COMPUTER SIMULATION OF CHANGES IN THE POPULATIONS OF WEED SEEDS: PORTULACA OLERACEA.

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Abstract. The level of viable seeds in the soil capable of germination is the net result of seed production and seed losses through dormancy, germination and death. The rates of gains and losses are due to a number of environmental and endogenous factors. A model can be developed that accommodates the rates of changes of the levels of components of the seed bank and the information network that describes the known and hypothesized controls of the rates of change. Such a model is useful in defining priorities of research and designing a program of weed control that could integrate a number of methods.

Viable seeds produced by plants of pigweed (*Portulaca oleracea*) consist of innately dormant and germinable seeds. For example, seeds collected in Perth, W.A., in the summer and winter of 1983 germinated 45 and 87% respectively. Apparently seed produced under long days and high temperatures were more dormant than seeds produced under short days and low temperatures. The levels of innate dormancy remained constant for 8 months when dry seeds were stored in the dark at 20°C. Seeds released from innate dormancy were enforced to be dormant by darkness and temperatures below 25°C. The optimum conditions for germination of seeds were at 35°C in the light, but a few seeds germinated in the dark at temperatures above 25°C.

Pigweed is a difficult weed to control in summer-irrigated crops of southern Australia, and seed dormancy at summer temperatures is induced by the dark due to seed burial. Lack of establishment in winter appears to be due to seed dormancy induced by low winter temperatures. Depletion of seed in the soil requires the death of germinable and dormant seed, and we have no information on the controls of these rates during winter and summer. Seed burial and subsequent death appears to be an option for weed control but requires integration with methods of crop establishment and the rotations of summer and winter crops.