

SMUT INFECTION EXPERIMENTS.

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Experiments were undertaken during the summer of 1901 to test the comparative susceptibility of maize (dent corn, pop corn, and sweet corn) and sorghum (Saccharine sorghum, Kaffir corn, and broom corn) to the same species of smut found on different hosts. Both the sorghum seed-smut (*Cintractia sorghi*) and the head-smut (*Cintractia reiliana*) were used.

Three rows each of dent corn, pop corn, sweet corn, Kaffir corn, sorghum and broom corn were planted. One row of each set of three was planted with untreated seed as a check row. Another row of each set was planted with seed rolled wet in sorghum head-smut (*Cintractia reiliana*) obtained from sorghum. The remaining row of each set was planted with seed rolled in the same species of smut obtained from maize.

In the same manner Kaffir corn, sorghum and broom corn were used, being treated with the sorghum head-smut (*Cintractia sorghi*) grown on the two hosts sorghum and broom corn.

Thorough precautions were taken in treating the seed and interesting results were expected. Unfortunately severe drouth and abundant chinch-bugs blasted hopes and experiments alike. Only one specimen of *Cintractia reiliana* was obtained, namely, on pop corn. So few stalks infected with *Cintractia sorghi* were obtained that no conclusions can be drawn. Experiments along these lines are now being carried on in the botanical greenhouse from which some satisfactory results are being obtained and which will be reported later.

A few stalks of sorghum artificially infected two to three years ago, and still growing, continuously produce infected panicles.

An illustration of one of the specimens planted January 1st, 1899, is here given. This illustrates the fact that infection takes place through the seed, first shown in 1891.* It also demonstrates that the mycelium, permeating throughout the entire plant, is perennial or at least is coexistent in duration with the host—the latter grown as an annual in our climate, but when protected, as has been the greenhouse specimen, it may continue to live a long while.

The other experiments, which are enumerated below, relate to corn smut (*Ustilago zaeae*); the primary object being to determine the effect of mutilation of the host upon the prevalence of the smut. Work of this kind has been reported by Hitchcock,† Clinton‡ and others.

* Kellerman, W. A., Bulletin Kans. Exp. Sta. No. 23.

† Bot. Gaz. 28, 429, 1899.

‡ Ill. Exp. Sta. Bull. 57, March, 1900.

The corn selected for the experiment was growing on the Ohio State University farm and was in good healthy condition. At the beginning of the experiment, July 30, it averaged about six feet in height and was partly in tassel.



Fig. 1. Sorghum, 3 years old, artificially infected through the seed.

In order to keep the different parts of the experiment as distinctly separate as possible every twentieth row was chosen and the second row west of this was taken as a check-row.

Row No. 1.

Each stalk in this row (972 stalks in all) was mutilated on east side, but at no given height, by being scraped with a piece of broken hack-saw blade. The work was done in late afternoon, between 6 and 8 P. M. A fairly heavy dew followed but no rain for several days.

Results: 15 per cent. of the stalks were smuted while the corresponding check-row showed but 9.7 per cent affected. The percentage of smut on the ear, as compared to the total smut on the whole plant, showed that of the total smut on the mutilated row only 29.2 per cent. was on the ear, while the check-row on the other hand showed 32.9 per cent. The difference is probably due to the fact that the ears

were not developed sufficiently to be affected by the mutilation; *i. e.*, the stalks were mutilated while the ears were not. The position of the smut balls in relation to the wounds was quite

significant. 34.2 per cent. of the smut balls were either *on* or *within six inches* of the wound but within the next six inches above and below the wound only 13.6 per cent were to be found.

Row No. 2.

Each stalk (842 in all) was mutilated as in No. 1 and then smut spores immediately brushed on or painted over the wound. The smut used had been kept dry in a tight box since the fall of 1900. The work was done after 5 P. M. and was followed by a good dew but no rain soon.

Results: 11.5 per cent. of these stalks were smutted against but 8.5 per cent. in the check. The relative position of the smut in this part of the experiment was, however, quite significant. 59.8 per cent. of the diseased stalks were infected within six inches or upon the wound, while, in the next six inches above and below the wound, only 17.5 per cent. of the bolls were to be found.

Row No. 3.

Each of these 806 stalks was painted at some place with spores as in No. 2 but none were mutilated. This was done in early evening and although followed by no dew, a fine mist fell the next morning.

Results: 10.4 per cent. of the stalks were smutted against a check of 8.6 per cent. Also the percentage of smutted ears to total diseased stalk was again significant; in the check-row 20.9 per cent. while in the infected row it was but 16.6 per cent.

Row No. 4.

This row was detasseled during the partly cloudy forenoon of August 3.

Results: 11.5 per cent. of the stalks were diseased against a check of 9.5 per cent. The percentage of the total diseased stalks having the ear as the affected part was 22.3 per cent. in this row and 28.6 per cent. in the check-row.

Stated very briefly the results are in accord with those obtained at the Indiana and Illinois Experiment Stations in recent years. At the stage of growth when the tassels are just appearing, detasseling, mutilation of the stalks lower down, and the application of spores without wounding the stalk all cause an increase of smut; and mutilation and the application of spores to the wound thus made results in a still larger per cent. of smut.

Following is a tabulation of the results obtained :

Number of row.....	1	x	2	x	3	x	4	x
Total number of stalks.....	972	1,026	842	841	806	777	737	884
Percentage of stalks smutted,	15	9.7	11.5	8.5	10.4	8.6	11.5	9.5
Percentage of diseased stalks having diseased ears.....	29.2	32.6	18.6	18.1	16.6	20.9	22.3	28.6
Percentage of smut above ear,	7.5	8	8.2	8.3	8.3	7.5	2.3	7.1
Percentage of smut below ear,	63.3	60	73.2	73.6	75	71.6	75.3	64.3
Percentage of smut <i>on</i> or with- in six inches of wound.....	34.2	....	59.8	....	....	....	....	....
Percentage of smut over six but less than twelve inches from wound	13.6	....	17.5	....	....	....	....	....

x, check row.