

Dispersal of spores before harvest.—The dispersal of the ripe spores takes place during the time of flowering, or at any rate before harvest-time. The spores (plate 8, fig. 2), are exceedingly light and are easily blown about when they will be caught by the loose, open glumes of the flowering oat plants in which they are held fast and become entrapped between the 'hull' and the kernel, as the latter increases in size. The amount of spores produced depends upon the rate of infection of a field of oats. When badly affected, the oat field will assume a much darker colour, owing to the presence of so many heads of smut. Where this is the case, the grain which is harvested will be badly infected with smut spores, and in oat smut we may regard the threshing machine as one of the most important factors for spreading the disease. It is very important not to permit the use of a threshing machine for any grain, whether oats, barley or wheat, unless the machine has been very carefully cleaned before it enters new premises.

Intensity of oat smut depends upon certain conditions.—When affected oats are eventually sown, without being treated for smut, the intensity of the outbreak is affected by certain climatic conditions which may prevail at the time of sowing. The maximum temperature at which oat smut spores germinate is comparatively high, hence, when the weather following the time of sowing is warm, the result may be a considerable infection, whereas if cold, the crop may be affected to a far lighter degree.

Germination of spores (plate 8, fig. D; 1-3).—The naked smut spore of oats is practically of the same size as the loose smut spores of wheat and barley, and resembles it in microscopical details, as, for instance, in being very finely dotted all over the surface. Its biological development, however, is similar to the covered smut of barley. On germination, the spore produces a septate promycelium, which produces a more or less large number of secondary hyaline conidia, which reproduce themselves, under favourable conditions, indefinitely, in a yeast-like manner. These conidia later on send out a germ tube by which the young oat plant becomes infected (Plate 8, fig. D, 3). The life of the spores is of long duration; records exist of their keeping alive for over seven years. From these observations, we may conclude that the immediate destruction of the spore would result in the control of this smut.

Method of control. Formalin preferable.—Owing to the protection of the oat by the hull, the bluestone treatment has not been found efficient, as a longer action of this chemical becomes necessary which will cause serious injury to the grain, whereas formalin possesses a sufficiently penetrative action and its application has controlled this smut very satisfactorily. The same treatment is recommended as described for stinking smut in wheat.

6. COVERED SMUT IN OATS.

(Plate 5, Fig. a.)

Care in distinguishing principal features of smut diseases emphasized.—A thorough knowledge of the biology of the smut fungi is, of course, necessary for the adoption of correct methods of treatment. From the farmer's point of view, it is only necessary to recognize the various different kinds of smut which require different methods of treatment, i.e., it is most important to distinguish, for instance, between loose smut and covered smut of barley. A mistake may result in using formalin or bluestone in the treatment of loose smut, which we now know cannot be controlled by these means at all.

The two oat smuts closely resemble each other.—As far as the two kinds of smut in oats are concerned, their life histories are practically the same. The one is as