

## RESPIRATION OF WHEAT GRAIN STORED IN DIFFERENT ENVIRONMENTS

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.During aerobic respiration, carbohydrates are oxidised to carbon dioxide and water with the release of energy. Respiratory activity in grain may be measured by the uptake of oxygen or the release of carbon dioxide in a closed system or by temperature changes in a well insulated container. We have used an automatic electrolytic respirometer, which constantly monitored oxygen uptake and allowed overall measurement of carbon dioxide production, to obtain replicate determinations of respiration rates in 25 g samples of grain at different constant temperatures (15-35=BOC) and water activities (0.65-0.95 aw). Oxygen uptake increased linearly with temperature up to 35=BOC and with time at water activities above 0.90 aw but not at lower water activities. At low water activities with high germinability most of the total respiration could be attributed to respiration by the grains themselves. However at high water activities, germinability decreased and microbial respiration came to predominate. Autoclaved grain inoculated with either *Eurotium amstelodami* or *Penicillium aurantiogriseum* respired at similar rates at 0.85 aw and 20=BOC but oxygen uptake by *P. aurantiogriseum*-inoculated grain was much greater than that of *E. amstelodami*-inoculated grain at 0.90 aw. Grain inoculated with a mixture of both species respired similarly to *P. aurantiogriseum* at 0.90 aw but at a faster rate than either species at 0.85 aw. Comparisons of oxygen consumption and carbon dioxide production generally gave respiratory quotients less than 1.0 except at 15=BOC. Moulding was not visible after 7 days at 15=BOC but increased in intensity from 20-35=BOC. Up to 0.13% dry matter was lost before grain was visibly mouldy while 0.13-1.24%, depending on temperature and water content, was lost from visibly mouldy grain.