature but they can store satisfactorily under control condition with low temperature and low moisture. Low vigour seed may result in poor field stands, especially if planted in less than ideal soil. To overcome such problem, seed technologies like proper storage technique is required in soybean to enhance seed and seedling performance, to protect seed from pathogens and to improve seed germinations. The study was thus designed to find out a viable and better seed packaging for soybean, a high volume seed crop, so that their seed viability and field emergence are maintained for prolonged duration.

Materials and Methods

Freshly harvested seed of soybean var. JS-335 were collected in November 2014 and samples of 1kg soybean seed were stored in different storage containers like polythene bag, cloth bag and airtight container along with silica gel and desiccant beads under ambient condition up to next sowing season. The experiment was conducted at the field of seed technology unit, Dr. P.D.K.V. Akola during kharif of 2015-16 to identify the field performance, the observations on the morphological and yield attributing characters were recorded for evaluating the effect of different techniques.

The experiment was laid out in Randomized Block Design with four treatments and five replication. The initial plant stand was determined by the total number of seedling emerged per plot after fifteen days of sowing. Days to 50%flowering was recorded by the day on which 50% plants from the plot found to be bloomed. Thus total number of days required for flowering of 50% plants, from date of sowing were counted and expressed as days to 50% flowering. Plant height measured by the randomly selected five labeled plant from base of the plant to tip of main shoot and average height per plant was reported in centimeter.

The pods from five randomly selected plants were collected, counted and mean number of pods per plant was recorded. Fully dried seed were taken from each treatment and each replication and 100 seeds were counted and their accurate weight was recorded on electronic balance. The total number of seeds from each of five observation plants was weighted separately and average weight of seeds per plant was recorded and reported as seed yield per plant[g]. The seed yield obtained from the net plot area recorded and calculated seed yield (q/ha) on the basis of net plot area.

Results and Discussion

During this study the data showed the seed quality parameters differed significantly due to different seed storage techniques. The seed stored in airtight container along with silica gel recoded significantly higher seed quality parameters followed by seed stored in polythene bag (Table 1 and 2). Significantly maximum seed germination (89.33%), seedling length (28.14cm), vigour index (2513.83) and minimum seed infection (0.67%) was recorded in seed stored in airtight container by using silica gel at the end of 8^{th} month of storage. The same treatment performed better in field than others (Table 3 and 4).

Initial plant stand was significantly influenced by different seed storage techniques. Maximum initial plant stand (115) was found in seed stored in airtight container by using silica gel followed by in T_4 (108.33). Rahman and Rahman (1997) reported that the highest germination and lowest prevalence of fungi was recorded in the seeds stored in tin followed by polythene bag and cloth bag with polythene.Field emergence of soybean seeds was significantly higher in the seeds stored in polythene bag (79.6%) than cloth bag (76.8%) after four months of storage.This is due to ageing, which resulted in deterioration of seed resulting the decrease in the field emergence.

Vieira *et al.,* (1999) reported that decline in seed germination, field emergence and seedling vigour was negatively correlated with greater electrolyte leakage in soybean. Shinde *et al., (*2008) reported the higher germination percentage (74.83%) field emergence percentage (71.66%) lower moisture content (8.75%) and pathogen incidence (7.9%) in the soybean seed stored in HDPE bags than seeds stored in jute canvas bags (72.00, 69.75, 11.81 and 9.00%, respectively). Sarmin (2009) reported decrease of soybean seedling emergence performance with increase of storage RH. Saha and Sultana (2008) declared that with increasing the soybean seed's age and storage duration will reduce germination and seedling field emergence.

Days to 50% flowering was recorded in ranges from 43 to 45 days. Seed stored in airtight container by using silica gel showed earlier flowering (43 days) followed by (44days) seed stored in polythene bag and seed stored in airtight container by using desiccant beads of seeds. Late flowering was observed in treatment seed stored in cloth bag (45days). The plant height was recorded during flowering which was ranges from 41.16 to 44.87cm. Maximum plant height (44.87cm) was recorded in Seed stored in airtight container by using silica gel. The lowest plant height (41.16) recorded in T_4.

In case of number of pod per plant, maximum no. of pods (31) was recorded in seed stored in airtight container by using silica gel followed by seed stored in polythene bag (30.67) and seed stored in airtight container by using desiccant beads (28.33).The lower no. of pod per plant were recorded in seed stored in cloth bag (26.33).

According to Lin (1982), Keshavulu and Krishnasamy (2005), soybean seeds with high vigour index emerged better in the field and produced more number of pods per plant than the seeds with low vigour.

