5

Treatment Manual

# Treatment Schedules

## *T100 - Schedules for Fruit, Nuts, and Vegetables*

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## Reporting Commodity Injury

Record any new or unusual observations relating to injury of commodity and report them to Quarantine Policy, Analysis and Support (QPAS) in Riverdale. Give pertinent details of the treatment and conditions regarding its application. In appraising the effect of a particular treatment, take care to distinguish between the actual or apparent effects directly attributable to the treatment and those relating to factors or conditions not subject to PPQ control.

Commodities in the T100 series are intended for consumption as food or feed. These commodities may have to be treated with methyl bromide to control a pest.

## FIFRA Section 18 Exemption

Methyl bromide fumigants, except those with “Q” labels, are subject to requirements of the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Section 18 Quarantine Exemption. When commodities intended for food or feed are fumigated with methyl bromide under the FIFRA Section 18 Quarantine Exemption, one additional EPA requirement must be met: PPQ must monitor aeration by sampling the gas concentration to determine when a commodity may be released.

In this manual, fumigation schedules under the FIFRA Section 18 Quarantine Exemption are identified by the following note:

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## Determine the Correct Label for Fumigation

Always use the label of the fumigant to determine if the commodity can be treated. Fumigation schedules in this publication are intended to clarify and expand commercial labels for methyl bromide. The EPA only authorizes fumigation for commodities that are listed on the label of the gas being used for the fumigation. Also, to comply with State regulations, a fumigant must be registered in the State where it is being used.

Although the EPA only authorizes the use of a pesticide on a crop, animal, or site that is listed on the label of a pesticide, specific pests do not have to be listed on the label to use the pesticide. An amendment to FIFRA in 1978 permits the use of a pesticide to control a pest not on the label if the application is to a crop, animal, or site specified on the label, unless mentioned otherwise.

## How Fruits and Vegetables Are Listed

Fruits and vegetables that are to be fumigated with methyl bromide (T101s) will be listed in alphabetical order. Each schedule will have an assigned letter, e.g., Apples T101-a-1, Zucchini T101-h-3. For fruits and vegetables which require treatment as a condition of entry, refer to the Fruits and Vegetables Manual (Nonpropagative) for the specific treatment. Also, monitor aeration. see **page-2-4-30**. However, if treatment is required as a condition of entry for a fruit or vegetable, monitoring the aeration is **not** required. On the other hand, if the fruit or vegetable is being treated under a Section 18 Exemption, then monitoring aeration is required.

# T101—Methyl Bromide Fumigation

## T101-a-1 Apple and Pear

Pest: External feeders

Treatment: **T101-a-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-a-3 Apricot

Pest: External feeders

Treatment: **T101-a-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-b-1 Asparagus

Pest: External feeders such as Noctuidae spp., *Thrips* spp. (except *Scirtothrips dorsalis* from Thailand), *Copitarsia* spp.

Treatment: **T101-b-1** MB ("Q" label only) at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-b-1-1 Asparagus from Thailand, Australia, and New Zealand

Pest: *Scirtothrips dorsalis* (Thailand), *Halotydeus destructor* (Australia) (New Zealand)

Treatment: **T101-b-1-1** MB ("Q" label only) at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 2.5 lbs | 32 | 24 |
| 70-79 °F | 3 lbs | 38 | 29 |
| 60-69 °F | 4 lbs | 48 | 38 |

## T101-c-1 Avocado (from Hawaii, Israel, or the Philippines)

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: **T101-c-1** MB at NAP—tarpaulin or chamber

This treatment is marginal as to host tolerance and shipper should be warned of possible injury. Treatment approved for issuance of 318.13-4e certification.

| Temperature | Dosage Rate (lb/1000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 4 hrs |
| 70 °F or above | 2 lbs | 26 | 16 | 14 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

**Alternate Treatment—**Fumigation plus refrigeration T108

## T101-d-1 Banana

Pest: External feeders such as Noctuidae spp., *Thrips* spp., *Copitarsia* spp.

Treatment: **T101-d-1** MB at NAP—tarpaulin or chamber

This treatment is marginal as to host tolerance and shipper should be warned of possible injury.

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-e-1 Bean (except for fava bean), dry

Pest: Bruchidae (seed beetles)

Treatment: **T101-e-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 3 lbs | 38 | — | 24 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 | — |
| 40-49 °F | 3 lbs | 38 | 29 | — | — | — | 24 |

see also T101-k-2 or T101-K-2-1 for fresh beans

## T101-g-1 Beet

Pest: Internal feeders

Treatment: **T101-g-1** MB chamber, 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2.5 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 3.5 hrs |

## Beet

**T101-g-1-1**

Pest: External feeders

Treatment: **T101-g-1-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | | |
|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 90 °F and above | 2 lbs | 26 | 19 | 19 | — | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 |

**T101-h-1**

## Blackberry

Pest: External feeders such as Noctuidae spp., *Thrips* spp., *Copitarsia* spp., Pentatomidae spp., and *Tarsonemus* spp.

