

Dry Ice: Easy Fumigation for Navel Orangeworm Control in Stored Almond Meats

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The Problem

Growers and consumers storing small lots of almond meats know that the nuts are subject to insect infestations. Chemical fumigation with methyl bromide or phosphine may be an impractical, unfeasible, or, for some consumers, undesirable way to control navel orangeworm (*Amyelois transitella*), the most important storage pest of almonds.

Fumigation with solid carbon dioxide (dry ice) is a safe, economical alternative readily available to consumers. Carbon dioxide leaves no residues and imparts no off-flavor to the almond meats. This method of fumigation suffocates the worms by replacing oxygen with carbon dioxide gas.

What to Do

Use clean, 5-gallon plastic buckets with tight-fitting lids as storage containers. Before storing the nuts, place ½ pound of dry ice in the bottom of the bucket. Then fill the bucket with almond meats. Each bucket should hold ½ pound of dry ice and approximately 23 pounds of nut meats.

Next, cover the bucket with a sheet of plastic wrap or a similar material, such as part of a plastic trash bag. Secure the plastic with a large rubber band. Prick a pinhole in the center of the plastic covering to allow the oxygen to escape. As the dry ice turns to carbon dioxide

gas, it will expand to fill the bucket. Being heavier than oxygen, the carbon dioxide will push the oxygen up and out of the pinhole.

When the dry ice has diffused (approximately 8 hours at a room temperature of 72°F), leave the plastic covering in place and seal the bucket with a tight-fitting lid. As a further precaution against air leaks, secure the lid edges with duct tape.

Store the containers in an undisturbed area at room temperature for at least 7 days. At the end of 7 days, you can either unseal the fumigated containers and use the nuts, or store the sealed containers at room temperature for as long as 6 to 12 months. For longer-term storage, refrigerate or freeze the sealed containers.

NOTE:

While this treatment will destroy worms at the time of fumigation, it will not protect against reinfestation once the bucket has been opened. Prevent reinfestation of the almond meats by storing them in tightly sealed containers.

The same procedure could be used for different-sized containers, provided you use similar weight-to-volume ratios. Use 8 ounces of dry ice for each 0.75 cubic feet (5 gallons) of storage space.

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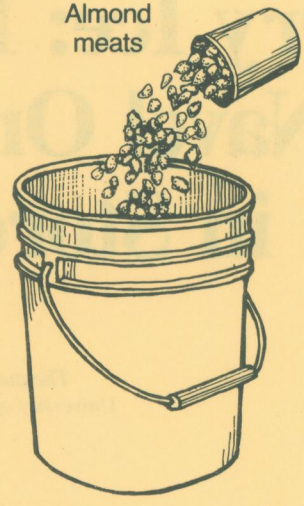
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Dry ice



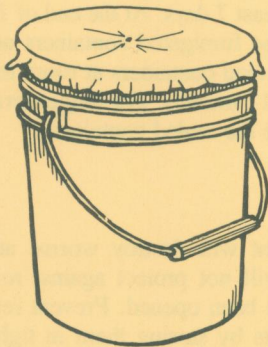
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Almond meats



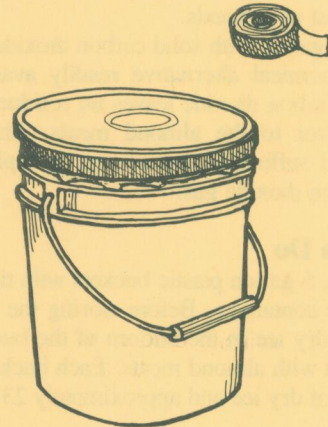
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Plastic sheet with pinhole



4

Lid and duct tape



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