

GENERAL INTRODUCTION

Arable cultivation in the ecological sense is a very artificial set up and constitutes man's interference with the natural habitat. On arable land nature is fighting back all the time to restore the appropriate climax vegetation by a process of plant succession. Plant succession therefore, is of interest in arable cultivation because it accounts for the presence of weeds on the land.

Weeds are undesirable in arable cultivation because they depress crop yields by competition for light, water and plant nutrients. Many crop husbandry-men therefore assess weed control measures by their reflective increase in yield. With the use of herbicides it is necessary that the status of individual species in the weed complex be known for an effective and economic weed control, because certain herbicide would only kill certain weeds. This status is best ascertained by quantitative methods.

Where land is rested in arable rotation a knowledge of weed succession may have considerable indicator value. They can be the basis for determining how long the land had been rested. Their composition may reflect the nutritive status of the soil with respect to various soil nutrients, soil aeration and soil acidity. In fact, in peasant agriculture it is their only basis for land utilization.

Where arable land is grazed during the resting period, measurement of characteristics of the vegetation which follow would be desirable for establishing their climatic and edaphic relationship. Trends in the development or deterioration with grazing and other treatments would be of interest for determining what stage in the natural plant succession is most productive in the maintenance of stock.

Qualitative methods give a quick, easy means of obtaining these information about vegetation, but they do not give the exactness necessary for scientific analysis. Quantitative methods are therefore of much more value and are likely to be used more in the future.

This investigation was undertaken by a group of three students to study weed succession on arable land and the effect of selective herbicides on such a succession. The methods used in collecting data from the field and their interpretation were my particular concern in the investigation. For the other aspects of the investigation, D.T.A. Reports, Muchangwe (1959) and Cruickshank (1959) should be consulted.

3. Number

4. Weight.

Penfound (1945) condemned frequency for being an artificial concept and unreliable in view of the fact that frequency relationship between species varied with quadrat size, number of species and total plant cover. Tensley and Chipp (1926) considered it a quick and easy method and recommended it for use in a reconnaissance survey, particularly in a new country where one wants to get acquainted with the vegetation in a superficial way.

Penfound (1945) found NUMBER a more reliable concept to use than frequency in the sense that Density relationship of species did not change with quadrat size and total plant cover. But the procedure can be very laborious and the problem of counting tiny individual seedlings in a weed population can be great.

WEIGHT, a very useful concept in assessing productivity, has been used a lot in grassland work in Great Britain, Russia, India, South Australia (Brown 1964). The method is laborious, specialized and expensive, and has very little economic application to weed investigations on arable land.

Area or Cover, apart from being the most reliable concept to use, in comparison with NUMBER and FREQUENCY (Penfound 1945), is the most important ecologically. Sauer (1943) concluding his statistical analysis of Chaparral and other plant communities was of the same conviction when he said "It is coverage rather than number of plants or frequency of occurrence of vegetation that determines dominance and gives character to a community." Cover in plants may be measured by both leaf spread and basal area, but