

THE REPRODUCTIVE EFFICIENCY OF SPINY EMEX

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*Emex australis* (spiny emex) is a widespread and important weed in many parts of Australia. Little is known, however, of its reaction to stress due either to plant density, climate, farming practices or control measures, particularly in relation to seed production since seed is its only means of spread. Seeding is markedly reduced or prevented in some weeds under stress - Harper and Ogden (1970) found that *Senecio vulgaris* was depauperate and many plants failed to flower under extreme stress conditions.

The effect of stress produced by insect attack is of special interest in the case of *E. australis* as an attempt at biological control by this means has begun in Australia. Thus an experiment was conducted to ascertain general energy distribution in various parts of *E. australis* and whether the proportion of energy allocated to seed production was fixed or plastic under varying degrees of stress. Plants were grown in various sized pots with a 100-fold range in soil volume and harvested at various times throughout the life cycle. The plant parts were counted, weighed and their energy values determined.

Maximum biomass per plant decreased by a factor of 75 under the highest stress. Nevertheless, all plants survived under these conditions and produced stems and seeds. There were no significant differences in time of flowering but maximum calorific values, root weight, stem weight, stem to root ratio, leaf number and mature seed weight per plant were attained approximately 2 weeks earlier under the highest stress than under the lowest stress conditions. It is likely that this precocity of development in highly stressed plants would be of value even if premature death resulted.

The proportion of total biomass in roots increased with increasing stress while the proportion in stems declined. 'Reproductive effort', in terms of calories in seed over total calories in biomass, ranged from 36% to 64% for the highest and lowest stress conditions respectively. There were no significant differences in mean individual seed weights between the treatments. Number of seeds per plant ranged from 15 to 1200 per plant at the highest and lowest stress conditions respectively.

The significance of these results points to *E. australis* being a very plastic plant, which naturally enhances its status