

SEED DISPERSAL ON FOOTWEAR

H. T. CLIFFORD

The Durham Colleges, University of Durham)

The presence of seeds in the mud scraped from the feet of birds has often been demonstrated. There are, however, few reports of the seeds or other propagules found in the mud which may accumulate on footwear. As Sir Edward Salisbury was reported to have stated (*Yorkshire Post*, 4th November 1954), such reproductive structures may be present in great numbers, especially on the footwear of those who work in the country. Furthermore, the presence of seeds on footwear may result in their transport to places far from where they were collected.

On the return to England of the Durham University Exploration Society's Eire Expedition in 1954, the members were asked to scrape off the mud from any footwear worn on the expedition but not since their return. The samples of mud received were placed on pots of sterilised soil in an unheated glasshouse. They were kept damp and within a few days seedlings began to germinate. From the 22.1 gms. of dry mud sown, 65 plants were raised among which the following were identified:

Aira praecox, *Anthoxanthum odoratum*, *Bellis perennis*, *Carex* sp., *Festuca* sp., *Juncus bufonius*, *J. effusus*, *Plantago lanceolata*, *P. major*, *Sagina procumbens*, *Vulpia bromoides*.

Similarly, from boots not worn since their wearer's return from Madeira 2.5 gms. of mud were obtained. This yielded 10 seedlings, all of which unfortunately died before being identified; they comprised 4 dicotyledons and 6 grasses.

Many samples of mud from the writer's footwear and that of friends have been tested. Only a few of these failed to produce plants within the three months for which each sample was tested. A list of the plants identified from all the samples tested is given in the accompanying Table.

TABLE I

PLANTS RAISED FROM MUD OFF FOOTWEAR

<i>Agrostis stolonifera</i>	<i>Capsella bursa-pastoris</i>
<i>Aira praecox</i>	<i>Cardamine pratensis</i>
<i>Anthoxanthum odoratum</i>	<i>Carex</i> sp.
<i>Atriplex patula</i>	<i>Cerastium</i> ? <i>semidecandrum</i>
<i>Bellis perennis</i>	<i>Galium hercynicum</i>
<i>Bromus mollis</i>	<i>Chamaenerion angustifolium</i>

<i>Chenopodium album</i>	<i>Poa annua</i>
<i>Cirsium arvense</i>	<i>Polygonum aviculare</i>
<i>Crataegus</i> sp.	<i>Prunella vulgaris</i>
<i>Deschampsia cespitosa</i>	<i>Ranunculus acris</i>
<i>Euphrasia</i> sp.	<i>R. repens</i>
<i>Festuca ovina</i> subsp. <i>tenuifolia</i>	<i>Rubus</i> sp.
<i>Glyceria fluitans</i>	<i>Sagina procumbens</i>
<i>Gnaphalium uliginosum</i>	<i>Senecio jacobaea</i>
<i>Holcus mollis</i>	<i>Spergula arvensis</i>
<i>Juncus bufonius</i>	<i>Stellaria media</i>
<i>J. effusus</i>	<i>Taraxacum officinale</i>
<i>J.?</i> <i>articulatus</i>	<i>Trifolium repens</i>
<i>Lolium perenne</i>	<i>Urtica dioica</i>
<i>Matricaria maritima</i> subsp. <i>inodora</i>	<i>Viola arvensis</i>
<i>Plantago lanceolata</i>	<i>Vulpia bromoides</i>
<i>Plantago major</i>	

From the Table it can be seen that plants with many different types of dispersal mechanism may be carried on footwear, and it would appear that many species are capable of being so dispersed. There would be little use discussing the number of individuals of each species that appeared during the tests as this depends upon several factors, including the amount of mud available for testing, the season of its collection and the type of habitat from which it was derived. Nevertheless, it is perhaps of interest to note that *Poa annua* occurred in more samples than did any other species; the greatest number of seedlings obtained from a single sample was 176.

As the samples were all taken from footwear that had travelled a considerable distance from where the mud was acquired to where it was scraped off, it is evident that large numbers of seeds may be dispersed on the footwear of travellers. This is fairly obvious, but as has been said by Ridley (1930), "Though it is highly probable that most of the seeds of the herbs common on roadsides and ploughed fields owe much of their distribution to their becoming attached in mud to the feet of men and domestic cattle, the amount of actual proof of this is not great".

The data presented above are a contribution to the analysis of this problem. They differ somewhat from those usually presented in that they have been obtained by cultivation. Some previous workers have postulated a pedestrian dispersal for certain plants after studying their distribution and usual habitats, while others such as Praeger (1915) have identified the seeds present in mud scraped from footwear. The former of these methods is unreliable in that it offers no conclusive proof of pedestrian dispersal, and the latter method does not show the

seeds to be viable. Using the technique described above these difficulties are partially overcome, though unless the experiment is conducted for a long time, dormant seeds will be overlooked.

REFERENCES

- PRAEGER, R. L., 1915, A Biological Survey of Clare Island in the county of Mayo, Ireland, *Proc. Roy. Irish Academy*, **31** (1), 47 & 54.
RIDLEY, H. N., 1930, *The Dispersal of Plants throughout the World*. London.