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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF
PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT: Methyl Bromide Registration Standard. Protocol for almond residue studies (RD I.D. No. 53201-1; Record No. 205357; RCB No. 2880)

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THRU: William J. Boodee, Chief
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TO: Jeffrey Kempter (PM 32)
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The Almond Board of California (ABC) has submitted a protocol for studies involving postharvest fumigation of almonds with methyl bromide (MeBr). These studies were required under the August, 1986 Methyl Bromide Registration Standard. A copy of the protocol was sent to Vernon White who serves as president of the Methyl Bromide Industry Panel (MBIP), a consortium of registrants. The ABC is planning to satisfy the deficiencies in the almond residue data base.

Deficiency as cited in the Registration Standard

Almonds are to be grown in soil fumigated preplant at 870 lb ai/A and then fumigated postharvest at 3.5 lb ai/1000 ft^3 for 24 hours as soon as ripe nuts are available from treated plots or two years later, whichever is longer. Several fumigation methods should be tested (such as vacuum, boxcar, tarpaulin) if such methods are used commercially. If $\geq$5% of the nut crop is fumigated more than once, then the maximum number used commercially should be tested. MeBr per se and inorganic bromide (iBr) should be determined before and after the postharvest fumigation(s). Sampling should be continued until MeBr per se is nondetectable (preferably approaching 0.001 ppm). This will allow establishment of an aeration period. Almond hulls must also be analyzed as above.

Summary of Protocol

Almonds "(preferably Nonpareil)" are to be fumigated in 28.3 L fiberglass chambers according to the regimes shown in Table 1.

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Table 1. Fumigation Regimes.

Temperature (F)	Exposure period (hr)	MeBr dosage (lb ai/1000 ft^3) Meats	In-shell
50	12	1	1.5
50	24	3.5	3.5
70	6	1	1.5
70	24	3.5	3.5
80	4	1	1.5
80	24	3.5	3.5

[Note that the approved label regime is 3.5 lb ai/1000 ft^3 for 24 hr with no temperature specified.] Test chambers are temperature-controlled, equipped with continuously-circulating fans, and will be filled to 70-75% capacity prior to MeBr introduction via gas-tight syringe. Nuts will be fumigated while in metal baskets, wooden bins, or single cartons, either lined or unlined. A minimum of three replicates/treatment will be included. Aeration will be for the same duration as the exposure period. Following aeration, nuts will be stored at or near the temperature at which they were fumigated. Samples will be taken for MeBr analysis at the end of aeration, 12 hr later, and at intervals from 1-50 days or until MeBr becomes nondetectable ($\leq$5 ppb). A modified headspace method of King et al. (1981. J. Agric. Food Chem. 29:1003-1005) will be used for MeBr analysis. Residue data will be presented as mean values with standard deviations. The utility of redwood chips and almond shells to trap MeBr during storage will be tested. Forced air aeration during storage will be studied in terms of MeBr residues. Efficacy data will be collected.

Specific Considerations/Conclusions Regarding the Protocol

Several aspects of the protocol are questionable and/or do not correspond with the data gap as cited in the Registration Standard. These are discussed below.

1. The protocol was submitted directly from the ABC (through their agent) to the Agency without prior approval by the MBIP. It is the registrants who are responsible for fulfilling data requirements and coordinating study conduct.

2. Several aspects of the data gap were not addressed. These are: (i) post-harvest fumigation must be conducted on almonds grown in soil fumigated preplant; (ii) several fumigation methods should be tested (such as vacuum, boxcar, and tarpaulin); (iii) multiple treatments of the same sample should be conducted if used commercially; (iv) analyses should be conducted before as well as after postharvest fumigation; (v) samples are to be analyzed for iBr as well as MeBr per se; and (vi) the protocol has no provision for analyzing almond hulls. We suggest that the ABC should forward a copy of the Residue Chemistry Chapter to their contractor if this has not already been done.

3. The cultivar selected should be the one with the highest oil content since this is expected to result in the highest retention of MeBr. If nuts are commercially treated both in-shell and shelled, then both forms should be treated.

4. A small fiberglass fumigation chamber is proposed for purposes of data generation. This does not duplicate commercial ambient pressure fumigation chamber conditions. This chamber also is not representative of other fumigation methods such as vacuum chamber, boxcar, and tarpaulin.

5. All tests should be conducted at maximum label rates and represent actual commercial fumigation events in all respects such as chamber type, MeBr introduction method, temperature, humidity, air circulation, packaging of nuts (with or without plastic liners, crates, etc.), percent of chamber capacity typically filled, duration of fumigation and aeration, and storage conditions. If the labels for registered MeBr products do not specify temperature and if commercial chambers are not equipped with temperature controls, then various ambient temperatures should be tested. The majority of samples should reflect the temperatures resulting in the highest residues.

6. The Registration Standard does not suggest that a research program be initiated. Much of the testing described in the protocol appears to involve efficacy studies and the use of conditions and materials not specified on approved labels for registered end-use products. Such conditions/materials include use of: redwood chips or almond shells, several fumigation and storage temperatures, several application rates much lower than the maximum label rate (0.29x or 0.43x), several fumigation intervals shorter than the label rate (0.17x-0.5x), and various packaging/container types. The Agency is interested mainly in the worst-case situation and, consequently, much of the testing described in the protocol would be of minimal use, or of no use, unless the registrants plan to use the data to support amended registrations. The ABC appears to have already determined that fumigation and storage at 80 F "...is the worst case situation with respect to consumer residues..." Note that some of the conditions/materials proposed in the protocol may not be considered to be practical or enforceable label directions (such as use of redwood chips, almond shells, or specific temperatures).

7. The protocol does not provide for the proposal of aeration intervals on product labels although these would be determinable from the proposed tests if aeration is continued until MeBr is nondetectable, as requested in the Registration Standard.

8. The ABC plans to present data expressed as means with standard deviations. While this is useful, RCB must also have the raw data, representative chromatograms, and calibration curves.

cc: Amy Rispin (SIS), PMSD/ISB