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Emergence of Healthy Seedlings of Soyabean as Influenced by Seed Storage Containers

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Abstract: Experiment was conducted at Agriculture University Peshawar, Pakistan to study the effect of seed storage containers on the emergence and healthy seedling of soybean (cv. Lee) under field conditions. The treatments were cloth bags, plastic bags, gunny bags, pitchers, tin cans, pods and refrigerator. Each treatment was replicated three times in randomized complete block design. Data revealed that field emergence was significantly different for sampling dates as well as storage containers. Seed emergence was greater in early sowing crop and seed stored in pods and refrigerator respectively. Further data demonstrated that storage containers were significantly affected the percentage of healthy seedlings. The seed stored in pods and refrigerators had 51.6 and 52.8% healthy seedlings respectively.

Key words: Gunny bags, pitchers, pods and germinability

INTRODUCTION

Soybean seed viability and stand establishment are the major constraints in soybean production because considerable amount of seed become useless due to improper storage as longevity of such is increased by controlling seed moisture content and storage temperature. (Thomas, 1980) reported that suitable combination for safe storing was moisture content below 12%, temperature less than 10°C and 70% relative humidity. (Radhakrishnan, 1983) reported that seeds stored in airtight glass containers maintained 40% germination for 4 months and in gunny or polythene bags for 2 months. He further reported that lost viability more rapidly than small seeds. (Delouche, 1974) reported that high quality seed lots maintained germination above 80% for full carry over period under warehouse conditions. (Ohta *et al.,* 1979) reported that stored seeds at 15,25 and 35^{0}C at 60,70 and 80% relative humidity had observed variation in germination capacity.

(Godoy *et al.,* 1976) stored large, medium and small seeds at 25°C and 35% relative humidity and they found that germination was proportional to seed size and decreased with storage time (Holman and carter, 1952) reported moisture content below 12%, germinability will stay good up to two years. Storage seed low moisture level in vapor sealed packages prolonged viability (Ashraf and Gregge, 1971). (Amaral *et al.,* 1984) stored seed with initial moisture content of 11.4, 13.4% in Jute, Polythene and multilayer paper bags from April to December and found no difference in seed vigour. However after 5 months in open storage the seed vigour was reduced. (Bogolepove, 1981) reported that seed store at constant temperature and humidity, the best results were obtained with seed stored in plastic begs. (Ravalo *et al.,* 1980) reported that seeds with initial moisture content of 8.6% moisture content in sealed bags at 12^{0}C had minimum loss in viability and 85% germination after eleven months. (Srivastava, 1975) and (Tonne *et al.,* 1978) reported that germination was the highest in seeds stored at 8.6% moisture content in metal cans than in bags. (Delouche, 1977) reported that Soybean seed could be stored at 15-18°C and 60% relative humidity for at 9% moisture content in vapor proof packing. Keeping in view the above findings therefore, it was decided to study the effect of seed storage containers on emergence and healthy seedlings of Soybean under field conditions.

MATERIALS AND METHODS

The experiment was conducted at Agriculture University Peshawar to study the effect of seed storage containers on the emergence and healthy seedling of Soybean under field conditions. The treatment were cloth bags, Plastic bags, gunny bags, pitchers, tin cans, pods and refrigerator. Each treatment was replicated three times in randomized complete block design with split plot arrangement in four replications on silt clay loam soil.

For determination of field emergence and healthy seedling, seed of 100 seeds from each treatment were planted from April Ist and onwards when the soil temperature was high enough to stimulate germination. Seedling with cotyledons free of the soil surface were counted until no more seedlings emerged for three consecutive days. The number of healthy seedling was recorded as seedling free of diseases, discoloration and

abnormalities were considered as healthy. Data was analyzed according to the appropriate design and means were compared according to Duncon and New Multiple Range test (Le Clerg *et al.,* 1962).

RESULTS AND DISCUSSION

Field emergence was significantly different for sampling dates as well as storage containers. However in 3 out of 10 sampling dates, the difference among containers means were not detected. The entire source of difference in container was due to reduce emergence in tin cans, when averaged across the dates. Emergence declined from 86.8% in April to 42.1% in August, with noticeable reduction from middle of May and onwards, seed emergence increased on August 15 irrespective for the storage container except in seeds in refrigerator. Similarly (Hatam and Jamro, 1991 and 1992) reported that emergence was higher in April and May than June. Further more they reported that highest emergence was recorded in cool months, which gradually declined to a minimum in hot day season and increased again during monsoon. Further (Burris, 1980) reported that seeds stored in refrigerator for at 6^0C had higher germination than plastic bags though the moisture was same.

