THE INFLUENCE OF THE AWN UPON THE
DEVELOPMENT OF THE KERNEL OF
WHEAT

C. E. ROSENQUIST

AWNED varieties of wheat are rapidly replacing the awnless varieties in the United States. They have been generally reported to be better adapted than the available awnless varieties and to have produced over a period of years greater yields of grain. In this connection the question arises whether the presence of awns upon florets of wheat causes an increase in weight of the enclosed kernels.

In 1889 and 1890, Hickman (4, 5) reported an increase in yield of awned over awnless wheat. Over a period of 10 years using hundreds of varieties, the increased yield in favor of the awned varieties was 6 bushels per acre. About 26 years later, Fleischmann (1) isolated three types from native Hungarian wheat and propagated them further. Type A was awnless or slightly spurred, type B had awns as long as the glumes or shorter, and type C had awns longer than the glumes. Type A was generally inferior to the other two types, being lower in yield and producing lighter kernels. Type C was slightly better in most respects than type B and much better than type A. In 1919, Grantham (2) reported an increase of 3.31 bushels per acre in favor of awned wheat when 1,986 varieties were used in 26 trials. Treyakov (9), however, found that over a period of years at the Poltava station the awnless varieties outyielded the awned ones but individual grains from awned spikes were heavier than those from awnless spikes.

Several investigators have offered explanations for an apparent superiority of awned varieties. Perlitius (6) calls attention to the fact that awned cereal varieties under normal conditions ripen earlier than awnless ones. This, in many cases, might explain the differences in yielding ability. But he also says that the volume, weight, and ash content of the grain is increased by the transpiration of the awns. In some cases awned spikes transpired twice as much as either awnless ones or "de-awned" ones. Zoebl and Mikosch (11) in 1892 had already advanced this belief. They found that spikes of barley having awns transpired almost five times as much water as spikes from which the awns had been removed. These spikes were kept in distilled water having an oil film, the whole being weighed periodically. They also found that the greatest part of the water lost by the spike was through the awns and that the spikes transpired almost as much water as the upper three leaves of the culm. Vasilyev (10) reported results similar to those mentioned above. He varied his procedure in one case, however, when he cut off the awns from one-half of the spike and found that the kernels produced in these "de-awned" florets were 9% lighter in weight than those produced in awned florets.

In 1898, Schmid (7) wrote nine different articles on the structure and function of awns in the cereals. Using approximately the same method as that of Zoebl and Mikosch, he found transpiration from the spikes of many cereals, including...