

The spores of smut fungi are minute, round or roundish plant cells, much finer and lighter than road-dust or other atmospheric impurities, and are readily caught by slight air currents, by means of which they are disseminated. The wind as an agent for the dispersal of spores seems often to be regarded as a far more important factor than it really is. No doubt, where badly infected grain is threshed, the wind may play an important role as a dispersing agent of the spores which may issue from the threshing machine in the form of black clouds of spore dust, but the matter is different under more natural conditions, i.e., in the field. Experiments demonstrating the distance of the dispersal of spores produced in a smutted grain field have been carefully conducted in widely different localities (Russia, Germany), and coincided so closely in their results that the conclusions arrived at may be considered reliable. It was found that no smut spores could be demonstrated in 'spore traps' farther distant from badly infected fields than 250 yards. Prof. Buller, of the University of Manitoba, in his able 'Researches on Fungi,' expresses his opinion as follows: 'The wind, when travelling several miles an hour, must frequently carry the spores from a fruit body (speaking of higher fungi) for very long distances. Owing, however, to their steady fall at the rate of 0.5-5 mm. per second, sooner or later all spores must reach the earth. The larger the spores the sooner they will settle.'

The wind is, no doubt, one of the natural factors concerned in the dissemination of fungus spores, but the smut diseases are not entirely spread by that agent. The hairiness of the wheat grain (see plate 1, fig. c. d), the small cracks or deep lines in the hull of the oat, the rough seed coat of barley, provide sufficient means for the adhesion of spores. By sowing such infected seed the disease is naturally spread. Or the smut spores may ultimately reach the soil by way of infested manure, farm implements, or machinery covered with fungus spores. The smut spores will also find their way into the barn, will infest the grain bin and contaminate new grain that may have been quite free from it previously. Care should also be taken to use clean bags, especially for seed that has been treated, or re-infection with smut spores is liable to take place. The old bags that have contained smutty grain may be freed from the spores by dipping them into a strong formalin solution, or into boiling water, when, after drying, they may be safely used again. All these points should be borne in mind particularly where smut-infected grain is threshed.

*Threshing machine, an important agent responsible for the spread of smut diseases.*—We cannot conclude our discussion of the ways and means of dispersal of spores without referring to the practice in vogue of moving threshing machines from one farm to another. While in ordinary farming practice no doubt of very great benefit in dealing with the problem of threshing grain, this practice forms one of the most important agents responsible for the wide distribution of smut diseases and their introduction at times to farms previously quite free from smut. A machine which has been used for threshing smutted wheat is so fully infested with spores that any grain subsequently threshed—unless the machine is properly sterilized after use—will become liable to infection.

The importance of the threshing machine in serving as a means of disseminating weeds, is to some extent recognized, as may be seen by the 'Weed Acts' in force in some provinces, making it compulsory for the men in charge of the threshing machine to clean it, as well as the wagon and racks or any other part of the outfit, before removing them from a farm. But as regards the dissemination of smut diseases, the necessity of making it compulsory to fumigate the outfit is by no means adequately dealt with. A machine which has been used for threshing grain infected with smut will contain millions of smut spores which it will scatter all over the fields or roads over which it travels, besides infecting the next lot of grain to be threshed. The successful control of smut diseases will depend very largely upon the exercise of every care and the adoption of means by which the possible ways of dissemination are controlled. The method of treatment alone will not dispose of smut diseases; it also is necessary to