Storage containers and storage period significantly affected the germination percentage of healthy seedlings respectively. These values were significantly higher than the remaining treatments. A minimum of 37.8 and 42.3% healthy seedlings were recorded in tin cans and plastic bags. No significant reduction in percentage, healthy seedlings were observed up to 135 days of storage. However reduction proceeded subsequently with a greater rate up to the end of storage period, reaching a minimum in July 30.6% and August 32.1% Number of healthy seedlings increased during the last fifteen days of storage containers (Table 1).

Seed moisture content declined due to post harvest ripening in storage and decrease in relative humidity. The loss and re-absorption of moisture in loss containers was different than in airtight containers (Tin cans, plastic bags). The rise in seed moisture content was mainly because of re-absorption of moisture in high humid monsoon. Re-absorption of moisture by seeds was high and rapid in some containers as compared with others. In case of loose containers, seeds being hygroscopic, absorbed moisture until the vapor pressures of seed moisture and atmospheric moisture was in equilibrium. In the tight containers the seeds already had enough moisture and the equilibrium was reached very soon.

Noticeable reduction in germination was observed with wider differences in storage containers with rise of temperature from April and onward. The reduction was greater in seed stored at high moisture (tin cans, plastic bags) and Both temperature and high moisture level (tin cans, plastic bags). Both temperature and high moisture are reported to be determintal to germination (Ashraf and Gregg, 1971), (Goldovskil and Smolyak, 1984) and (Burris, 1980). seeds stored in refrigerator at 6^0C had higher germination than those in plastic bags, through the moisture content was equal. The seeds in pods were exposed to ambient temperatures and humidity like other containers, but germination was the highest because individual seeds in pod cavity may provide a different microenvironment against dumping of seeds in other containers (Table 2).

Table 1: Effect of storage containers on field emergence of soybean (*cv.* Lee)

Container	Apr 1	Apr 15	May 1	May 15	June 1	June 15	July 1	July 15	Aug 1	Aug 15	Mean
Cloth bag	86.0abc	80.7	75.0d	62.7	53.3	42.7b	45.0c	56.7a	49.0a	58.7ab	61.0ab
Plastic bag	94.7bc	75.0	83.8ab	58.3	48.0	45.0b	47.0b	47.3a	46.0ab	69.3a	61.5ab
Gunney bag	88.0ab	78.0	82.0bc	56.3	52.3	46.06	46.06	54.3a	42.3b	61.7ab	61.1ab
Pitcher	68.7ab	81.0	75.7cd	60.0	53.0	50.3b	50.3b	51.7a	42.0b	65.3ab	63.4a
Tin can	82.7c	84.0	82.3bc	57.3	49.7	44.0b	44.0b	29.3b	34.3c	34.3c	54.2b
Pods	86.7ab	86.7	82.7bc	63.3	54.3	72.3a	72.3a	62.3a	53.3b	53.3b	66.4a
Refrigerator	89.0a	89.0	90.0a	64.7	54.0	52.7b	52.7b	61.7a	53.7b	53.7b	67.2a
Mean	86.8a	81.1	81.6b	60.4	52.1e	50.4c	60.9c	51.9e	42.1f	65.6d	

Table 2: Effect of storage containers on percentage of healthy seedlings of soybean in field (*cv.* Lee)

Container	Apr 1	Apr 15	May 1	May 15	June 1	June 15	July 1	July 15	Aug 1	Aug 15	Mean
Cloth bag	60.0b	61.7bcd	60.0b	47.7	34.7bc	31.7b	27.7	31.3ab	37.0a	40.0	43.2b
Plastic bag	61.7b	65.0bc	63.0ab	44.7	33.7c	28.3b	29.0	26.7b	33.3a	37.3	42.3bc
Gunney bag	59.7b	60.cd	60.0b	45.7	42.0a	33.0b	31.7	30.0ab	32.0a	41.7	43.8b
Pitcher	59.3b	57.7b	61.7ab	42.7	39.7ab	33.0b	35.0	31.3ab	34.0a	43.3	43.8b
Tincan	59.7b	66.3bc	60.0b	46.7	31.3c	29.3b	31.7	14.0c	10.7b	28.0	37.8c
Pods	73.3a	67.3b	66.7a	51.0	45.0a	50.7a	41.7	40.7a	36.3a	44.0	51.6a
Refrigerator	70.7a	74.7a	66.7a	53.0	45.0a	49.3a	51.0	41.0a	41.3a	46.0	52.8a
Mean	63.5a	64.6a	62.6a	47.4	38.3cd	36.5de	34.0ef	30.6g	32.1fg	40.1bc	

Values within the same column followed by common letter are not significantly different according to Duncan's New Multiple Range Test

Field emergence could be affected by high ambient temperature, fluctuations in relative humidity and soil borne diseases. The loss of soil moisture influenced by relative humidity and temperature, during the emergence period may also because of low emergence. Emergence increased again during mid August when relative humidity increased and daily evaporation decreased against constant decreased in germination under laboratory conditions. Germination and emergence were directly proportional to healthy seedlings. However the reduction in germination in February did not respond with the number of healthy seedling suggesting that these two are independent Phenomena. The results conclude and suggested the following recommendations.

