

## STINKING-SMUT OF WHEAT.

### I. THE EFFECT ON GERMINATION OF SOME SEED-DISINFECTANTS.

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THE disease of wheat known as stinking-smut, sometimes called covered smut or bunt, is due to one or both of two closely allied fungous parasites, *Tilletia Tritici* (Bjerk.) Wint. and *Tilletia levis* Kuehn. From the earliest historical times, and in all countries, it has caused greater aggregate loss to the grower than any other wheat-disease, and in New Zealand it is still the most formidable enemy of the wheat crop. Where no preventive measures are taken stinking-smut may take anything from 5 per cent. to 40 per cent. of the crop; and, further, even a small percentage of smutted heads lowers greatly the market value of the wheat, rendering it unfit for milling, while badly smutted lines are unsuited even for use as fowl-feed.

Fortunately, since the discovery of the hot-water, bluestone, and formalin treatments of the seed-wheat it has been possible, under such conditions as prevail in the New Zealand wheat-growing areas, to reduce the amount of stinking-smut normally present to very small proportions.

In New Zealand the main, and possibly the sole, cause of infection is by means of spores of the fungus which become attached to the seed during harvesting and threshing. When the seed is sown the fungus-spores germinate at about the same time as the wheat-seed, and, sending out germ-tubes, which penetrate the tender seedlings, become established in the tissues of the growing plant. As the wheat-plant grows, the fungus grows with it, showing no outward sign of its presence until flowering-time, when it establishes itself in the young wheat-grains. Here the fungus grows rapidly at the expense of the food material stored in the grain, finally converting the whole contents of the seed-envelope into a black mass composed of millions of the fungus-spores. The name stinking-smut is derived from the peculiar rancid smell given off by these "smut balls," which imparts a distinctive mustiness to flour milled from wheat in which they are present in any quantity. As the outside coat of the grain is still intact it is only by fairly close observation of the wheat-ear that the presence of the smut can be detected. When the crop is harvested and threshed the smut balls are more or less broken, distributing over the clean wheat their millions of contained spores, which adhere so tenaciously that no mechanical cleaning process will remove them.

In countries where a summer fallow system is practised, notably in north-western America, infection of the soil by wind-borne spores liberated from the threshers becomes, in some years, a factor of great importance in the spread of smut. If the autumn wheat is sown in