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INFLUENCE OF SEASON ON THE RATE OF IMBIBITION AND SPEED OF GERMINATION OF SEEDS OF CHILLI

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ABSTRACT

The differences in the rate of imbibition was more in larger seeds from rabi than kharif seasons. The difference in the rate of imbibition between grades was comparatively more in kharif season than rabi. In both the seasons, seeds from earlier pickings recorded higher rate of imbibition than those from later pickings.

Seeds from rabi season germinated faster than kharif. Smaller seeds germinated faster than medium and larger seeds and seeds obtained from earlier pickings germinated faster than those

from later pickings.

Season of the place of production of seeds differentially influences the development of various parts of seed. In a developing seed, the organisation

of seed coat depends on the prevailing environment at the later stage of development and maturation phase. It is the seed coat which decides the imbibition nature of the seed leading to emergence of radicle during germination. The present study is continuation of the general plan to investigate the influence of season on the seed cost of the resultant seed and its subsequent performance.

MATERIALS AND METHODS

Trials were conducted during Rabi 1984 (S1, Kharif 1985 (S2) and 1986 (S3) with chilly cv. K 2 by raising nursery and the 35 days old seedlings were transplanted in an area of 0.3 ha in each season adopting a spacing of 45x30 cm. Recommended packages of practices were adopted. During the time of harvest the red ripened fruits were harvested in six pickings and dried and were extracted manually. The bulk seeds were size graded using 9/64" and 8/64" round holed sieves to obtain three grades of seeds viz., Those retained by 9/64" (G1), 8/64 (G2) and passed through 8/64 (G3).

Rate of imbibition: Four replicated of 100 seeds each in each grade with uniform moisture content were placed on a two layered wet germinator paper in petri dishes after estimating the initial weight and covered with the lid. The wet weight of the sample was recorded after 8 hours of imbibition and the rate of imbibition was worked out and expressed in percentage.

$$\text{Rate of imbibition} = \frac{\text{Final weight} - \text{Initial weight}}{\text{Initial weight}} \times 100$$

Speed of germination: Four replicates of 100 seeds each in each grade were allowed to germinate in darkness in sterilized sand medium in trays. The emergence was counted daily from third day after sowing until 7th day. The rate of germination was calculated using Maguire's (1962) formula.

Rate of germination =

$$\frac{x_1}{y_1} + \frac{x_2 - x_1}{y_2} + \frac{x_n - x_{n-1}}{y_n}$$

where X_n - per cent germination nth count

Y_n - number of days from sowing to nth count.

RESULTS AND DISCUSSION

Grades of seed from season-I recorded the highest rate of imbibition than from season-III and season-II. The rate of imbibition was significantly higher in larger than medium and smaller size seeds. In both season-I and season-III, there were significant differences among the grades; whereas in season-II it was only between medium and smaller size seed. Seeds from Pi. I and Pi. II recorded significantly higher rate than Pi. III. Irrespective of the seasons and pickings, the rate of imbibition was higher in smaller than medium and larger seeds.

Speed of germination: Seeds from season-I was superior to those from season-II and III. It was more in smaller than larger and medium size seeds. Generally, the speed of germination was more in seeds from Pi. I and low in Pi. VI.

TABLE I : Influence of season on the rate of imbibition (%) in size grades of seeds from six pickings in cv. K2 Chilli.

