

Dr. McAlpine, the Plant Pathologist of the Government of Australia, reports that wheat treated with 1 pound formalin in 40 gallons of water loses its power of germination, to some extent at least, after being kept a few days; that this effect is cumulative, for a time at least, but gradually disappears after, say, four to five weeks.

The injurious action of bluestone on the vitality of grain is generally established, and if the treatment as recommended is not carefully carried out, or if there exists any doubt about it at all, it is advisable to sprinkle the grain, after treatment with bluestone, with lime water (1 pound of lime to 10 gallons of water strained through cheese-cloth) which will greatly reduce any injurious action.

2. LOOSE SMUT OF WHEAT.

(Plate 2, Fig. d.)

Appearance in field.—The observant farmer will be acquainted with another 'smut' disease in wheat very different from stinking smut. This kind of smut becomes noticeable in the field at the time when the ears are being formed, when some will be found covered with a black, sooty powder, which is, when ripe, readily shaken off on touching. At a later stage, only the central axis of the ear will be left, and no grain will be produced. This smut is the loose smut of wheat, and is readily distinguished from stinking smut by the distinctly black spore powder which is produced 'loosely,' i.e., without any covering, as is the case with smut balls in stinking smut.

Related, but biologically distinct from loose smuts of barley.—The loose smut of wheat is closely related to loose smut of barley. Though very much alike, however, in appearance, the two fungi causing the loose smut diseases in wheat and barley are as distinct from each other as the two plants on which they grow. It may be said here that only comparatively recently was it found that all the various forms of smut in grain are quite different from each other. Cross inoculations, i.e., infecting, for instance, a wheat plant with smut from barley, or an oat plant with smut of wheat, clearly proved this fact, as under no circumstances was it possible to produce a smut disease with spores taken from a different host plant. This behaviour gave rise to very careful researches into the life history of the smut fungi which afforded ample confirmation of this experience.

Although so much alike to the naked eye, and somewhat alike when viewed under the microscope, the spores of the various smut fungi produce plants as widely different, biologically, as the plants of cabbage, cauliflower, rape, turnip and other cruciferous plants, which have seeds so much alike that they can hardly be distinguished, except by certain microscopical features.

A study of the life history of the loose smut of wheat will clearly reveal its nature.

LIFE HISTORY OF LOOSE SMUT OF WHEAT.

Loose smut of wheat is due to a fungus technically known as *Ustilago Tritici* (Pers.) Rostr. When harvesting a field of grain in which we have noticed a number of ears affected with loose smut (plate 2, fig. d), we will be surprised to find no evidence of the disease except the dry central axis, which was formerly densely covered with the black spore powder. It is indeed a fact that most of the smut spores have disappeared. The absence of spores is somewhat unfortunate because it is likely to cause indifference. Where have these spores disappeared to? The question is very simply answered: the wind, waving the grain about, blew off the loose spore powder. Millions of spores that are produced in each head will be carried by the wind and will settle upon all parts of the neighbouring plants, upon the soil and wherever there is the slightest degree of moisture which will hold the spores.

Spores ripe before wheat is in flower.—On carefully looking into the subject, we will notice that the smut spore powder is produced before, or just at the very time,