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BRIEF COMMUNICATION

# Intracapitular Cypsele Dimorphism and Dormancy in *Bidens bipinnata*

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**Abstract.** In *Bidens bipinnata*, a common composite inhabiting mostly gravelly or rocky habitats, two cypsele types are found within a single capitulum. These dimorphic cypsele types differ in their dormancy periods. Evolutionary implications of this differential intracapitular cypsele dormancy are discussed.

*Bidens bipinnata* is a common composite inhabiting mostly gravelly or rocky habitats in and around Delhi, and in similar situations all over the country. The populations exhibit great variations in habit and in general characters of the capitulum. Interestingly, each capitulum shows cypsele of two types (Fig. 1 *A*, *B*), differing in size, colour, and general surface features. The outer 3—8 cypsele in a capitulum are shorter (0.6—1.3 cm long), brown and with a rugose surface at maturity (referred to in the text as brown cypsele). The inner 8—15 cypsele, on the other hand, are longer (1.0—1.8 cm long), black and with a smooth surface at maturity (referred to in the text as black cypsele). Seed sizes have been shown to be related to the size and vigour of the seedlings (HARPER *et al.* 1970, MAURYA and AMBASHT 1973) and to their competitive ability and dominance (HESLOP HARRISON 1967). Whether there is any such relationship between the dimorphic cypsele types from a single capitulum and the habit variants found in nature, germination studies of these two cypsele types from *B. bipinnata* were undertaken. For this usual methods of sowing the seeds in petriplates on filter papers irrigated with distilled water were followed. Each set with 50 cypsele per plate was replicated five times. Temperature regime of 22 ± 5 °C was maintained during the course of germination studies.

None of the cypsele germinated during the first seventy-nine days of sowing. On 80th day, however, the black cypsele started germinating (10%) and the percentage germination improved and attained a 100% level in about 180 days. The brown cypsele, on the other hand, did not show any germination till about 230 days. After this period, they started germinating and the

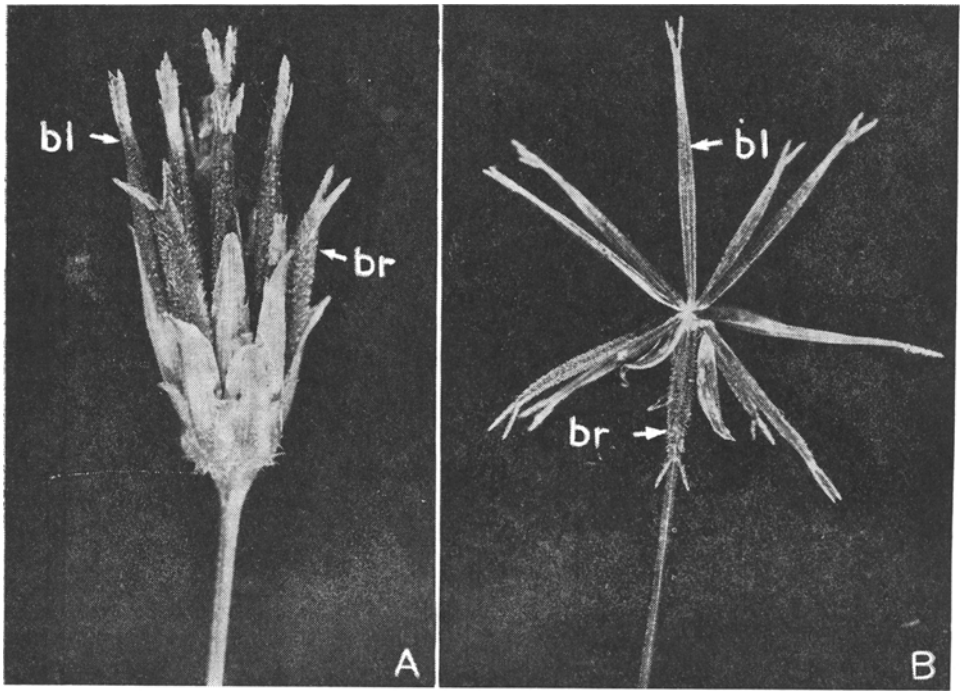


Fig. 1*A*, *B*. Fruiting capitula of *Bidens bipinnata* showing dimorphic cypsele. *A* × 3.5, *B* × 2.5. (*br:* brown cypsela, *bl:* black cypsela.)

lnitial lower germination percentage (5—10%) gradually increased later on. During the initial period, 79 days in case of black cypsele and 230 days in brown cypsele, the light or dark conditions too, did not show any positive response towards breaking dormancy and thus initiating germination. In addition to light, other conventional methods of breaking dormancy, such as mechanical scarification and complete removal of cypsele coat, leaching with running water, acid scarification with concentrated sulphuric acid (for 5 minutes followed by washing with running tap water), gibberellic acid (5 ppm), and potassium nitrate (5 ppm) were tried but the initial period of dormancy (79 days in case of black cypsele and 230 days in case of brown cypsele) could not be broken.

Presumably, therefore, the dormancy in the two types of cypsele from the same capitulum of *B. bipinnata* is not a consequence of the hard cypsele coat but may be due to after-ripening processes, late maturation of embryo or other physiological causes as reported for other systems (Barton 1965, Brown and van Staden 1959, Dakshini and Tandon 1969, Evenari 1949, Pandey 1968).

The morphology and physiological behaviour of seeds are important features for understanding the pattern of seasonal distribution of species (Maurya and Ambasht 1973, Williams and Harper 1965). Also, the potentialities of seeds to germinate in different environmental conditions

or habitats ensure perpetuation and distribution of a plant in different ecological niches and thus direct the evolution of a species. In view of the fact that this is the first report of the occurrence of different dormancy periods in the two cypsele types from the same capitulum, further investigations are in progress to understand the evolutionary significance of this peculiar phenomenon in *Bidens bipinnata*.

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## References

BARTON, LELA V.: Seed dormancy: General survey of dormancy types in seeds, and dormancy imposed by external agents. — In: RUHLAND, W. (ed.) Handbuch der Pflanzenphysiologie. Vol. 15. Pp. 699—720. Springer-Verlag, Berlin 1965.

BROWN, N. A. C., VAN STADEN, J.: The effect of scarification, leaching, light, stratification, oxygen and applied hormones on germination of *Protea compacta* R. BR. and *Leucadendron daphnoides* MEISN. — J. S. Afr. Bot. **39** : 185—195, 1959.

DAKSHINI, K. M. M., TANDON, R. K.: Seed germination in the grass *Oropetium thomaeum* (LINN. f.) TRIN. — Flora B **158** : 631—644, 1969.

EVENARI, M.: Germination inhibitors. — Bot. Rev. **15** : 153—194, 1949.

HARPER, J. L., LOVELL, P. H., MOORE, K. G.: The shape and size of seeds. — Annu. Rev. Ecol. Syst. **1** : 327—356, 1970.

HESLOP-HARRISON, J.: New Concepts in Flowering Plant Taxonomy. — Heinemann, London 1967 (Repr.).

MAURYA, A. N., AMBASHT, R. S.: Significance of seed dimorphism in *Alysicarpus monilifer* DC. — J. Ecol. **61** : 213—218, 1973.

PANDEY, S. B.: Adaptive significance of seed dormancy in *Anagallis arvensis* LINN. — Trop. Ecol. **9** : 171—193, 1968.

WILLIAMS, J. T., HARPER, J. L.: Seed polymorphism and germination 1. The influence of nitrates and low temperature on the germination of *Chenopodium album*. — Weed Res. **5** : 141—150 1965.