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Seed quality of okra cultivars as affected by sowing dates and plant geometry

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ABSTRACT : The experiment was carried out in rainy season during 2009 and 2010 at Seed Testing Laboratory of Gochar Mahavidyalaya, Rampur Maniharan, Saharanpur, Uttar Pradesh to study the influence of sowing time and plant geometry on seed quality of okra. Seed collected from all twenty four treatments subjected to laboratory test. In laboratory, experiment was laid out in Complete Randomized Design with three replications. The mean estimates of test weight (67.81g), seedling length (27.96cm.), and seedling dry matter (1.21g) in case of seed harvested from 24th June sowing were significantly best among all the sowing was superior in these traits over rest of the sowing. Very poor performance of these parameters was observed in the crop sown on 22th July. While the standard germination (87.46%), seed viability (83.44%), seed vigour index-I (2243.60) and seed vigour index-II (110.77) was observed superior under the treatment V1 (Prabha Kranti).

KEY WORDS : Date of sowing, Spacing, Growth, Yield, Variety, Okra

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India is the largest producer of okra in the world and in India, it is grown twice a year during spring-summer and rainy seasons. The once declining production due to yellow vein mosaic virus is now on rise with the release of resistant varieties and hybrids extending bhindi cultivation in disease prone areas and seasons. Okra has a vast potential for consumption in the country and export to the Middle-East and Gulf countries. A number of high yielding and good quality varieties are grown in the country; however their quality seed is always in short supply. The information available regarding seed production technology of okra is inadequate. The seed quality as determined by vigour and viability of the seeds is greatly influenced by the environmental conditions to which the seed crop is exposed from sowing to seed maturity and harvesting. Besides environmental factors, seed production in okra is also influenced by plant geometry or spacing. Available reports suggest that planting date plays an important role in plant growth, fruit development, seed yield and its quality in okra. The early sown crop in rainy season experiences high temperature and hot winds during their growth period resulting in stunted growth, less number of fruits and reduced seed yield. The late sown crops encounter high rainfall during flowering and fruit set are more prone to attack by insect-pests and diseases. Plant density plays an important role in the seed production of okra and high seed yield, may be obtained from the densely sown crop. However, closer spacings in okra especially during rainy season pose greater problems of manual weeding and hoeing by adjusting the row and plant spacing without affecting the yield and quality of seed and therefore the optimum spacing needs to be worked out. The good quality seed should be clean, genetically pure, viable, vigorous and free from diseases and insect-pests. Basically, seed quality is determined by its purity and germination percentage in laboratory to get the information about the planting value of the seed. Field conditions are not always optimum, therefore, the standard germination tests in the laboratory often over estimate the field performance of the seed lots. Recently, seed vigour has gained significance as a quality attribute, which is a complex character governed by many parameters and requires the indexing of many components. Vigour tests are commonly evaluated according to their ability to predict the potential seed performance, particularly seedling growth rate, seedling emergence in field,

plant uniformity, crop yield and storability. Keeping in view the present investigation was planned to study the effect of plant geometry on seed quality and determine the optimum spacing.

RESEARCH METHODS

The present investigation was carried out in rainy season during 2009 and 2010 at Research Farm and Seed Testing Laboratory of Gochar Mahavidyalaya, Rampur Maniharan, Saharanpur, Uttar Pradesh with a view to study the influence of sowing time and plant geometry on seed quality of okra. In field, the experiment was laid out in split-split plot design with three replications and four dates of planting in each season *viz.*, 10 June, 24 June, 8 July and 22 July 2009 and 2010 taken in main plots and three plant geometries *viz.*, 60 x 30 cm, 60 x 45 cm and 60 x 60 cm in sub plots and two varieties *viz.*, Parbhani Kranti and Pusa A-4 in sub-sub plots. The plant distance was maintained as between and 50 cm within the rows. Regular cultural operations were done according to the need of crop. But in laboratory, experiment was laid out in complete randomized design with three replications and seed collected from all twenty four treatments subjected to laboratory test. Observations on test weight, seed viability, germination, seedling length (cm), and seedling dry weight, seedling vigour index I (on the basis of seedling length) and seedling vigours index II (seedling dry matter) was recorded to evaluate the seed quality from randomly selected lot of seed.

RESEARCH FINDINGS AND DISCUSSION

Good quality seed is a pre requisite for higher productivity of crop and it plays an important role in vegetable production too. It insures genetically and physical purity, higher germination and seed vigour and thus better and healthy crop production. Freshly harvested seed usually has maximum level of viability and vigour. Losses in seed viability and vigour do occur depending upon various factors *viz.*, genetic makeup of the seed material, harvesting stage of seed, environmental conditions at harvesting time, seed size etc. As the farmers/seed growers have become quality conscious the seed technological research needs to be geared to suit the needs of the existing seed policy.