Treatment: **T101-h-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

**T101-i-1**

## Blueberry

Pest: External feeders

Treatment: **T101-i-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |

## T101-i-1-1 Blueberry

Pest: *Ceratitis capitata* (Mediterranean fruit fly)

Treatment: **T101-i-1-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3.5 hrs |
| 70 °F or above | 2 lbs | 26 | 22 | 21 |

## T101-n-2 Broccoli (Brassica oleracea var. botrytis)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Broccoli, Chinese (gai lon) (Brassica albogiabra)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Broccoli raap (rapini) (Brassica campestris)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Brussels sprouts (Brassica oleracea var. gemmifera)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-j-1 Cabbage

Includes both European and Chinese cabbage

Pest: External feeders

Treatment: **T101-j-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

For other *Brassica* spp., use the leafy vegetable schedule T104-n-2

## T101-n-2 Cabbage (Brassica oleracea)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Cabbage, Chinese (bok choy) (Brassica chinensis)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Cabbage, Chinese (napa) (Brassica pekinensis)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Cabbage, Chinese mustard (gai choy) (Brassica campestris)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-k-1 Cantaloupe

Pest: External feeders

Treatment: **T101-k-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above* | 1.5 lbs | 19 | 14 |
| 70-79 °F* | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

* Use “MB 100” at 70 °F or above, use MB “Q” label at 40 °F or above.

For other melons, see T101-o-2

## T101-l-1 Carrot

Pest: External feeders

Treatment: **T101-l-1** MB at NAP—tarpaulin or chamber—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | |
|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 90 °F and above | 2 lbs | 26 | 19 | 19 | — | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 |

## T101-m-1 Carrot

Pest: Internal feeders

Treatment: **T101-m-1** MB, chamber, 15" vacuum

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2.5 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 3.5 hrs |

## T101-n-1 Cassava (manihot and yuca)

Pest: External feeders

Treatment: **T101-n-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | 19 | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Cauliflower (Brassica oleracea var. botrytis)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Cavalo broccolo (Brassica oleracea var. botrytis)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-1 Celeriac (celery root)

Pest: External feeders

Treatment: **T101-n-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | 19 | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-o-1 Celery (above ground parts)

Pest: External feeders

Treatment: **T101-o-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

For below ground parts, use T101-n-1

## T101-p-1 Chayote (fruit only)

Pest: External feeders

Treatment: **T101-p-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

For below ground parts, use T101-a-2 (Dasheen)

## T101-r-1 Cherry

Pest: Insects other than fruit flies

Treatment: **T101-r-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-s-1 Cherry

Pest: *Rhagoletis indifferens* (Western cherry fruit fly) and *Cydia pomonella* (codling moth)

Treatment: **T101-s-1** MB at NAP—chamber only

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 70 °F or above | 2 lbs | 2 hrs |
| 60-69 °F | 2.5 lbs | 2 hrs |
| 50-59 °F | 3 lbs | 2 hrs |
| 40-49 °F | 4 lbs | 2 hrs |

## T101-t-1 Chestnut

Pest: *Cydia splendana* (nut fruit tortrix) and *Curculio* spp.

Treatment: **T101-t-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 4 hrs | 5 hrs | 6 hrs |
| 90 °F and above | 4 lbs | 58 | 34 | 34 | — | — | — |
| 80-89 °F | 4 lbs | 58 | 32 | — | 32 | — | — |
| 70-79 °F | 5 lbs | 72 | 42 | — | 42 | — | — |
| 60-69 °F | 5 lbs | 72 | 40 | — | — | 40 | — |
| 50-59 °F | 6 lbs | 85 | 50 | — | — | 50 | — |
| 40-49 °F | 6 lbs | 85 | 48 | — | — | — | 48 |

see also T101-u-1

Does not include water chestnut

## T101-u-1 Chestnut

Pest: *Cydia splendana* (nut fruit tortrix) and *Curculio* spp.

Treatment: **T101-u-1** MB in 26" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 80 °F or above | 3 lbs | 2 hrs |
| 70-79 °F | 4 lbs | 2 hrs |
| 60-69 °F | 4 lbs | 3 hrs |
| 50-59 °F | 4 lbs | 4 hrs |
| 40-49 °F | 4 lbs | 5 hrs |

Does not include water chestnut

## T101-v-1 Chicory (above ground parts)

Pest: External feeders

Treatment: **T101-v-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

see T101-n-1 for below ground parts

see T101-z-1 for below ground parts

see T101-a-2 for below ground parts

## T101-n-1 Chicory root

Pest: External feeders

Treatment: **T101-n-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | 19 | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD)..

