EFFECT OF SEED VERNALIZATION ON TRANSLOCATION RATE IN *B. napus*

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INTRODUCTION

Among the oleiferous Brassicas, *B. napus* has the highest seed and oil productivity(Zaman 1987). But inspite of its high yield and oil potentials it has not become popular among the Indian farmers mainly because of its indeterminate growth habits. Flowering period is extended that sets in a compitition for assimilates between the growing stem, newly formed flowers and developing fruits resulting in overall reduction in yield. To maximize productivity in *B. napus* there is need to minimize compitition by reducing flowering period and shoot size. Seed vernalization has been found to enhance flower initiation (Ross and Murfet 1986 ; Eliss *et al* 1988 ; Summerfield *et al* 1988 and Roberts *et al* 1989). The genetics of vernalization has received much attention but the genes involved have not been regarded as yield genes despite their frequent association with increased growth and development. Keeping this in mind the translocation rate of photosynthates was studied in the developing seeds of *B. napus* with a view to evaluate the possible role of vernalization in manipulating the yield potentials.

MATERIALS AND METHODS

Seeds of four varieties of *B. napus* viz. R-7018, R-7027, R-7033 and GSL-1 were subjected to cold treatment (6°C to 4°C) for a period of 45 days and were sown in replicated trials at RRS Bathinda during 1989-90 along with their untreated seeds. The flowers were individually marked with the date of opening and the developed pods were harvested at 15, 30, 45 and 55 day intervals. Observations were recorded for thousand seed weight, seed number per pod, pod thickness, pod length and Pedicel length and the data were analysed statistically.

RESULTS AND DISCUSSION

The process of vernalization was found to effect, thousand grain weight, thickness of pods, pedicel length and seed yield per plant significantly (Table 1 and 2). Maximum test weight gain was observed in GSL-1, a high yielding variety followed by R-7033, R-7027 and R-7018 in the decreasing order. The rate of translocation of assimilates

Table 1. Effect of vernalization on plant parameters.

Varieties	Seed Yield/ Plant (g) C	V	No. of seeds/ pod C	V	Thickness of pods (cm) C	V	Pod length C	V	Pedicel length (cm) C	V
R-7018	5.33	5.47	20	20.3	4.2	4.6*	5.0	5.2*	1.8	2.1*
R-7027	5,7	6.00*	20.7	20.7	4.4	4.97*	5.3	5.3	1.97	2.2*
R-7033	5.9	6.13	20.7	20.3	4.6	4.9*	5.2	5.3	2.0	2.4
GSL-1	6.43	7.16*	23.3	23.7	4.9	5.7*	5.4	5.4	2.3	2.7*
C.D.5%	0.139		0.961		0.191		0.137		0.139	

Table 2. Effect of vernalization rate of seed weight increase.

No. of days after flower opening	Thousand seed weight (g) Control R-7018	R-7027	R-7033	GSL-1	Vernalized R-7018	R7027	R-7033	GSL-I	C.D. % 5
15	0.52	0.67	0.73	0.84	0.57	0.72	0.92*	1.21*	.05
30	1.45	1.56	1.65	1.78	2.42*	2.56*	2.74*	3.11*	.26
45	3.68	3.82	3.92	4.13	4.22*	4.43*	5.13	5.56*	.28
55	4.26	4.43	4.88	5.81	5.14*	5.22*	5.51*	6.13*	.27

was also significantly enhanced in all the varieties with maximum in GSL-1 (Fig.1) at all stages of seed development, resulting in increased seed yield per plant. Results indicate that genes for vernalization continue to act even after floral initiation andare in accord with the findings of Musser and Kramer (1988). Varietal differences for seed yield were also significantly enhanced with maximum effect in GSL-1 followed by R-7027, suggesting that intraspecific variation for vernalization response can be considered to be of possible adaptive value in providing the species with variation in development and growth, both for adaptation in seasonally variable environment and for successful invasion of new environments. Thus vernalization has been found to effect

