

TREATMENTS FOR THE CONTROL OF SMUTS IN CEREAL CROPS

THE cereal smuts of oats, wheat and barley cause heavy annual losses, which now more than ever must be prevented. Smut fungi are of two types, perpetuated by (1) spores carried on the exterior of the seed or (2) fungous threads (hyphae) embedded in the tissues of the seed. These differences govern methods of treatment.

Oat Smut

The oat is susceptible to loose-smut (*Ustilago avenae*) and covered-smut (*Ustilago kollerii*), both of which are readily controlled by treatment with organic mercurial dusts. The fungous spores producing loose-smut of the oat are carried by the wind from smutted to clean heads, usually at about the time the grain in the healthy ears is nearing maturity. Infection arises through one or more spores lodging in the enveloping husk, where the spore remains, if untreated, until the next sowing season. It then germinates along with the germinating grain, and the fungous hyphae penetrate and grow along with the oat plant. Infected plants may indeed be wholly indistinguishable from others, although in some cases they are said to grow even more vigorously.

At about the time the grain in the ear should be maturing the familiar brownish-black smut heads appear in the diseased plants, and the smut spores are wind-borne to continue the fungous life cycle by reinfesting

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healthy ears. Eventually, only the bare and barren oat straws remain. Covered-smut of the oat replaces the grain by a mass of smut spores, but, unlike loose-smut, the spores of which are carried away on the wind, covered-smut spores are spread at threshing when the smut masses are broken and distributed through the grain. As both infections are carried externally and do not develop further until the next sowing season, dusting or pickling is an effective means of control.

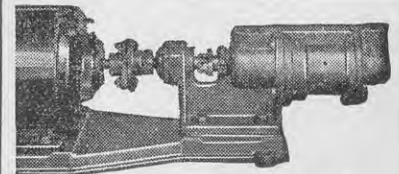
Loose-smut Of Wheat

In contrast, loose-smut of wheat (*Ustilago tritici*) differs in its mode of infection in that the spores, while also wind-spread, are liberated principally in the early flowering stage of the crop. They lodge on the floral parts of healthy ears, immediately germinate, and produce hyphae, which penetrate the ovarian tissues, remaining there in a dormant state while the grain matures normally. Such infected grain is indistinguishable from healthy grain. When infected seed is sown the fungus grows parasitically along with the wheat plant, and converts the developing grain into masses of black smut spores. Once

again the wind disperses the spores to other plants, leaving barren stalks. Loose-smut of barley is caused by the same fungus.

The covered-smut of wheat (*Tilletia foetens* and *T. caries*) and barley (*Ustilago jensenii*), familiar from the masses of spores held within the skin, which in healthy plants envelops the grain, are recognisable by their offensive and fishy odour. From this characteristic they are commonly known as "stinking-smut." Infection seriously lessens the value of the crop for milling purposes. The masses of spores are liberated at threshing, and contaminate healthy grain. As the spores adhere to the outer seed coating and do not develop further until sowing time, they are readily controllable by surface treatment with organic mercurial or copper carbonate dusts.

Because they are internally seed-borne infections, the control of loose-



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