

The results obtained indicate that the very different climatic conditions no doubt prevailing at the time of the various sowings have influenced the rate of infection. We have made similar observations concerning the virulence of attack depending upon the different date of sowing of turnips in the case of the well-known club root disease. Dr. Munerati in explanation of the above table states: 'A grain which is covered with smut spores (*Tilletia*) and has not been treated with solutions, escapes the attack of the parasite if sown early, but the same grain will, on the contrary, be infected by the disease, if sown when the temperature is low and the plant is making little growth. The contrary is the case in spring wheat. In practice, the later in the autumn and the earlier in the spring wheat is sown, the more necessary it is to treat the grain with fungicides.' Canadian conditions may be vastly different, but that such escapes from infection in the case of wheat are known here is beyond any doubt. What, now, are the effects of such evidently climatic conditions on the decrease or increase of smut respectively?

The influence of temperature on the germination of wheat and of smut spores is well known. The lower the temperature, the slower is the germination of wheat. Wheat sown in experimental pots kept at so low a temperature as 34-36° F., i.e., a few degrees above freezing point, began to germinate, but its progress was very slow. When kept at 77° F. the germination took place after some 20 hours, and the period from germination to the production of the first leaf which pushes through the protective sheath was considerably shortened by the higher temperature.

Smut spores (*Tilletia*) do not start into active life at all before 41° F. is reached, while their germination maximum is about 77° F.

Bearing these facts in mind, it is easily understood that wheat beginning to germinate at a lower temperature than the smut spores, may be just in the most susceptible stage when the latter begin their activity. On the other hand, when considering that, under normal circumstances, the young wheat is only for some eight to ten days in a fit condition for the fungus' attack, the plant may have outgrown this stage before the fungus succeeded in effecting an attack. Thus it may be realized what an important rôle the temperatures prevailing at the time of germination really play.

Infection of the wheat plant takes place only during the normally short period from the beginning of the germination to the point when the first green leaf is ready to push through the colourless sheath in which it is enclosed (see fig. a-e). That the rate of development may be greater in some varieties of wheat than in others is indicated by the fact that Early Ohio wheat has shown itself in Germany to be very immune from stinking smut. This variety germinates far more quickly than any other. However, even this wheat may be subject to a considerable amount of smut, depending upon the different dates of sowing, anything from 0 to 62 per cent of smut showing.

*Varietal susceptibility of wheat towards stinking smut.*—From these observations we may conclude that the different rates of infection of different varieties of wheat are not due to any special degree of immunity or susceptibility, but rather to outside conditions of which temperature seems to be the most important. But the observations of the different rates of infection have been taken into account by plant breeders who saw in them characters worthy of propagation for the purpose of breeding resistant varieties. We firmly believe that the underlying scientific principles concerning the fungus itself and its attack of the host plant are worthy to be taken into consideration wherever work is carried on along the lines of disease resistance. It has been shown that the fact that a variety may escape infection is not a proof or even an indication of its being particularly disease resistant.

*Smut spores hibernating in the soil.*—The question whether smut spores lying in the soil over winter play a part in carrying over smut disease from year to year is also of importance. To begin with, as far as the true loose smuts of wheat and barley