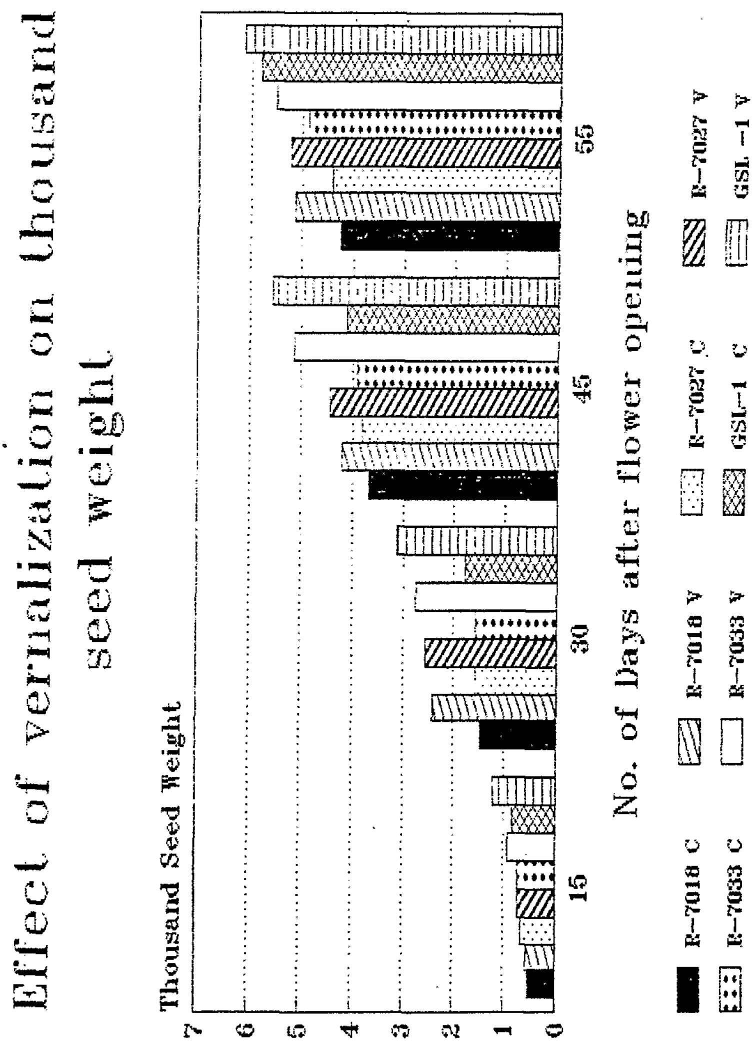
Effect of vernalization on thousand seed weight
Thousand Seed Weight
0
1
2
3
4
5
6
7
15
30
45
55
No. of Days after flower opening
R-7018 C
R-7018 V
R-7027 C
R-7027 V
R-7033 C
R-7033 V
GSL-1 C
GSL -1 V

Fig. 1

seed yield by effecting seed size only and not seed number which in turn might be responsible for increased thickness of pods. Significant increase in Pedicel length can also be an indication of increased rate of translocation of photo assimilates towards fruit parts. These results are in agreement with the findings (Rawson 1970 ; Flood and Halloran 1986 ; Musser and Kramer 1988), where vernalization has been associated with increased size and number of leaves, spikelets and tillers in wheat. This indicates the possibility of them being regarded as pleiotropic effects of vernalization response genes. Thus vernalizatioin genes can be considered to contribute indirectly to yield by effecting plant development and growth leading to the production of increased biomass. Still more knowledge of the role of vernalization response in effecting growth and development via translocatioin rate of photosynthates appears to be necessary to give greater objectivity to breeding for closer adaptation and increased yields in the crop, which is a recent introduction in India.

Conclusion

Vernalization response as generally accepted, has been found to effect plant development and growth in *B. napus* species. The rate of seed weight increase, seed yield per plant, thousand seed weight, pod thickness and pedicel length were significantly effected possibly by partitioning more photoassimilates towards the growing fruits. But still more study appears to be necessary if the significance of vernalization response in manipulating yield potentials of variety is to be more clearly understood.

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