

The chlamydospores used in this investigation were kindly supplied by Dr. J. E. Puhalla, at the Connecticut Experimental Station, New Haven, Conn.

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2. Pollen sterility in maize caused by fungus attack (*Ustilago maydis* (DC.) Corda).

Almost no information is available on pollen sterility caused by fungus attack on standing crops. The present investigation was carried out with respect to the influence of smut on maize pollen. A synthesized maize variety (a dent corn with the 4th chromosome from *Nobogame teosinte*) was chosen for this study. This maize variety exhibits an anomalous ear formation; at first the ears appear normal, but later, after the original tassel completes pollen shedding and the ears complete their normal pollination cycle, the tips of the ears elongate and produce staminate spikelets. The male spikelets show normal anther development and shed viable pollen grains which are perhaps useful for the younger developing ears at the receptive stage. Such anomalous ears are often called "laughing-ears." However, these plants also produce a normal tassel at the top. In this maize variety, the first four leaf-sheaths below the tassel are always sterile, the first ear being formed in the 5th leaf-sheath, and the second ear in the sixth leaf-sheath.

The seedlings in this study were grown in the greenhouse, then transplanted to the field. After the seedlings had reached about 6 inches in height, they were dusted with viable corn-smut chlamydospores. The chlamydospores were obtained from kernel infections. A cloudy, calm, humid afternoon was chosen for infecting the seedlings and the plants were carefully watered. The chlamydospores germinated and produced sporidia which infected the maize seedlings during the following evening. The infections appeared on the plants almost at the time when "laughing-ears" started to appear. The effect of fungus attack was appraised on the basis of the smut-gall formation on the ears bearing staminate flowers. In the control plants, staminate flowers of the "laughing-ears" developed normally and shed viable pollen grains at maturity. The male

flowers, with the infected kernels at the base, failed to show anthesis. The degree of pollen sterility was correlated with the amount of infection of the ears. A test of pollen sterility was made using the technique discussed by us earlier (MGCNL 44:45, 1970). It was also found that during severe corn smut attacks even the original tassels of the plants failed to shed pollen and exhibited a high percentage of pollen sterility. Even failure of kernel formation was observed, probably owing to inadequate development of the embryo-sacs in the kernels.

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3. Formation of smut galls (*Ustilago maydis*) in normal and aborted kernels of maize.

It has been reported that certain smuts can produce chlamydo-spores on artificial culture media (Sartoris, Amer. Jour. Bot. 11:617, 1924; and Wang, Phytopath. 28:860, 1938). It was emphasized in these studies that chlamydospore development is accelerated on rich culture media over that on minimal media. This suggests that the fungus has a preference for concentration of nutrients in the culture media and matures more rapidly. But, in either case, no size or structural difference of chlamydospores was reported, when spores produced in vitro were compared with spores produced in host tissue. To demonstrate the nutrient preference of the fungus, corn smut (*Ustilago maydis*) was used in vivo. A few previously infected maize plants were chosen for this investigation. On each plant the second ear from the tassel was selected, because the first ear often exhibits delayed infection. At the time of pollination a limited quantity of pollen was applied to the protruding receptive stigmas of marked ears. Immediately after the ears were artificially pollinated, they were covered with paper bags to prevent further pollination. The kernels whose stigmas were not receptive at the time of pollination failed to produce a normal endosperm, due to lack of fertilization. Smut-galls appeared on the kernels of the marked ears. The ears were checked regularly to score the degree of infection. It was