Therefore, a modest attempt in this direction has been made by author for evaluating different seed quality parameters in okra. The vigour and viability of okra seed influenced by sowing dates and plant geometry are discussed here in the light of results reported earlier.

The mean estimates of test weight (67.81g), seedling length (27.96cm.), and seedling dry matter (1.21g) in case of seed harvested from 24th June sowing were significantly best among all the sowing was superior in these traits over rest of the sowing. Very poor performance of these parameters was observed in the crop sown on 22th July. While the standard germination (87.46%), seed viability (83.44%), seed vigour index-I (2243.60) and seed vigour index-II (110.77) was observed superior under the treatment V_1 (Prabha kranti). These results are in accordance with the

Table 1 : Effect of sowing dates and plant geometry on seed quality of okra cv. Parbhani Kranti and Pusa A-4

Treatments	Test weight of seed (g)	Germination (%)	Seedling length (cm)	Seedling dry weight (g)	Seed viability (%)	Seed vigour index-I (seedling length basis)	Seed vigour index-II (dry weight basis)
Date of sowing							
D_1	65.53	76.92	24.70	1.16	73.33	1771.00	84.69
D_2	67.81	81.88	27.96	1.21	77.79	2117.89	93.13
D_3	62.60	73.04	25.95	1.19	69.38	1906.58	89.05
D_4	56.61	68.88	24.25	1.13	64.25	1683.33	79.92
S.E.±	0.56	0.56	0.25	0.01	0.75	46.89	1.45
C.D. (P=0.05)	1.86	2.14	1.96	0.04	2.56	176.23	4.53
Spacing							
S_1	62.40	73.52	24.81	1.15	69.13	1825.00	84.56
S_2	62.89	74.42	25.29	1.16	70.25	1811.10	85.42
S_3	63.39	75.94	26.14	1.19	72.13	1927.90	88.97
S.E.±	0.41	0.16	0.36	0.004	0.36	24.56	0.48
C.D. (P=0.05)	NS	0.43	NS	0.04	1.24	76.58	1.46
Variety							
V_1	64.26	87.46	26.38	1.30	83.44	2243.60	110.77
V_2	62.02	62.90	25.05	1.04	58.94	1495.40	62.62
S.E.±	0.32	0.25	0.56	0.005	0.45	18.65	0.48
C.D. (P=0.05)	1.01	0.65	0.46	0.22	1.56	52.48	1.24

NS=Non-significant

findings of Randhawa (1967) who reported lower 100-seed weight and seed yield when the crop was sown after June *i.e.* in July. Similarly, Singh *et al.* (1986) also recorded higher 100-seed weight in the okra crop sown on 15th June than the crops sown on later dates.

The findings of present investigation revealed that the seed harvested from 24th June sown crop were bold and more vigorous than the seed obtained from 8th July sown crop. The superior performance of the crop sown on 24th June than later sowings in respect of seed quality attributes may be due to favourable environmental condition particularly temperature to which the crop was subjected during vegetative growth, flowering, fruit setting and fruit maturity. Similar findings were reported by Palanisamy and Ramasamy (1987) who found significant and positive correlation of temperature with number of flower, fruits per plant, seed germination and seedling vigour.

The higher seed germination in case of crops sown on 10th June and 24th June can be attributed to ample soil moisture in combination with favourable temperatures prevailing during cropping period of these crops which led to quick seed emergence, better seedlings establishment and improved crop performance. These results are in accordance with the findings of Lal *et al.* (2001) who noted more number of pods/plant, higher seed yield and better quality of seed when crop was sown in June. The better germination and plant growth in June sowing seems to be because of well distributed rainfall along with favourable temperatures prevailing at that time promoting the increased photosynthesis and better physiological plant growth. Similar results were also reported by Bisen *et al.* (1994).

The 1000-seed weight which is an index of seed size was significantly affected by different plant geometry. Higher seed weight and bold size seeds were obtained in 60 x 60 cm geometry as compared to 60 x 45 and 60 x 30 cm plant geometry although land area per plant was same. It appears that conditions under 60 x 60 cm were more conducive for plants to synthesize and translocated the photosynthates more efficiently towards the seeds making them bolder as compared to other plant geometry in which wider space between rows remained under utilized. Thus, the spacing of 60 x 60 cm was more balanced and it proved more efficient in favouring physiological process and productivity of the plants. These findings are contrary to the results reported by Palanisamy *et al.* (1986) who observed bolder seed in widely spaced plants.

The quality of seed as determined by its higher germination and greater seedling vigour was also found superior under 60 x 60 cm plant geometry. Similar findings were reported by Soni *et al.* (2006). In accordance with these observations, Palanisamy and Karivartharaju (1984) noted the highest seed test weight and best quality seeds with 94 per cent germination at relatively wider spacing.

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