Control treatments for organic grain

The Allowable Standards for Organic Grain are determined by the Australian Quarantine and Inspection Service (AQIS), and the Organic Produce Advisory Committee. The latest revision of the National Standard for Organic and Bio-dynamic Produce was published in April 1998. It is available from the Australian Government Publishing Service ($9.50 [1998]). Substances permitted as post harvest/storage treatments are:

- for controlled atmosphere—carbon dioxide, nitrogen or oxygen
- for pest control—physical barriers, temperature control, diatomaceous earth, rodenticides (in enclosed traps outside of food processing or storage areas), and sticky boards.

No other pesticides are permitted.

Use of controlled atmospheres

There are two types of controlled atmosphere:

- a mainly nitrogen atmosphere in which oxygen is reduced to a very low level (less than 1%) at which it is held for more than 3 weeks at above 20°C. This requires a very high sealing standard and continuous top-up of the low oxygen gas and may not be suitable for on-farm use; the use of low oxygen gas produced by burning bottled gas is still being developed.
- a high concentration of carbon dioxide used in a similar manner to other fumigants. The procedure which follows is provided by Dr Peter Annis.

Fumigation with carbon dioxide

Material prepared by Dr Peter Annis, CSIRO Australia, Division of Entomology, Stored Grain Research Laboratory. Reproduced by permission of GRDC.

Treatment of grain with food grade carbon dioxide (CO_2) in a sealed silo is one of the few acceptable ways of disinfesting and protecting commodities for the organic food market. The treatment is relatively simple and reliable if carried out in a sealed structure (one that passes the pressure test). The carbon dioxide concentration needs to be above 35% for 15 or more days for a carbon dioxide treatment to kill all stages of all insects likely to be found in an Australian on-farm storage. This can be achieved by a single addition of gas in an adequately sealed white bin (i.e. one which passes the pressure test).

Procedures for (CO_2) treatment of bulk grain in small bins (less than 300t)

Equipment required:

- **A sealed silo or a silo that can be sealed to a high standard of gas-tightness. The silo**

should be fitted with a gas inlets at top and bottom

- **Several lengths of plastic tubing (at least enough to go from the ground to the top of the bin and back)**
- **A few rolls of self-adhesive plastic tapes. 18 mm electrical tape and 50 mm duct tape are the most useful for making temporary seals and connections**
- **Sealing mastic in a putty gun cartridge. Silicone sealants are best. Butyl mastic can be satisfactory but is harder to apply**
- **A mastic gun for the above**
- **An oil filled pressure relief valve or a U tube manometer**
- **A source of compressed air**
- **At least one 30 kg (G size) cylinder of food grade carbon dioxide (CO_2) per 20 tonne of storage capacity plus one extra cylinder**
- **CO_2 pressure regulator with a fitting to connect to flexible plastic pipe**
- **A method of estimating the approximate CO_2 concentration. There are various commercial devices available for this purpose.**

Treatment method

1. **Seal all openings to silo using tapes and mastics as appropriate. Examine silo for obvious leaks, with special attention to hatches and joints, and fill any potential leaks.**
2. **Carry out a pressure test. The bin leaks should be further sealed if the time it takes for the pressure to halve is less than:**
   - **3 mins in a full bin**
   - **3 mins in an empty bin**
   - **3 minus [fraction full multiplied by 3] for a part filled bin.**
3. **Ensure there is an opening at the top of the bin.**
4. **Turn on the CO_2 cylinder valve and the flow regulator. The flow should be such that the inlet tube just becomes covered in frost. Continue gas addition until the concentration at the top of the bin reaches 60-80% CO_2 or until the cylinder freezes and the gas flow is reduced.**
5. **If the cylinder freezes, disconnect and add gas from another cylinder. The frozen cylinder will thaw with time and can be used later if needed.**
6. **When the concentration at the top of the bin reaches 60-80%, stop CO_2 addition and close the top of the bin.**
7. **If the pressure test was successful, the concentration should stay higher than 35% CO_2 for 15 days.**
8. **If the bin did not quite pass the pressure test, it is possible to add gas daily as required, so long as the concentration does not fall below 35%.**
   If the bin badly fails the pressure test even concentration make up will not be possible.

Use of natural insecticides

Natural insecticides such as neem or juvenile hormone are not permitted for storage of organic produce and are generally unsuitable for commercial use in their natural state, due to cost of production and instability. Stable synthetic analogues can be produced which may be less toxic than the natural compound

but must be classed as synthetic, not natural compounds.

Endnote

You've now reached the end of this section. Before you explore another part of this program, how do you plan to manage pests in future? What further knowledge and skills do you need?

- you could visit the Workshop and try a quiz: Pest quiz—❑; Aeration quiz—❑; Phosphine fumigation quiz—❑
- you could look back at the list of questions at the start of this section to identify what you still need to do—❑.

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