



Seed to Seed phenology of *Emex australis* Steinh.

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Emex australis Steinh. (Polygonaceae) is a common weed found growing in more than 30 countries of the world including India (Sharma & Jamwal 1987). In Jammu and Kashmir, plants of this species grow luxuriantly in and around waste lands of Jammu region (Sharma & Jamwal 1987, Bala & Kaul 2011). Plants are autumn-winter germinating annuals typically associated with disturbed environments. Life cycle is short and completed within 5 to 6 months. Germination of seeds is staggered and occurs throughout the growing season provided the conditions are favourable. Seeds start germinating after the first shower of winter rain usually in December. The seedlings show rapid growth and development such that each transforms into a plantlet within one to two weeks after germination (Fig.1a). Each such plantlet bears a rosette of leaves and crown with a long and thick tap root. Shoots radiating from the crown branch dichotomously at the nodes. Vigorous vegetative growth spread over three to four weeks follows. Around first week of January, the plants switch to reproduction by initiating the development of floral buds (Fig.1b). Plants bloom in February; peak blooming occurs till April and thereafter during May flowering declines. Plants are monoecious differentiating small and unisexual flowers first on the crown and then on the nodes along the shoots (Fig.1c). Borne in whorl-like clusters flowers are incomplete and actinomorphic. The male flowers are pedicellate and borne in racemes. Each male flower consists of a herbaceous 4 to 6 lobed perianth which encloses 4 to 6 stamens. The female

flowers are sessile and differentiate individually in groups of 4 to 6 at each node. Each flower bears a single pistil within the confines of a 6 toothed or lobed perianth. The gynoecium is tricarpellary syncarpous. It can be distinguished into a feathery trifid stigma, reduced style and a trigonous, unilocular and uniovulate ovary. Fruit formation occurs 1 to 2 weeks after fertilization and continues till the end of flowering period. It initiates with the conversion of herbaceous and soft female flowers into hard spiny brown coloured single seeded fruits or achenes. Initially the fruits are green which turn dark brown at maturity (Fig.1d, e). The plants set maximum fruits during May and June. Each fruit is three faced and distinctly grooved. Having a very hard persistent perianth, fruits are indehiscent and shed as a unit. The spines on fruits aid in their dispersal. As mentioned before, each pistil is uniovulate and therefore each fruit is single seeded. Seeds are small, trigonous and brown (Fig.1f). Seed dispersal is limited and occurs by biotic and abiotic agents. Human beings and certain animals (zoochory) unintentionally, and strong winds (anemochory) help in dispersal. The dispersed seeds remain dormant from July till November. In December the phenological cycle is repeated (Fig.2).

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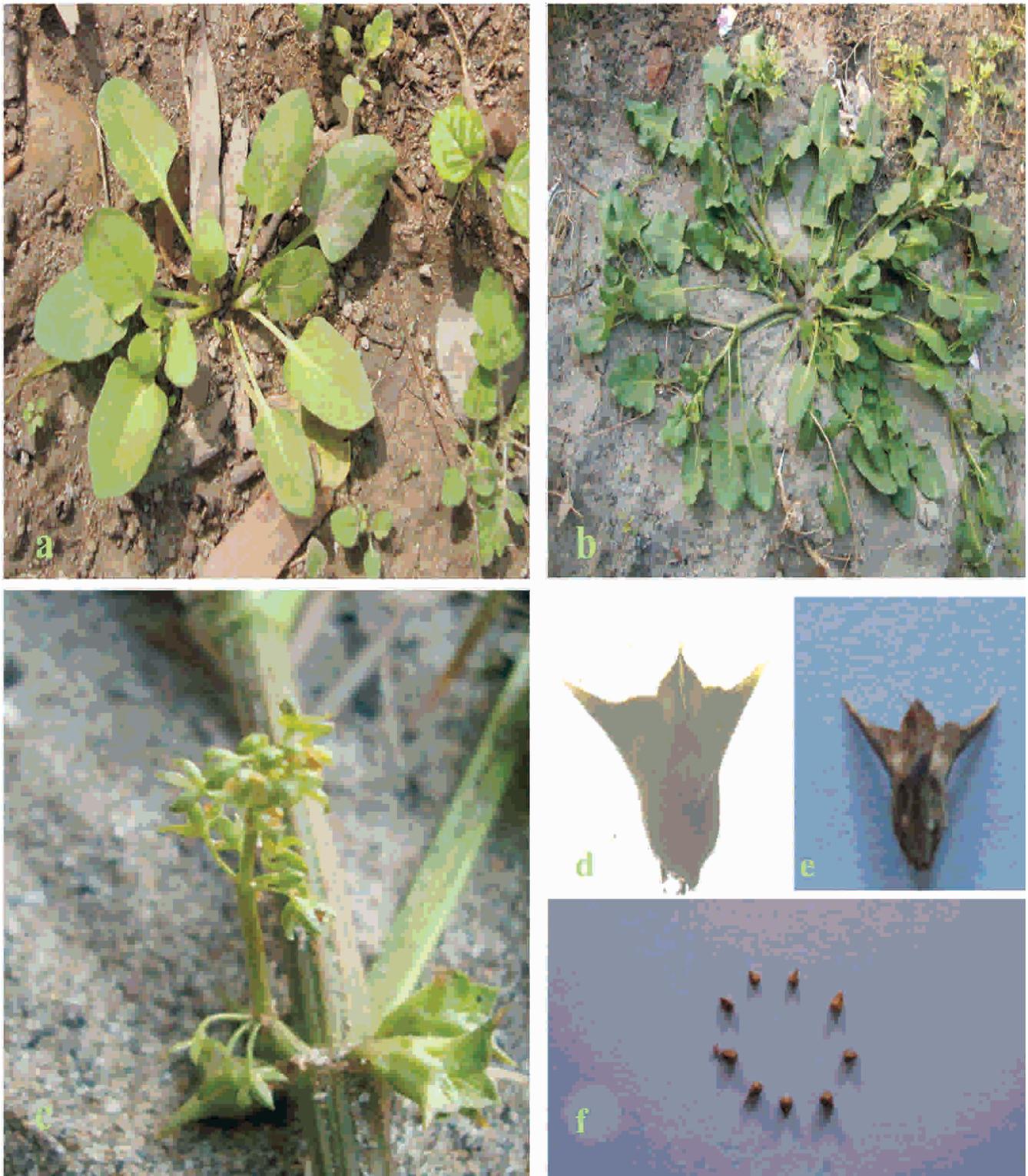