- Field emergence was significantly different for sampling dates as well as storage containers.
- Emergence decreased with late planting.
- Seed germination and number of healthy seedlings consistently in all storage conditions.
- Germination and emergence was greater in seeds stored in pods and refrigerator.
- Healthy seedlings were directly proportional to germination and emergence.
- Seeds storage at ambient temperature level and usually done by farmers is not a good practice.
- Storage at low temperature (6°C) or in pods is the ideal and such seed will retain maximum germinability.

REFERENCES

Amaral, A., S. Dos and L.S. Bandet, 1984. Effect of Seed moisture content, type of packing and storage period on quality of Soybean seeds. Brasilain desemonte sementes(1983), 5: 27-35.

Ashraf, Q.M. and B.K. Gregge, 1971. Viability of Vegetable seed as influenced by moisture content packing and storage climate, Agronomy Abstract. 63rd Annual meeting Am SOC., Agron 42.

Bogolepove, G.G., 1981. Effect of different methods of storing Vegetable seeds on their quality. In selekisiyai Semen orod Kartafelyai ovoshch Bakhcher. Kulture. Alama Ata, Kazakh U.S.S.R. (1979): 148-157. Seed Abst., 4: 1906.

Burris, J.S., 1980., Maintenance of Soybean seed quality in storage as influenced by moisture, temperature and genotype, Iowa state. J. of Res., 54: 377-389 Dept. Plant Pathology Iowa State Univ. Ames. USA.

Delouche, J.C., 1974. Seed quality and storage of Soybean (*Glycine max* L.) proc. of conf for Scientists of Africa, the Middle East and South Asia. INTSOX Univ. Illenois, Urbana INTSOY series No. 6: 86-104.

Delouche, J.C., 1977. Soybean seed division, ASTA. 7: 60-73. Department of Agron. Mississippi state. Univ., Missiaaippi, USA.

Godoy, R., J.T.M. Abrahao, J. Marcosfilho and L. Bragantini, 1976. Effect of seed size on the storage, germination and Vigor of Soybean seed duizde Queiroz (1973), 31: 187-206.

Goldovskil, A.M. and H.V. Smolyak, 1984. Limits of water content at Various states of Seed Fizivlogiya Bio Khimiyn Kul, Turny. Kh. Rastenii, 15: 471-476.

Hatam, M. and G.H. Jamro, 1991. Effect of seedling time, depth and density on Soybean emergence. The nuciens, 28: 45-46.

Hatam, M. and G.H. Jamro, 1992. Soybean emergence in relation to rate of soil moisture losses. Pak. J. Agri. Res., 13: 191-196.

Holman, L.E. and D.G. Carter, 1952. Soybean storage in farm type bins. A research report Bull No. 552: 451.

Le Clerg, E.L., W.H. Leonard and A.G. Clark, 1962. Field Plot Technique. 2nd Edn., Burgess Publishing Co., South Minneapolis, USA., pp: 144-146.

Ohta, K., T.K. Takeno, T. Nikkuni, K., Hashizume and Saio, 1979. Soybean quality change and its influence of food processing. Report of National Food Research Institute Yatabe, Tbaraki Japan, 35: 56-70.

Radhakrishnan, R., 1983. The effect of storage condition on prolonging variability of vegetable Soybean varieties. 21st Hor. Congr, 1: 1551.

Ravalo, E.J., F.D. Tenne, E.D. Roddo and J.B. Sincllair, 1980. Tropical storage of U.S Certified Soybean seed Transaction of the ASAE., 23: 398-402.

Srivastava, A.K., 1975. Physiological studies on Soybean seed viability during storage and its practical applicability. Seed Research, India, 4: 56-61.

Thomas, W., 1980. Seed viability in relation to storage conditions in varieties of Soybean *Glycine max* L. Merr. My sore J. Agri. Sci., 14: 271.

Tonne, F.D., E.J. Ravalo, J.B. Sindari and E.D. Rodda, 1978. Changes in viability and micro flora of Soybean seed stored under various conditions in Puerto Rico J. Agri., University of Puerto Rico, 62: 255-264.