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Internal Fissuring of Wheat due to Weathering

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Radiographic technique developed at this Station for the determination of internal or hidden insect infestation in stored grain[1] has proved to be useful for the detection of other physical anomalies in grains. Practical applications of this sort include the detection of cracked or broken kernels in rough rice (paddy) prior to milling[2] as well as the extent of internal fracturing of certain grains such as maize due to uneven stresses arising from severe drying conditions. This communication deals with a condition of internal fissuring occurring in wheat due to weathering of the ripened grain in the field.

Examination of radiographs of numerous samples of non-infested wheat disclosed that some had the appearance shown in Figure 1, indicative of sound, normally matured grain, while others produced fine radiographic shadows indicating the existence of cracks or fissures oriented at right angles to the longitudinal axis of the kernel (Figure 2). (The pictures are projection prints of the original radiographs.) Close visual examination of both kinds of grain revealed that those samples which exhibited the fissuring were weathered, whereas the sound grain was of normal colour and bright in appearance. Weathered grain loses this sheen and color, and the kernels present a faded and roughened appearance. This condition is known to be caused by wetting of the mature grain by rain as it stands in the field prior to harvest.

It is well known that weathered or 'bleached' wheat kernels suffer a decrease in density associated with the swelling caused by wetting of the grain and that this change is not entirely reversible by subsequent drying in the field. This permanent loss in density is related also to the severity and frequency of wetting. It was at one time proposed[3] that this loss in density of grain, which has swelled by wetting and then has been re-dried, may be due to the formation of internal spaces in the endosperm of the grains. The present discovery confirms this hypothesis strikingly. The internally fissured condition has been noted not only in weathered hard red winter wheats from Kansas but also in spring wheats from North Dakota and western Canada.

These observations have prompted laboratory studies to determine precisely the conditions of wetting and drying which cause the fissuring of wheat to occur, as well as the effect of such fissuring on those physical characteristics of the grain which would affect its technological properties. The results of these studies will be published elsewhere.

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References

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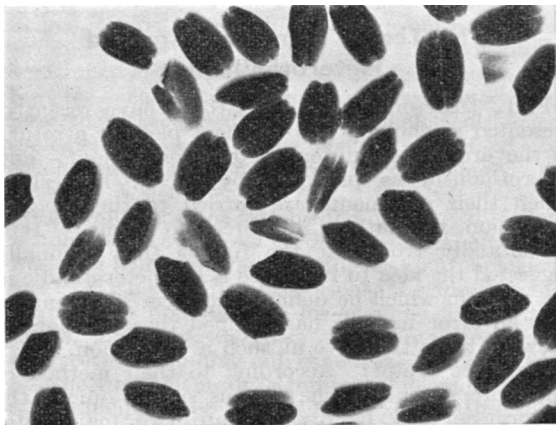

Figure 1

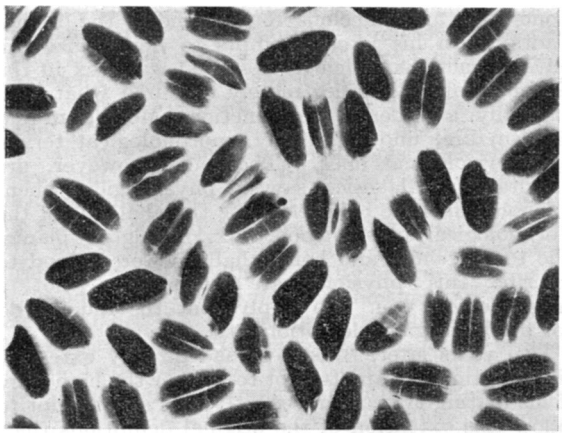

Figure 2