Fig.1 — *E. australis* plants in vegetative (1a) and reproductive (1b, c) phases. Note the relative position of male and female flowers at a node (1c). Fruits in immature (1d) and mature (1e) states, and seeds (1f).

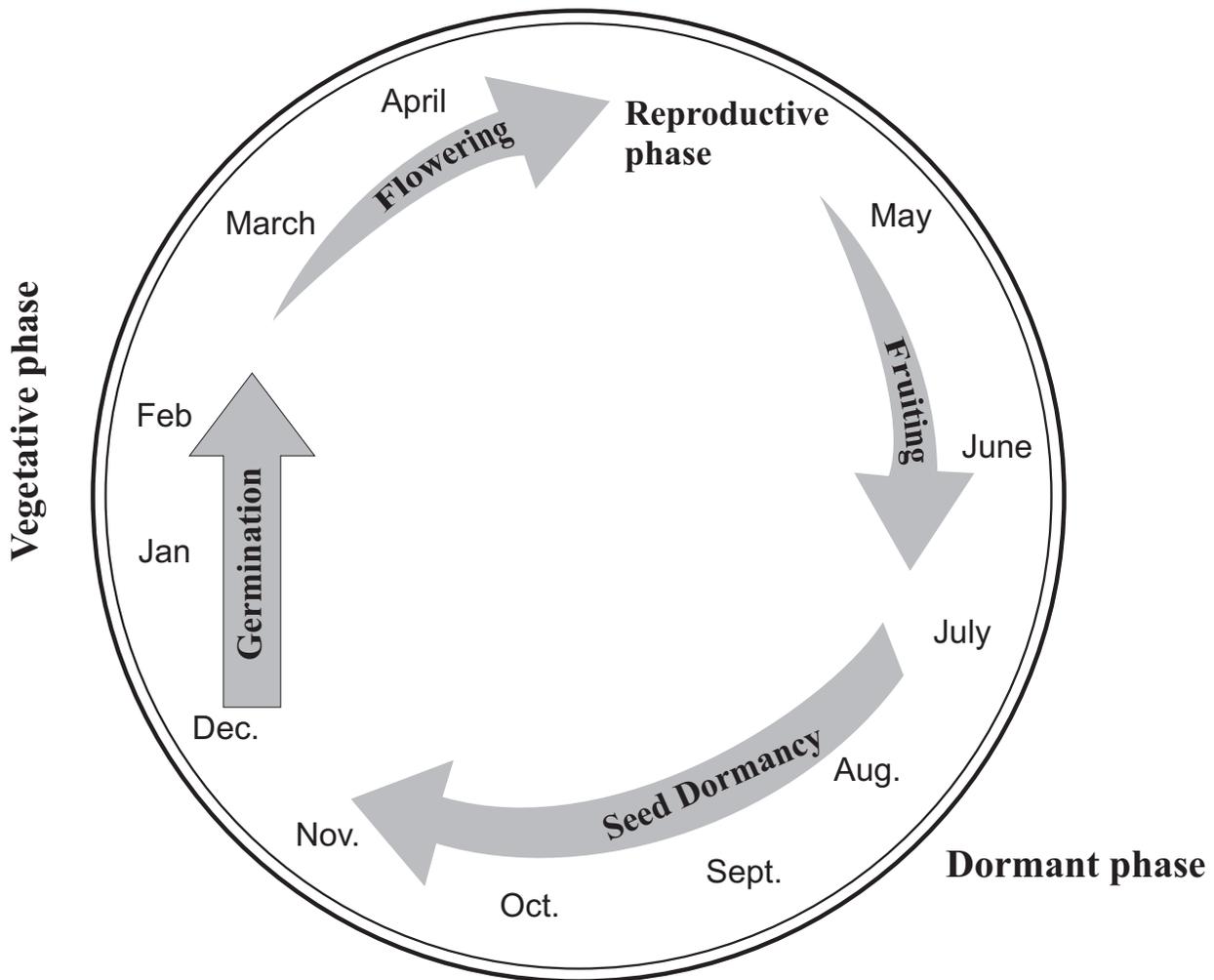


Fig.2- Seed to Seed phenology of *Emex australis* Steinh

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