

Jensen's original hot water method has been considerably modified owing to the advanced researches, particularly of Appel, who demonstrated that soaking the grain previous to the real hot water application is of decided advantage. We have explained the scientific principles of such treatment, and will quote some interesting figures given by Dr. Appel* which show the results very convincingly.

It was first necessary to demonstrate whether previous soaking followed by the main treatment would reduce the smut disease and what temperature would be the most advantageous. Wheat was soaked for four hours, or the time which it took the spores to germinate at 77° F. Various temperatures were used; the wheat was then treated with hot water in the usual way, with the following result:—

Temperature of water of preliminary soaking..	34° F.	48° F.	64° F.	86° F.
Percentage of smut in field plot noted..	4.6%	3.1%	1.1%	0%

The percentage of smut in an untreated check plot was 4.0%.

In addition, Dr. Appel investigated the question of the length of time necessary or most advantageous for the preliminary treatment. Some of the same wheat served the purpose as used in the first experiment.

Length of preliminary treatment...	2 hours.	4 hours.	6 hours.
------------------------------------	----------	----------	----------

Percentage of smut in field plot noted...	2.7%	1.1%	0%
---	------	------	----

In this experiment the temperature of the water was 64° F.

The conclusion drawn from the above experiments, of which a considerable number were performed, is as follows:—

'It is thus shown that a reliable method for the control of loose smut of wheat (and barley) has been discovered, viz., soaking the grain for a period of from 4 to 6 hours in water of a temperature from 68° F. to 86° F., followed by a treatment with hot water at a temperature not below 122° F. and not above 129° F.'

The next point to consider is the length of time required for the 'main' treatment, i.e., the exposure to the hot water. This will depend to some extent upon the facilities for maintaining the correct temperatures, but the general rule is 10 minutes at an even temperature of 124°–125° F.

We have endeavoured to explain in the foregoing lines the reason for the various manipulations, believing that the successful control of any enemy of plant life depends largely upon a thorough acquaintance with its nature or life history.

The farmer will immediately realize that there are some serious objections from the practical point of view to this treatment, but then it must not be forgotten that at the present time this method is the only one known to control loose smut. After all, the apparent difficulties may be largely overcome by systematic work, and, by the exercise of care, this treatment will give highly satisfactory results. We will now carefully describe the carrying out of this treatment.

SIMPLE METHOD FOR HOT WATER TREATMENT.

(a) PRELIMINARY TREATMENT (SOAKING).

Apparatus required.—1. One reliable thermometer; the ordinary bath-tub or room thermometer is very undesirable for this purpose, but a good dairy thermometer will serve the purpose well.

2. One large wooden barrel or any kind of metal tank or large vat.

3. A number of good strong grain bags which will allow the water to pass through rapidly.

4. Some kind of stove, boiler or fireplace to heat the water.

* Otto Appel, *Theorie & Praxis der Bekämpfung*, &c., Ber. D. Bot. Ges., Vol. 27, Heft 10, 1909.