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Floral Initiation in *Celosia cristata* L.—Photoperiodic Requirement and Isozymic Changes

AMARJIT S. BASRA*, R. K. KOHLI** AND S. SAWHNEY

Department of Biology, Guru Nanak Dev University, Amritsar-143005, India

Celosia cristata L. is an ornamental plant belonging to the family Amaranthaceae. Little work has been done on the physiology of flowering of this plant. This communication deals with the photoperiodic response of the plant, number of photo-inductive cycles required for floral transition and isozymic changes in the shoot apices of vegetative and induced plants.

To study photoperiodic response, adequate number of uniform plants raised under continuous illumination after attaining a height of 4.0±0.5cm and 15.0±0.3 unfolded leaves were divided into 11 lots with 10 plants in each. Lots 1 to 11 were subjected to photoperiods of different length for 40 d and observations on the appearance of macroscopic inflorescence primordia were recorded daily. Similarly, for studying the number of inductive cycles required, the plants with 4.0±0.2 cm of height and having 18.0±0.6 unfolded leaves were divided into 11 equal lots with 10 plants in each. Plants of lot 1 were exposed to continuous illumination while those of 2 to 11 received different numbers of 8 h photoperiodic cycles. After the requisite treatment the plants of each lot were transferred to continuous light and maintained there till 40 d after commencement of the photoperiodic treatment. Daily observations on the macroscopic appearance of inflorescence primordia were taken. For isozyme analysis, adequate number of uniform plants were raised and divided into 2 equal lots to be exposed to 24 and 8 h photoperiodic cycles, respectively, for 40 d. The apical portions comprising 5 uppermost leaves with an equivalent stem length were taken for analysis. Sampling was done at the stage of appearance of macroscopic floral primordia under 8 h photoperiod and simultaneously in vegetatively growing plants under 24 h photoperiod. The procedures for the preparation of extracts and disc gel electrophoresis for the isozymes of peroxidase, acid- and alkaline phosphatase and esterase were the same as described in a previous paper (Sawhney *et al.*, 1981).

The qualitative short day response of *C. cristata* is discernible from the results in Table 1 with the critical photoperiod lying between 12 to 14 h in a 24 h cycle.

Present address : *Department of Botany, Punjab Agricultural University, Ludhiana-141004, India.
**Department of Botany, Panjab University, Chandigarh-160014, India.

This is so because 100% plants were induced under 12 h of photoperiodic exposure or less (except 4 h) whereas, plants receiving 14 h or longer photoperiods remained completely vegetative. The plant required a minimum of 5 consecutive 8 h photoinductive cycles for the macroscopic initiation of floral primordia (Table 2). Once this was dispensed, the increasing number of photoinductive cycles hastened the floral expression.

Table 1. Days to floral initiation in *C. cristata* L. exposed to photoperiods of varying length

Photoperiod (h)	Days to initiate inflorescence primordia		Per cent plants bearing inflorescence primordia
	Mean	Standard error	
4	24.3	2.2	90
6	20.2	1.0	100
8	13.2	1.5	100
10	14.4	2.0	100
12	18.2	1.0	100
14 to 24	—	—	0

Table 2. Days to floral initiation in *Celosia cristata* L. exposed to different number of photoperiodic cycles

Photoperiodic Cycles	Days to initiate inflorescence primordia		Per cent plants bearing inflorescence primordia
	Mean	Standard error	
0 to 4	—		0
5	17.4	1.50	80
6	17.3	1.07	100
7	13.1	1.00	100
8	12.2	1.60	100
9	11.3	1.50	100
10	11.1	2.20	100
16	11.2	1.60	100

There is a bewildering array of changes associated with the transformation of vegetative apices into floral buds of plants. Many of these changes occur in widely different species or in different inductive regimes in the same species, indicating that they are probably in a general sense, essential for floral evocation. In the present study, 2 isozymes each of peroxidase, esterase and acid phosphatase were synthesized only in induced plants whereas isozymes of alkaline phosphatase showed no change

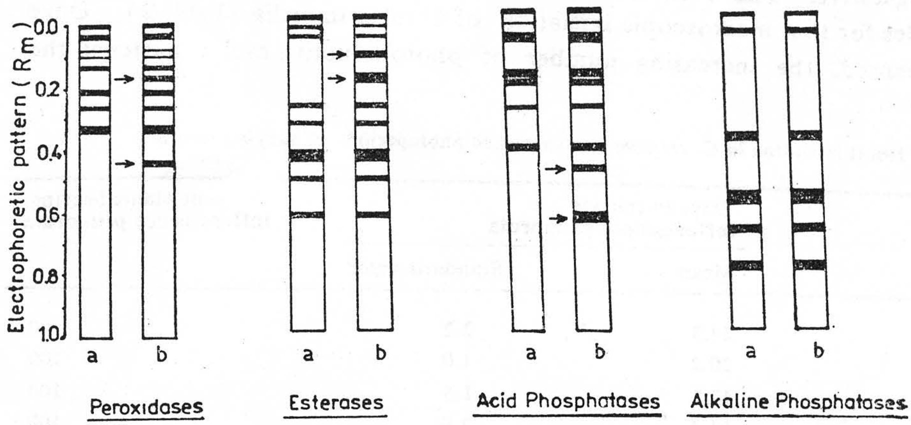

Fig. 1. Electrophoretic pattern of isozymes in vegetative and induced apices of *Celosia cristata* L. Arrows point to new isozyme in induced apices (b).

(Fig. 1). Isozymes specific to the induced state have also been observed in *Amaranthus viridis* (Sawhney *et al.*, 1981). On flowering, certain genes are switched on which are not expressed in the vegetative plant. The expression of floral genes should be accompanied by the formation of proteins also specific to flowering and not found in the vegetative plant. Therefore, the neosynthesis of 2 isozymes each of peroxidase, acid phosphatase and esterase (Fig. 1) might be specifically required for the metabolism of the induced state. Investigations along this line seem promising and need attention.

REFERENCE

Sawhney, S.; Basra, A. S. and Kohli, R. K. (1981) Enzyme activity and electophoretic pattern of isoenzymes of peroxidase, esterase and alkaline and acid phosphatase in relation to flowering in *Amaranthus viridis* L.— a quantitative SD plant. *Biol. Plant.* **23** : 335-341.