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EFFECT OF SEED SIZE ON GERMINATION AND SEEDLING VIGOR IN SAFFLOWER

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Abstract: Seeds of two varieties of soffower viz, Bhima and Tara were graded into four categories on the basis of seed size as large, medium, small (sieved with bottom screen of 4.8, 4.0 and 3.2 mm) and bulk (ungraded) and these were evaluated for their 100 seed weight, standard germination, first count germination, plumule length, radicle length, speed of germination, seedling dry weight, seed vigour index, brick gravel test, sand test and field emergence. Large grade seeds were superior with respect to germination as compared to small, medium and ungraded seeds. Large and medium grade seeds produced more vigorous seedlings than small and ungraded seeds.

Keywords: Safflower, Vigour index, Germination

Introduction:

Safflower (*Carthamus tinctorium* L.) is an important oil seed crop grown in India but it did not receive sufficient attention of the scientists to improve its yield performance. Good quality seed is a major attribute which decideds proper germination and seedling vigour. This is found to reflect on growth and yield performance of a crop. Scientists have recorded favourable relationship between seed size and growth performance in different crops. (Singh et al., 1982, Dharmalingam and Basu, 1989) The present study was undertaken to determine the optimum seed size that will give higher germination and field stand, besides producing healthy and vigorous seedlings for successful seed production.

Materials and Methods:

Seeds of two varieties of safflower viz., Bhima and Tara were sifted through three different sieves having hole diameter 4.8, 4.0and 3.2 mm and the seeds retained by the above sieves were designated as G1, G2 and G3 respectively, while the bulk as UG. On these graded seeds were performed the following laboratory tests (i) 100 seed weight, (ii) standard germination and first count under laboratory conditions in between towel paper media (Anonymous, 1985), (iii) length of plumule an dradicle, (iv) dry matter production on 14th day of germination count (Anonymous, 1985), (v) speed of germination (Maguire, 1962), (vi) seed vigour index (Abdul-Baki and Anderson, 1973) and field emergence test (Anonymous, 1985).

Results and Discussion:

Seed weight of each grade showed a close association with the size of seed (Table 1). Agular and Nakane (1983) also made similar observation.

There was recorded a decreasing trend in germination with the decrease in seed size. The varieties Bhima and Tara exhibited highest germination 100% and 90% respectively in G1 grade seeds followed by G2, UG and G3. Probable reason for low germination in the G3 may be the presence of immature seeds. Similar observations has been made by Johnson and Luedders (1974), Paul and Ramaswamy (1979). Kalakannavar et al. (1989) and Charjan and Tarar (1991) in cowpea, wheat and soybean seeds respectively. Gurbanov and Bertii (1970) reported that the increased germination percentage in bigger seeds is delivered due to increased activity of redox enzyme in bigger seeds helping in breaking down the complex food material into simple soluble sugar. All the seed grades affected most of the vigour test parameters. Large and medium size grades (G1 and G2) were found superior for first count germination, plumule and radicle length, speed of germination, dry weight, seed vigour index, brick gravel test and sand test than small and bulk seed grades (G3 and UG).

Table-1: Effect of seed size on germination and seeding vigour in safflower varieties.

	Characters										
Treatments	100 seed weight (g)	Standard germination (%)	First count germination (%)	Plumule length (cm)	Radicle length (cm)	Speed of Germination	Dry weight (g)	Seed vigour index (SVI)	Bric gravel test (%)	Sand test (%)	Field emergence (%)
Bhima											
G1	6.58	100.00	98.00	13.12	17.82	24.73	0.40	3094.00	98.00	99.00	97.00
G2	5.43	98.00	92.00	10.97	13.67	23.73	0.31	2390.08	92.00	94.00	91.00
G3	4.44	91.00	80.00	7.33	10.12	21.56	0.21	1605.40	76.00	78.00	76.00
UG	5.32	98.00	90.00	9.61	11.03	23.20	0.28	2022.72	92.00	93.00	90.00
Tara											
G1	6.61	90.00	89.00	14.04	18.42	22.36	0.42	2921.40	87.00	89.00	86.00
G2	5.77	85.00	83.00	11.26	15.12	21.00	0.32	2242.30	80.00	82.00	80.00
G3	4.37	80.00	73.00	7.12	11.14	18.89	0.23	1460.80	68.00	69.00	66.00
UG	5.60	85.00	80.00	9.80	10.39	20.63	0.29	1717.00	78.00	80.00	76.00

McDaniel (1969) reported that the increased root length, dry weight and vigour index of seedling from bigger seeds of barley might be due to efficient utilization of production of energy. Similar observation have been reported by singh et al. (1982) in sorghum ,Kalakannavar et al. (1989) in wheat and Charjan et al.(2011) in soybean

Under field conditions large size (G1) seeds recorded maximum emergence 98% and 86% in Bhima and Tara respectively followed by G2, UG an dG3. Better percentage of field emergence in large size seeds could be ascribed to the large food reserve contained in them. Then seed size and seed weight may therefore serve as indices of field emergence potential.

Thus, it is evident that in most of the estimates, seed size is positively associated with germination and vigour. Therefore, in safflower seed size grading of bulk seed lots with a sieve having 4.8 mm and 4.0 mm aperture would ensure separation of sound seeds from others.

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