

PURGING GRAIN BULKS WITH NITROGEN: PLUG FLOW AND MIXING PROCESSES OBSERVED UNDER FIELD CONDITIONS.

H.J. BANKS and P.C. ANNIS

*Stored Grain Research Laboratory, CSIRO, Division of Entomology, PO Box
1700 Canberra, ACT 2601, Australia.
Fax: 6162464202*

Many experimental, full-scale applications of nitrogen gas to grain bulks have been extensively monitored. These trials have showed that there are often substantial deviations in practice from the theoretical behaviour expected when a gas, such as nitrogen, is used to displace air from a particulate commodity such as cereal grain in store. In its most efficient form, plug flow in the grain bulk can be expected, followed by dilution of the headspace by the incoming nitrogen. In practice there is a degree of dispersion as the purging front transits the bulk. The degree of dispersion is dependent on several factors, notably the face velocity of the front, with higher velocities reducing dispersion. Dilution of the headspace generally follows the expected logarithmic fall in oxygen content with time. Some areas of grain bulks, in practice, are not effectively purged by disperse plug flow processes, but lose oxygen by dilution, leading to inefficient use of purge gas. These areas are apparently associated with low pressure gradients or high levels of non-grain material (e.g. grain dust). Examples of various problems encountered in purging grain bulks with nitrogen for CA are presented. These are drawn from full scale practice.