

As in loose smut of wheat, this smut completely destroys the grain and the spores appear as loose powder at the time of flowering of the barley. In the earlier stages, the affected ear may resemble covered smut owing to a fine covering skin which may be present, but this skin is hardly ever found unruptured at harvest-time, when there will be left only the empty axil of the ear, and in bearded barleys the curved, twisted awns.

The life history is like that of loose smut of wheat. There are no secondary spores but more or less richly branched infection tubes which vary somewhat in breadth. The spores of this fungus (plate 8, fig. 7), though practically the same size as those of its near relative in wheat, show under the microscope one-half to be brownish in colour and the other distinctly paler, while the whole surface is finely dotted. The differences which are demonstrable are very slight.

The loose smut of barley produces flower infection only. The germ of the disease is carried within the barley grain. As regards control, the treatment recommended for loose smut of wheat applies in this case, i.e., the growing of selected grain on small plots, preceded by hot water treatment.

SMUT DISEASES OF OATS.

(Plate 5.)

Oat smut causes greatest loss.—Generally speaking, smut prevails in oats to a far greater extent than in wheat and barley. There is no excuse for suffering this to still further increase. There may be some excuse for the presence of loose smuts in wheat and barley, owing to the difficulty of controlling these smuts, but oat smut responds so readily to treatment that its presence may be regarded as a manifestation of neglect on the part of the farmer to thoroughly treat his grain before sowing.

Two smut fungi concerned.—In Canada we may observe occasionally two different smut fungi producing 'smut' in oats, viz., 'loose' or, better, 'naked' smut, to avoid confusion with the true loose smuts of wheat and barley, caused by the fungus *Ustilago Arenae* (Pers.) Jens., and 'covered' smut which is due to a closely related fungus, *Ustilago levis* (Kellerm. & Swingle) Magnus. The former is far more common. From their life history and their close biological relationship, we will see that both kinds of smut may be prevented on the same lines as suggested for stinking smut of wheat and covered smut of barley.

5. NAKED SMUT OF OATS.

(Plate 5, Fig. b.)

Appearance in field.—This species of smut destroys the ears of oats, and appears in the form of an almost black powder while the plants are still growing. The first indications of its presence are the peculiarly stunted ears which develop in some instances. The normal ear will spread out far and carry its grain in a graceful manner; the diseased ear does not open out, but the glumes containing the spore powder stand erect and close to the centre axis. No doubt the ripening grain gaining in weight accounts largely for the spreading panicles. In some instances, the fungus is capable of growing on the uppermost leaf of the oat plant, enclosing the ear. We have observed recently a case where long black stripes were produced in the leaf tissue, which eventually burst open and contained masses of spores. This appearance reminds the investigator at first of the common 'leaf' smut in rye (*Urocystis occulta*).