Non-significant differences were observed in hundred seed weight. It was ranges from 4.77g to 6.02g. The seed yield per plant was significant influenced by different seed storage techniques. Significantly highest seed yield per plant (8.46g) was recorded in treatment T_3- seed stored in airtight container by using silica gel seed followed by inT_4- seed stored in airtight container by using desiccant beads (7.22 g).

Seed yield per hectare (20.35q/ha) was also significantly highest in T_3- seed stored in airtight container by using silica gel, followed by T_4 (18.74q/ha) and T_1 (17.20q/ha). The lowest seed yield per hectare (16.22) was recorded in T_2.

Based on the results obtained, it can be conclude that, the airtight container along with silica gel was safe for soybean storage. Such storage techniques will maintain seed quality during storage and improving field performance as compare to other packaging material**.**

Table.1 Effect of different seed storage techniques on seed germination and seedling length of soybean during storage

Treatment/ month	Germination (%)				Seedling length(cm)			
	2	**4**	**6**	**8**	**2**	**4**	**6**	**8**
T_1	95.67	91.67	88.33	83.33	28.19	29.25	27.86	27.99
T_2	93.67	87.33	82.00	77.67	28.27	29.16	27.49	28.03
T_3	95.33	94.33	90.33	89.33	30.46	30.01	29.54	28.14
T_4	90.00	89.33	87.00	87.00	27.81	26.89	26.05	24.70
SE (m+-)	0.91	1.17	1.11	1.41	0.58	0.62	0.71	0.64
cd@5%	2.98	3.80	3.61	4.61	1.90	2.03	2.31	2.07

Table.2 Effect of different seed storage techniques on vigour index and seed infection of soybean during storage

Treatment/ month	Vigour index				Seed infection (%)			
	2	**4**	**6**	**8**	**2**	**4**	**6**	**8**
T_1	2695.83	2681.23	2459.81	2332.97	0.33	0.67	1.33	1.67
T_2	2648.37	2546.98	2253.42	2177.93	5.89	6.10	6.20	6.41
T_3	2904.25	2833.01	2669.65	2513.83	0.33	0.33	0.67	0.67
T_4	2503.01	2400.7	2267.6	2147.76	0.33	0.33	0.67	0.67
SE (m+-)	59.66	68.43	70.02	64.40	1.24	1.13	1.08	1.38
cd@5%	194.55	223.16	228.35	210.00	4.04	3.70	3.53	3.19

Table.3 Effect of different seed storage techniques on seed morphological character on soybean crop

Treatment	Intial Plant Stand	Days to 50% flowering	Plant Height (cm)	No.of Pods/ plant
T_1	106.33	44	42.76	30.67
T_2	99.00	45	43.98	26.33
T_3	115.00	43	44.87	31.00
T_4	108.33	44	41.16	28.33
SE(m)	1.84	0.60	1.12	0.82
CD@5%	6.00	2.08	NS	2.66

Table.4 Effect of different seed storage techniques on seed yield attributing character in soybean seed during storage

Treatment	100 Seed wt (g)	Seed yield/ plant (g)	Seed yield (q /ha)
T_1	4.80	6.89	17.20
T_2	4.77	5.82	16.22
T_3	6.02	8.46	20.35
T_4	5.77	7.22	18.74
SE(m)	0.34	0.28	0.84
CD@5%	NS	0.98	2.75

T_1: Seed storage in polythene bag (700 guage) control, T_2: Seed storage in cloth bag,
T_3: Seed storage in airtight container by using silica gel, T_4: Seed storage in airtight container by using Desiccant Beads

References

Keshavulu, K. and Krishnasamy, V., 2005. Effect of seed clourign on seed quality and bruchid damage in soybean. Seed Res., 33(2): 208-210.

Lin. S.S. 1982.Effect of vigour on field performance of soybean. Agronomia Sulriogradese, 18: 37-46.

Rahman, M. M. K. and G. M. M. Rahman.1997. Effect of container and length of storage on germination and seed-borne associated with jute seed. Bangladesh J. Plant Path. 13(1-2): 13-16.

Saha RR, Sultana W. 2008. Influence of seed ageing on growth and yield of Soybean. Bangladesh Journal of Botany, 37, 21-26.

Sarmin, T. 2009. Effect of storage relative humidity and container on quality of shelled and unshelled groundnut seed. M.S. Thesis, Dept. Agron., Bangladesh Agril. Univ., Mymensingh, Pp. 28-65.

Shinde S. S., Sangle T. V. and Hudge V. S. 2008. Effect of packaging materials on storability of soybean. Annals of Plant Physiology, 22(2): 295-296.

Vieira R.D., Paiva- Auega J. A. and Pereein D.1999. Electrical conductivity and field performance of soybean seeds. *Seed Tech.*, 21: 15-24.