WHEN wheat is threshed some of the grains are usually broken. This damage in very dry wheat frequently exceeds 2% and may amount to more than 10%. The value for seeding purposes of the germ end of broken grains is of interest to the farmer.

Obviously, the fragments without embryos are a total loss in seed grain. If, as has often been stated arbitrarily, in the formation of the seed nature supplies food reserves in considerably greater quantities than is necessary to insure a normal development of the seedling up to a stage at which it is capable of independent support, then within limits fragments of grains containing embryos might be expected to produce normal plants. There is evidence, however, that the removal or reduction of the food reserves of the seed results not only in a deleterious effect upon the early growth of the seedling but also in impaired subsequent development.

Extensive experiments have been carried on by various investigators to determine the effects upon the germination of seeds and the subsequent development of the resulting plants when portions of the seed have been removed. These experiments, however, have dealt principally with embryos devoid of endosperm and few have been carried on entirely in the field or continued up to the maturity of the plants.

This article presents the results of field plantings of winter wheat seeds from which different portions of the endosperm were removed, together with additional observations on plantings made in greenhouse flats.

REVIEW OF LITERATURE

Andronescu (1), Blociszewski (4), Bonnet (5), Brown (6), Brown and Morris (7), Dubard and Urbain (10), Sachs (14), Stingl (15), and Van Tieghem (16) found that the endosperm was not indispensable for the germination of the embryo or for the early development of the young plant.

Cronbach (8) found a higher and more rapid germination in half kernels than in whole kernels of wheat.

Delassus (9) and Wollney (17), as quoted by Brown (6), experimenting with kernels of vetch, beans, peas, lupines, and rye having various proportions of the seed attached to the embryo, found the plants produced from whole seeds superior in development.

Although the present study deals with mutilated seed, the possible bearing on the size of seed is obvious. Kiesselbach and Helm (13) carried on experiments to determine the relation of size of seed to yield and reviewed the extensive literature dealing with size of seed. The later work of Arny and Garber (2), Kidd and West (11, 12), and of Bayles (3) is of interest. In general, these investigators report