SEASONAL FLUCTUATIONS IN DENSITY OF *CHONDRILLA JUNCEA*

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Harper (1967) has drawn attention recently to the inadequacy of results published on changes in plant numbers with time. Such an inadequacy is true, especially for published accounts of numbers of weeds in relation to present or future control measures. This paper reports some results on fluctuations in numbers of *Chondrilla juncea* (skeleton weed) plants obtained from 6-weekly reading of permanent quadrats at two sites for a two-year period (June 1968-June 1970). A pantograph was used to plot accurately the position of seedlings and rosettes.

Table 1 presents these results for 1 out of 6 quadrats at each site for selected dates. (The continuity of the results at Wagga was necessarily interrupted between the burning of the wheat stubble in January 1969 and the sowing of the barley crop in May 1969). The Table shows the large fluxes in plant numbers which may occur over the summer-autumn period. Some of these fluxes are due to germination and subsequent death of true seedlings, some to death of old rosettes and replacement by new rosettes.

One results of ecological significance not shown in the Table is that on no occasion did true seedlings (defined as bearing cotyledons or cotyledonary scars) survive through to seed setting. At both sites in both years the stems of many rosettes elongated but failed to flower.

The following conclusions are drawn from this investigation:

(1) Numbers of plants even in a perennial weed population are rarely constant. The effect of control measures imposed on the population must be considered in relation to environment and the seasonal flux in population.

(2) The lowest number of skeleton weed plants obtained in this work (65,000 plants per acre = 160,000 plants per hectare) is greatly in excess of the maximum number of skeleton weed plants usually observed in Europe (15,000 plants per acre = 37,000 plants per hectare - Wapshere, pers. Comm.).

(3) Absence of ecologically significant regeneration from seed in some areas of cereal cropping and, failure to flower after stem elongation emphasizes that any attempt at biological control requires the use of organisms that will effectively reduce numbers of plants already present in ecosystems and especially the vigour of root systems of plants.

TABLE 1

Number of Plants of *Chondrilla juncea* Per 2.7 sq ft (0.25 m^2) in Wheat (1968) And Barley (1969) at Wagga and Semi-Improved Pasture at Canberra

Date		
June 1968	33	17
July 1968	53 (+20)	16 (-1)
November 1968	29 (-25 (+1)	12 (-4)
January 1969	32 (-27) (+30)	13 (-3) (+4)
June 1969	8	6 (-19)# (+12
October 1969	10 (+2)	4 (-2)
January 1970	9 (-2) (+1)	4 (-3) (+3)
April 1970	34 (-6) (+31)	10 (-3) (+9)
May 1970	79 (-10) (+55)	13 (-4) (+7)

Figures in parentheses represent the number of deaths (-) and the number of replacements (+).

Cumulative deaths and replacements over the summer-autumn months.

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(4) Skeleton weed is regarded as a weed of cultivation, in that cutting of the underground organs will lead to an increased regeneration of new rosettes from below the cut. However, these and other of our results from Wagga show a marked reduction in numbers of rosettes under the 1969 crop compared with those under the 1968 crop. We invoke seasonal rainfall and density of the 1968 wheat crop to explain this result. Numbers of skeleton weed plants may increase only with long-term, continued cultivation.

ANALYSIS OF COMPETITION FOR LIGHT IN MIXED COMMUNITIES

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Analysing the effect light relationships have on the fate of individual species in mixed communities has met with only limited success. In fact, it is apparent from a survey of the extensive literature on plant competition that only a particular situation has lent itself to interpretation; this is the situation exemplified in the work of Stern and Donald for a community composed of two species of contrasting stature, in that case subterranean clover (*Trifolium subterraneum*) and ryegrass (*Lolium temulentum*). In this situation it is possible to account for the success or failure of the species of lower stature on the basis of comparatively crude measurements of the proportion of incident light penetrating the foliage of the taller species down to the position in the canopy occupied by the lower species. It is clear that few situations in crop and pasture communities are represented by this extreme example. Rather the general case is where two or more species occupy more or less the same vertical displacement in the canopy, although within it they may individually have distinctly different foliage arrangements.

The study of community photosynthetic behavious has developed rapidly over recent years to the extent that the analysis and understanding of the relation between foliage display and light