

## Seed germination studies in relation to stage of harvest in soybean [*Glycine max* (L.) Merrill]

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### SUMMARY

Quality of soybean [*Glycine max* (L.) Merrill] seed depend upon the stage of harvest. The study was undertaken among five genotypes viz., JS-93-05, JS-335, MAUS-71, MAUS-81 and MAUS-158. Per cent germination, vigour index, shoot and root length, fresh weight and dry weight of seedling differed significantly in all the genotypes. The seed crop harvested between physiological maturity and 7 days after physiological maturity was superior in germination and most of the seedling vigour components. The genotypes MAUS-158 recorded maximum germination while highest vigour index and shoot length was exhibited by MAUS-71.

**Key Words :** Germination, Vigour, Maturity, Fresh weight

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Soybean is termed as “Miracle Golden of 21st Century” because of its protein content of about 40 per cent. Beside protein it is good source of oil, iron, vitamins and calcium. Being leguminous crop it enriches soil fertility by nodulation. One of the major obstacles for the expansion of soybean cultivation in the tropics is the difficulty of producing high quality seed. In general, tropical environment are conducive to the production of good quality seed. Deterioration in the field could be slowed down either by protecting the matured seeds from ambient environment or remove them completely from the field. Seed quality was shown to decline in germination and emergence when harvest was delayed beyond two weeks of physiological maturity.

Timely harvest of mature seed is important in protecting and maintaining seed quality. Based on this fact a study was

carried out to determine the quality of seeds harvested at different times in five soybean cultivars.

The experimental material comprised of five genotypes viz., JS-335, JS-93-05, MAUS-71, MAUS-81 and MAUS-158 which were obtained from Soybean Research Station, Marathwada Agricultural University, Parbhani. The experiment was laid out in Factorial Randomized Block Design with three replication. The seed were treated with thiram @ 3 g per kg before sowing. The row to row and plant to plant spacing of 45 x 5 cm was maintained. The sowing was carried out on 5th July 2008 and all the recommended cultural and plant protection measures were followed. The harvesting and sampling was initiated at physiological maturity and continued at 7 days interval upto 21 days, respectively. The seed material obtained from 20 treatment combination of five genotypes and four stages of harvest were subjected to laboratory studies on seed germination and seedling vigour components.

The germination test was conducted in three replications of 100 seeds following rolled paper towel method (ISTA, 1985). The root length of five randomly selected seedling from it initiation point to the tip of the root was measured in cm and averaged. The short length was measured in cm from its initiation point. The vigour index was determined by

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**Table 1 : Seed quality characteristics in soybean varieties**

Genotypes	Germination (%)	Vigour index	Shoot length (cm)	Root length (cm)	Seedling fresh wt. (g)	Seedling dry wt. (g)
JS-335	90.25	16.39	8.73	9.92	3.63	0.39
JS-93-05	87.66	17.62	7.78	12.36	3.78	0.41
MAUS-71	91.00	18.24	9.67	10.38	4.12	0.46
MAUS-81	89.50	16.27	8.21	9.97	3.78	0.41
MAUS-158	91.33	17.07	8.51	10.10	3.80	0.12
S.E. $\pm$	0.76	0.31	0.16	0.28	0.09	0.008
C.D. (P=0.05)	2.11	0.86	0.46	0.79	0.26	0.024
Stage of harvest (H)	92.73	17.89				
Physiological maturity (PM)	90.06	17.47	8.70	10.63	3.91	0.46
7 days after PM	89.20	16.84	8.69	10.71	3.98	0.42
14 days after PM	87.80	16.27	8.57	10.32	3.78	0.40
21 days after PM	0.68	---	8.37	10.17	3.61	0.39
S.E. $\pm$	1.90	0.27	0.14	0.25	0.08	0.007
C.D. (P=0.05)		0.77	NS	NS	0.23	0.021

\*\* indicates significance of value at P=0.01

NS=Non-significant

multiplying the per cent germination with sum of root and shoot length in cm (Woodstock, 1969) and value obtained was divided by common factor (100).

Seed germination and seedling vigour components are the major aspects deciding higher productivity because plant population depends upon healthy and vigorous growth of seedlings which is possible mainly by using better quality seeds for sowing to reap golden harvest.

In the present study, it was noted that germination vigour index, shoot length, root length, seedling fresh weight and seedling dry weight differed significantly due to genotypes. The genotype MAUS-158 (91.33%) was found superior in seed germination. However, all five genotypes under study maintained seed germination over and above the minimum seed certification studied. The genotype MAUS-71 recorded higher seed vigour index (17.89), shoot length (9.67 cm), seedling fresh weight (4.12 g) and seedling dry weight (0.46 g) while higher root length was exhibited by the genotype JS-93-05 (12.36 cm). Differences in total dry matter production due to genotypes have been reported by Hudge *et al.* (1982) and Burris (1973).

Seed germination decreases with delay in harvesting after physiological maturity. All the seed quality characteristics like germination, vigour index, shoot length and seedling dry weight were high at physiological maturity. Harvesting of soybean at physiological maturity significantly increased the germination percentage upto (92.73%), shoot length (8.70) and seedling dry weight (0.46). While harvesting of soybean 7 days after physiological maturity significantly increased root length (10.71) and seedling fresh weight (3.98). This may be due to germination capacity and vigour index reached its maximum value at physiological maturity stage and cells of cotyledons were filled with starch, lipid granules and proteins

globules similar results were reported by Sekar (2002).

It was further observed that the seed germination, vigour index, seedling fresh weight and seedling dry weight were significantly reduced with advancement of different stages of harvest after physiological maturity. This may be due to deterioration of seed because of field weathering of after physiological maturity. Similar results were obtained by Thomson (1979) and Tyagi (1992).

The soybean crop attains maximum seed weight and full germination potential at physiological maturity hence, it is advisable to harvest the soybean crop at physiological maturity for better seed quality.

## REFERENCES

- Burris, J.S. (1973). Effect of seed maturation and plant population on soybean seed quality. *Agron. J.*, **65**(3):440-441.
- Hudge, V.S., Solunke, M.R. and Borikar S.T. (1982). Dry matter accumulation, harvest index and yield studies in soybean. *Tropical Grain Legume Bull.*, **26**:17-19.
- International Seed Testing Association (ISTA) (1985). International rules for seeds testing. *Seed Sci. Technol.*, **13** : 299-335
- Sekar, H. (2002). Seed maturation in soybean (*Glycine max* (L.) Merrill). *Zirrat Fakultesi Dergisi Ataturk Univeristy*, **3**(2):221-227.
- Thomson, J.R. (1979). An introduction to seed technology, pp:28-43.
- Tyagi, C.S. (1992). Evaluating viability and vigour soybean seed with automatic seed analyser.
- Woodstock, L.W. (1969). Seedling growth as a measure of seed vigour. *Proc. Int. Seed Test. Association*, **39** (3):271-280.

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