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EFFECT OF TEMPERATURE ON SEED GERMINATION OF WINTER ANNUAL FLOWERS

H. S. Baweja, P. K. Baweja and A. S. Panwar*

Horticultural Research Station, Kandaghat, Solan - 173 215 (HP)

ABSTRACT

Freshly harvested seeds of four winter annuals viz. Pansy, Antirrhinum, Sweet willium and Candytuft were sown in Patridishes (filter paper, Whatman No. 1) in sand medium and their germinability was studied. The seeds were sown at three different temperatures i.c. 22°C, 26°C and 30°C in a BOD incubator for three years. There was differential response of temperature on seed germination and further establishment upon transplantation.

INTRODUCTION

Various studies in cereal and vegetables crops indicates that, temperature was one of the key factor in the germination as well as stand establishments, whereas in flower crops, such studies are lacking and there exist a gap of knowledge, since there is growing tendency in the present day commercialisation of flower seeds production. The objective of the present study was, therefore, to find out the response of winter annuals to temperature on germination and further establishement.

MATERIALS AND METHOD

The experiment was conducted at Horticultural Research Station, Kandaghat of Dr. Y. S. Parmar University of Horticulture and Forestry during 1995-96, 1996-97 and 1997-98. Freshly harvested seeds of pansy, antirrhinum, sweet willium and candytuft were sown on wet filter paper (Whatman No. 1) and in sterilised sand media. Fifty seeds of each species were pre-soaked in water and kept in a BOD incubator at 22°C, 26°C and 30°C in quadruplicates. Germination per cent was monitored upto 14 days and the experiment was repeated for three years. The seedlings after 15th days of germination were transferred from individual treatment to 30 cm diameter pots filled with a mixutre of FYM, soil and sand (1 : 1 : 1) and kept at uniform room temperature to study the stand establishment.

RESULTS AND DISCUSSION

Seed germination at the end of 15th day for all the winter annuals under study during three years is presented in Table 1 & 2. The per cent seed germination of pansy did not differ for all the three years whereas for the other three species, there was reduction in per cent germination. The trend remained same irrespective of the media. In all the four species, the per cent seed germination was lower at 22°C and 30°C compared to that of 26°C. Differential response in relation to temperature regime was noticed under direct sowing (filter paper)

* *ICAR Research Complex for NEH Region UMIAM, Meghalaya*

compared to sand media wherein the germination was better at 30° C.

Similarly, differential response with regard to stand establishment was noticed after transplantation. Seedlings germinated at 22° C were found superior in their established in all the four species, irrespective whether they were sown directly or in sand medium except in sweet willium, wherein seedling germination at 26° C were established effectively.

Direct sowing under controlloed condition has shown maximum germination as compared to the indirect sowing. Gutormson and Burris (1992) while working with corn and soybean, reported that germination per cent under bleach custom wrap, and Kimpak media differed significantly but under sand there was no significant difference in germination. On the other hand, West (1992) noticed a difference in seed germination with media and temperature. In the presnet studies differential response between the two treatments might be because of temperature differences, although they were kept at uniform BOD temperatures. This was evident from the improvement of germination in sand medium with increased temperature (30°C). All the four species behaving in a similar fashion further proves that seed germination is a temperature dependent process.

It was noticed that stand establishment was superior for those germinated at 22° C (Table 3). This indicates that seedling survival is an independent process, which again might be requiring different temperatures. Thus, seedling survival seems to be dependent upon other physiological processes other than seed vigour as was reported in pea (Shukla, 1989). It was reported that post germination growth might be useful basis for culling out of inferior germinated seedling for rapid plant establishment and having greatest probability of success (Finch-Savage, 1984). In the present studies, the seeds whether germinated under direct or in sand medium did not differ in their stand establishement when they were germinated at 22°C. This could be because of slower seedling vigour whereas seed germinated at 26°C and 30°C might have depleted most of the reserves during early germination period and therefore, led to a poor establishement. This indicated that assimiltes does play an important role in further stand establishment in flower crops.

It can thus be concluded that germination is better under direct sowing at 26° C, and 30°C in sand medium. Stand establishment of seeds germinated at 22° C was found to be superior in these four flower crops.

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Table 1. Effect of temperature on percent seed germination under direct sowing medium in four winter annuals.

Winter annuals	Direct Sowing								
	22° C			26° C			30° C		
	95–96	96–97	97–98	95–96	96–97	97–98	95–96	96–97	97–98
Pansy	90	92	94	94	96	92	80	82	78
Antirrhinum	84	82	80	86	88	82	76	79	70
Sweet Willium	75	70	72	78	76	70	68	66	60
Candyluft	65	60	55	70	72	66	56	50	48
$CD_{0.05}$ Species	4.2	5.1	4.8	6.0	4.5	5.8	5.2	5.6	5.4
Media	1.9	1.9	2.1	2.3	2.3	2.4	NS	NS	NS
8 x M	NS	NS	NS	2.3	2.1	2.2	NS	NS	NS

Table 2. Effect of temperature on percent seed germination under sand medium in four winter annuals

Winter annuals	Sand Medium								
	22° C			26° C			30° C		
	95–96	96–97	97–98	95–96	96–97	97–98	95–96	96–97	97–98
Pansy	45	48	50	55	50	52	60	56	52
Antirrhinum	42	38	30	45	42	38	52	50	48
Sweet Willium	30	28	25	50	52	40	48	50	50
Candyluft	25	20	22	38	30	28	40	44	35

Table 3. Stand establishment of pre-germinated seedlings grown at three different temperatures regimes.

Winter annuals	Direct Sowing			Sand medium		
	22° C	26° C	30° C	22° C	26°	30° C
Pansy	97	92	60	98	83	96
Antirrhinum	80	70	72	98	87	82
Sweet Willium	65	60	58	82	78	79
Candyluft	50	55	45	78	74	72
$CD_{0.05}$ Species	1.4	1.2	1.8			
Media	4.7	4.5	5.2			
S x M	2.4	2.1	3.2			