

cut off all means of infection. It is very advisable to make it compulsory not only to clean the machine after use in order to prevent the spread of weeds, but to clean it also from the disease germs of smut. In the absence, at present, of any legal enactments farmers are strongly advised to insist upon the use of clean machines, and not of those which are liable to introduce diseases which it will cost much more time and money to control, than that required for the initial cleaning of the machine.

Where a farmer has succeeded by years of careful treatment in eliminating or practically eliminating the smut diseases from his farm, the use of a smut-infected machine will undo the work of years during one single process of threshing.

We realize that the time during which such cleaning operations would have to be performed is probably one of the busiest of the year, and also that many hundreds of threshing machines may be at work at one time, but this fact emphasizes rather than diminishes the necessity of guarding against the spread of smut diseases. We suggest that it be made compulsory, and that the provincial authorities be induced to pass the necessary legislation for cleansing threshing machines thoroughly before using them on new premises. The operation which would be required to destroy the smut disease germs is as simple as it is effective. After sweeping the machines inside and out to get rid of the weed seeds, the foreman of the gang should immerse some old bags or sackings in formalin—one pound to one gallon of water—and place them inside the machine, after which, all openings should be closed or covered up to retain the formaldehyde which evaporates. If thoroughly air-tight, or as air-tight as possible, the fumes will very effectively destroy the vitality of any smut spores while the machine is travelling from one farm to the other. After five to six hours fumigation, the inside of the machine contains no living smut spores. The outside of the machine, wagon, racks and any implements, etc., in use may be rapidly sterilized by means of an ordinary knapsack sprayer filled with the formalin solution mentioned before. The whole procedure would not require more than one-half hour after a little experience, and would cost only a slight amount.

The farmers should insist on seeing this treatment carried out, and the thresher should be provided with a card setting forth that this treatment was carried out before leaving the farm, which card should be signed by the farmer and be demanded by the next farmer on the list, when the machine arrives on his premises. Farmers by exercising such care would greatly aid in the reduction of smut diseases throughout important grain-growing areas.

*The vitality of the smut spores.—(a) Natural.*: The spores of certain smut diseases which reproduce entirely by spores, as, for instance, stinking smut of wheat, covered smut of barley, the oat smuts, etc., are very long-lived; under certain favourable circumstances, the spores may retain life for seven or eight years. In a dry condition, they are also exceedingly resistant to frost. Where reproduction depends on spores only, nature has endowed them with great powers of resistance, but where so-called vegetative reproduction occurs—as in the true loose smuts—the spores lose their vitality after five to six months. In these cases, there is no necessity for a long life of the spores, inasmuch as the fungus is dependent for reproduction upon the mycelial filaments within the tissues of the seed, as will be explained later. The question of the longevity of the spores, of course, closely concerns the control measures for the various smut diseases. It also clearly proves that storing grain infected with smut spores would reduce the germinative power of the seed rather than that of the spores, at any rate no advantage would be gained from such a practice.

*(b) The vitality of spores passing through the bodies of animals.*—The next point to consider is the germination of spores which have passed through the bodies of animals fed on smut-infected food. This point is of practical importance, considering the fact that animal manure contains ingredients having a decidedly beneficial influence on the germination of smut spores, and thus they may retain their power of infection for a considerable period, when eventually such manure is spread on land.