Project No. 85-P1 - Sealing Fumigation Facilities

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Objectives: Develop recommendations on sealing storage buildings to minimize the use of chemical fumigants and to allow the use of controlled atmosphere fumigation.

Interpretive Summary:

In 1984, a test showed that a conventional almond storage facility could be sealed tightly enough to allow controlled atmosphere fumigation or improved fumigation with conventional fumigants. However, some of the sealing materials showed signs of rapid deterioration. 1985 tests evaluated a series of materials for their ability to withstand wear caused by almonds in normal storage. Test patches of the following sealing materials were evaluated:

Neoprene sheet (NC 621 Gaco Western): applied to wall
Liquid neoprene (N 100 Gaco Western): applied to floor
Liquid synthetic rubber (P 5000 Gaco Western): applied to floor
Liquid aliphatic urethane (UA 6500 Gaco Western): applied to floor
Epoxy paint (Rustoleum): applied to floor

Patches were applied in two storages. Ground walnut shells were added to half the patches of liquid materials from Gaco Western for improved abrasion resistance. Materials will be evaluated at the end of the storage season.

Because these sealing materials may be used with conventional fumigants, tests are being conducted to determine the phosphine and methyl bromide sorbtivity. All of the above materials and the following are being tested:

Liquid Envelope vinyl-based coating (65-871 Essex Specialty Products)
Coated metal panel (QC 462 Zerolock Co.)
Coated metal panel (QC 317 Zerolock Co.)
Fiberglass reinforced panel (Zerolock Co.)

The last three materials are part of a panelized construction system that could be used to line the inside of a fumigation facility. Testing to date has shown that the panels and the Gaco neoprene materials sorb less methyl bromide than the epoxy paint, which is an approved sealing material for fumigation facilities.

The storage facility survey has been started and will be completed this winter. Preliminary results have shown that there are two main types of facilities that are used for fumigation. Large buildings for long term storage of walnuts, almonds, and prunes are fumigated about once a year. They will probably be expensive to seal considering the limited amount of fumigation done in these facilities. Most all fruits and nuts are fumigated just after being received in rooms designed for fumigation. These rooms are used repeatedly during the year and sealing is more economically feasible than with the large buildings. The sealing materials we are testing may offer better performance than epoxy-based sealants which are now used.

SEALING STORAGE FACILITIES FOR CONTROLLED ATMOSPHERE FUMIGATION - 1985

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ABSTRACT:

A group of five sealing materials are being studied for their resistance to wear by nuts in bulk almond storage. These sealing compounds, one other sealing material and three panelized lining materials are being tested for their resistance to sorbing methyl bromide and phosphine fumigants. A survey is also being conducted to determine how these materials might be used in existing storage and fumigation facilities for dried fruits and nuts.

OBJECTIVE:

Develop recommendations on sealing storage buildings to minimize the use of chemical fumigants and to allow the use of controlled atmosphere fumigation.

PROCEDURE:

1. Abrasion resistance of sealing materials was measured by applying two foot by four foot test patches of the following sealing materials to two almond storages:

   Neoprene sheet (NC 621 Gaco Western): applied to wall
   Liquid neoprene (N 1400 Gaco Western): applied to floor
   Liquid synthetic rubber (P 5000 Gaco Western): applied to floor
   Liquid aliphatic urethane (UA 6500 Gaco Western): applied to floor
   Epoxy paint (Rustoleum): applied to floor

   Ground walnut shells were added to half the patches of liquid materials from Gaco Western for improved abrasion resistance. Materials will be evaluated for wear at the end of a full storage season.

2. Fumigant sorbtion was measured using one foot by one foot metal panels coated with the above materials and the following:

   Liquid Envelope vinyl-based coating (65-871 Essex Specialty Products)
   Coated metal panel (QC 462 Zerolock Co.)
   Coated metal panel (QC 317 Zerolock Co.)
   Fiberglass reinforced panel (Zerolock Co.)

   One at a time, the panels are placed in a sealed fiberglass chamber and exposed to a 2 lbs per 1000 ft^3 concentration of methyl bromide at 80° F for 4 hours. Quantity of fumigant sorbed is determined by measuring the reduction in gas concentration in the chamber three times over a period of several hours. A correction is made for the amount of gas sorbed by the chamber. Three replications of each sealant are tested.

3. The survey of existing storage and fumigation facilities is being conducted by visiting representative examples of prune, raisin, walnut and almond processing facilities. Data on holding capacities, construction technique, method of use, and present insect control strategies are being noted.

RESULTS:

None of the three parts of the project are complete. Preliminary results from methyl bromide sorbtion tests have shown that the panelized lining materials and the Gaco neoprene materials sorb less methyl bromide than the epoxy paint, which is an approved sealing materials for fumigation facilities.

The storage facility survey has been started and will be completed this winter. Preliminary results have shown that there are two main types of facilities that are used for fumigation. Large buildings for long term storage of walnuts, almonds, and prunes are fumigated about once a year. They will probably be expensive to seal considering the limited amount of fumigation done in these facilities. Most all fruits and nuts are fumigated just after being received in rooms designed for fumigation. These rooms are used repeatedly during the year and sealing is more economically feasible than with the large buildings. The sealing materials we are testing may offer better performance than epoxy-based sealants which are now used.