	G ₁			G ₂			G ₃			Mean			
	S ₁	S ₂	S ₃	Mean	S ₁	S ₂	S ₃	Mean	S ₁		S ₂	S ₃	Mean
Pi. I	78.7 (62.5)	67.5 (55.2)	72.4 (58.3)	72.9 (58.6)	80.1 (63.5)	69.2 (56.2)	73.8 (59.2)	74.4 (59.6)	81.6 (64.6)	70.1 (56.8)	75.0 (56.8)	75.0 (60.0)	75.6 (60.4)
Pi. II	78.1 (62.1)	66.0 (54.3)	71.4 (57.6)	71.5 (57.7)	79.2 (62.8)	68.4 (55.8)	72.4 (58.3)	73.3 (58.8)	80.3 (63.6)	69.2 (56.2)	73.8 (59.2)	74.4 (59.6)	73.1 (58.7)
Pi. III	76.2 (60.8)	64.9 (53.6)	67.3 (55.1)	69.5 (56.4)	76.2 (60.8)	67.1 (55.0)	71.5 (57.7)	71.6 (57.8)	80.2 (63.5)	67.9 (55.4)	72.5 (58.3)	73.5 (59.0)	71.5 (57.7)
Pi. IV	75.1 (60.0)	63.1 (52.5)	68.2 (55.6)	68.5 (55.8)	75.1 (60.0)	66.9 (54.8)	71.2 (57.5)	71.1 (57.4)	78.9 (62.6)	67.2 (55.0)	72.2 (58.1)	72.8 (58.5)	70.8 (57.2)
Pi. V	72.8 (58.5)	62.7 (52.3)	67.0 (54.9)	67.2 (55.0)	72.9 (58.6)	64.7 (53.5)	70.2 (56.9)	69.3 (56.3)	77.3 (61.5)	65.2 (53.8)	71.0 (57.4)	70.9 (57.3)	69.1 (56.2)
Pi. VI	71.3 (57.6)	61.5 (51.6)	66.1 (54.3)	66.3 (54.5)	72.2 (58.1)	63.2 (52.6)	69.3 (56.3)	68.2 (55.6)	75.9 (60.6)	64.5 (53.4)	70.2 (56.9)	70.2 (56.9)	68.6 (55.9)
Mean	75.4 60.2)	64.3 (53.3)	68.7 (55.9)	69.3 (56.3)	76.0 (60.6)	66.6 (54.7)	71.4 (57.6)	71.3 (57.6)	79.0 (62.7)	67.3 (55.1)	72.5 (58.3)	72.9 (58.6)	
SEd	0.33			0.46			0.80		0.57		0.80		1.39
CD (P=0.05)	0.64			0.91			1.57		1.11		2.72		

(Figures in parentheses are transformed values)

TABLE 2 : Influence of season on the speed of germination in size grades of seeds from six pickings
in cv. K 2 Chilli.

	G ₁				G ₂				G ₃				Mean
	S ₁	S ₂	S ₃	Mean	S ₁	S ₂	S ₃	Mean	S ₁	S ₂	S ₃	Mean	
Pl. I	24.55	16.33	19.64	20.17	25.22	17.53	20.22	21.01	25.97	18.12	21.10	21.73	20.97
Pl. II	22.46	15.98	15.77	18.04	23.12	16.21	16.78	18.70	24.10	16.91	17.38	19.43	18.73
Pl. III	19.01	13.14	13.10	15.08	20.11	13.78	14.10	16.00	20.97	14.52	14.97	16.82	15.97
Pl. IV	17.94	11.71	12.15	13.93	18.82	11.62	12.99	14.48	19.52	12.32	13.71	15.18	14.53
Pl. V	16.51	10.27	11.85	12.88	17.22	10.82	12.48	13.51	18.10	11.82	13.21	14.38	13.59
Pl. VI	11.85	10.52	10.06	10.74	12.15	10.98	10.98	11.37	12.89	11.72	11.90	12.17	11.43
Mean	18.72	12.99	13.76	15.16	19.44	13.00	14.59	15.81	20.26	14.23	15.38	16.62	

(Figures in parentheses are transformed values)

S	0.34	0.48	0.34	0.84	0.59	0.84	1.48
SEd	0.67	0.67	0.65	1.16	1.65	2.85	
CD (P=0.05)							

The imbibition in larger seeds was slower than in smaller. Difficulty in obtaining uniform seed substrate contact (Pollock and Roos, 1972) or length of diffusion (Brandnock and Mathews, 1970) may be the causes for the same. Besides seed coat embryo ratio, toughness or seed coat, mechanical damage in post harvest seed composition and seed vigour and the environmental conditions in which the seed had developed may also alter the rate of imbibition of a particular grade of seed (Bewley and Black, 1978). According to Maguire (1962), large sized seed emerged faster than smaller sized,

whereas Sharples and Kuehl (1974) did not obtain any relationship between seed size, weight and rate of imbibition.

Seeds from rabi season exhibited quicker emergences than from kharif season. Environmental interaction has also been found to be important in determining germination rate (Hodgkin, 1980). Seeds from earlier pickings exhibited rapid rate of germination than those from later pickings. It is plausible that age of mother crop and genetic factors strongly influence germination rate (Wittington and Fierlinger, 1972).

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