It is not always sound to apply laboratory germination findings to the field. However, a possible interpretation of the pattern of *Echium* seedling emergence is in terms of a field dormancy. The laboratory findings make it unlikely that seed coat impermeability, either to gases or water, would be involved in any such delayed germination. Nothing should be inferred about any possible conservation of seed in the soil, nor are the inhibitor findings decisive in their present form. Thus the question of what factors in nature initiate the cell expansion necessary to overcome the seemingly important coat restriction must remain open.

FLOWERING RESPONSES OF *ECHIUM LYCOPSIS* TO PHOTOPERIOD AND VERNALIZATION

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The development of *E. lycopsis* (Paterson's curse or Salvation Jane) - seedling establishment in late autumn, the formation and growth of rosettes during winter with stem elongation occurring in early spring, followed by flowering on the elongated stems - is characteristic of a pattern frequently shown by plants whose flowering is mainly controlled by long days (LD) but may also be affected by (low) temperature.

These features were therefore investigated on *Echium* plants grown from seed collected near Adelaide, South Australia, and in the Riverina district, New South Wales. The main findings are summarized in the Table.

Flowering is obviously promoted and hastened by long photoperiods and favoured by lower temperatures. At the higher temperatures *Echium* is virtually a qualitative LD plant, with a critical daylength in the vicinity of 12 hours. At the shorter photoperiods some stem elongation occurred, but this did not lead to flower production, both the terminal and lateral meristems producing curious 'perched' rosettes. At lower temperatures the flowering response is quantitative. Although response is possible

Photoperiod[1] (hours)	Day/night Temp., 24/19°C			Day/night Temp., 21/16°C		
	Flowering (%)[2]	Days to anthesis	Position 1st open flower[3]	Flowering (%)	Days to anthesis	Position 1st open flower
8	7	183	L	100	190 ± 5.9	L, MS died
9	0	-	-	100	201 ± 8.6	L, " "
10	0	-	-	100	181 ± 8.4	L, " "
12	28	135 ± 9.4	L	100	156 ± 4.5	L MS
16	89	118 ± 7.4	MS L	100	79 ± 1.7	MS L
20	100	61 ± 2.0	MS	100	56 ± 1.6	MS

[1]Natural day, restricted by shuttering, or extended by 50 f.c. incandescent light.

[2]Groups of 13-24 plants.

[3]MS = main stem, L = rosette lateral.

at the shortest photoperiods, it is drawn-out and increasingly variable. Other growth features suggest that these conditions are far removed from the optimum, e.g. a lack of vigour in the main aerial stem and its frequent death, and the preferential flowering on laterals, whose development is doubtless encouraged by main stem inactivity.

Clearly there is no obligate requirement for very low temperatures. However, when germinated seeds were kept at 5°C for 1, 2, and 4 weeks before planting in a warmed glasshouse in natural days 11.1-13.0 hours, the flowering was accelerated by 9, 30, and 51 days respectively (controls taking 159 days). This vernalization response would probably also be shown by very young plants. A similar effect was produced by the application of gibberellic acid to the apex, e.g. 2 and 8 microgrammes of gibberellic acid applied daily accelerated flowering by 53 and 73 days respectively (conditions as before). Flowering was also accelerated under 18-hour photoperiods by low temperature and gibberellic acid, though less markedly.

The results of a single experiment suggest that *Echium* is reasonably sensitive to the LD induction - 0, 30, and 100% flowering followed 2, 6, and 10 exposures respectively to an 18-hour day.

Caution should be exercised in applying these data too closely to the distribution of *Echium* for two reasons: (1) they refer only to the stated seed collections, and other ecotypes with different properties may exist; (2) they refer only to flowering, and other features, such as seed production, may influence distribution. Accepting these limitations, it seems that the south of the continent, with the possibility of vernalizing temperature, low night temperatures, and fairly long days, would provide the best conditions for *Echium*. While it is technically possible for the plant to flower in more northerly latitudes, the retarded flowering and reduced vigour associated with the higher temperatures and shorter photoperiods suggest that the plant would be increasingly at a disadvantage there.