## T101-w-1 Cipollini (bulbs)

Pest: *Exosoma lusitanica* (chrysomelid beetle)

Treatment: **T101-w-1** MB in 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Exposure Period |
|---|---|---|
| 80 °F or above | 2 lbs. | 2 hrs |
| 70-79 °F | 3 lbs. | 2 hrs |
| 60-69 °F | 4 lbs. | 2 hrs |
| 50-59 °F | 4 lbs. | 3 hrs |
| 40-49 °F | 4 lbs. | 4 hrs |

## T101-w-1-2 Citrus from U.S. (interstate movement)

Pest: *Ceratitis capitata* (Mediterranean fruit fly)

Treatment: **T101-w-1-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 22 |

Includes only kumquats, lemons, limes, oranges, tangelos, and tangerines for interstate movement

## T101-j-2-1 Clementines (Tangerines) from Mexico

Pest: *Anastrepha* spp.

Treatment: **T101-j-2-1** MB at NAP—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 80-85 °F | 2.5 lbs | 2 hrs |

Load limit not to exceed 80 percent of chamber capacity

Inspect a representative sample of the fruit. If the level of infestation with fruit flies is more than 0.5 percent for the lot, then the fruit is ineligible for fumigation.

## T101-n-2 Coles (Brassica spp.)*

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

**Important**

*Coles (Brassica spp.), EPA Crop Group 5, are restricted to broccoli (Brassica oleracea var. botrytis); broccoli, Chinese (gai lon) (Brassica albogiabra); broccoli raap (rapini) (Brassica campestris); brussels sprouts (Brassica oleracea var. gemmifera); cabbage (Brassica oleracea); Cabbage, Chinese (bok choy) (Brassica chinensis); Cabbage, Chinese (napa) (Brassica pekinensis); cabbage, Chinese mustard (gai choy) (Brassica campestris); cauliflower (Brassica oleracea var. botrytis); cavalo broccolo (Brassica oleracea var. botrytis); collards (Brassica oleracea var. acephala); kale (Brassica oleracea var. acephala); kohlrabi (Brassica oleracea var. gongyiodes); mizuna (Brassica rapa Japonica Group); mustard greens (Brassica juncea); mustard spinach (Brassica rapa Perviridis Group); rape greens (Brassica napus)

Of these, cabbage (Brassica oleracea) (labeled treatment T101-j-1) is the only vegetable in this group not covered by a FIFRA Section 18 Exemption.

## T101-n-2 Collard Greens (Brassica oleracea var. acephala)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-x-1 Copra

(Dried coconuts and whole coconuts without the husk)

Pest: External feeders

Treatment: **T101-x-1** MB ("Q" label only) at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |

## T101-x-1-1 Corn-on-the-cob

(Green corn, sweet corn)

Pest: *Ostrinia nubilalis* (European corn borer)

Treatment: **T101-x-1-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2.5 hrs |
| 70 °F or above | 2.5 lbs | 32 | 24 |

## T101-y-1 Cucumber

Pest: External feeders

Treatment: **T101-y-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |

## T101-z-1 Dasheen

(Eddoe, malanga, tannia, tanya, taro, and yautia)

Pest: External feeders

Treatment: **T101-z-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | | |
|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | 19 | — | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 |
| 40-49°F | 4 lbs | 48 | 40 | — | — | 32 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

This schedule may be used for other root and tuber vegetables not listed on the "Q" label, such as celeriac (celery root) and chicory root.

## T101-a-2 Dasheen

Pest: Internal feeders

Treatment: **T101-a-2** MB chamber, 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2.5 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 3.5 hrs |

This schedule may be used for other root and tuber vegetables not listed on the "Q" label, such as celeriac (celery root) and chicory root.

## T101-b-2 Endive

Pest: External feeders

Treatment: **T101-b-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-c-2 Fava bean (dried)

Pest: Bruchidae (seed beetles)

Treatment: **T101-c-2** MB in 26" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 70 °F or above | 3 lbs | 3.5 hrs |
| 60-69 °F | 3 lbs | 4 hrs |
| 50-59 °F | 3 lbs | 4.5 hrs |
| 40-49 °F | 3 lbs | 5 hrs |

## T101-d-2 Fava bean (dried)

Pest: Bruchidae (seed beetles)

Treatment: **T101-d-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 11 hrs | 12hrs | 13 hrs | 14 hrs |
| 70 °F and above | 3.5 lbs | 46 | 28 | 27 | — | — | — |
| 60-69 °F | 3.5 lbs | 46 | 28 | | 27 | | |
| 50-59 °F | 3.5 lbs | 46 | 28 | | | 27 | |
| 40-49 °F | 3.5 lbs | 46 | 28 | | | | 27 |

If fresh, see Green Pod Vegetables

## T101-e-2 Garlic

Pest: *Brachycerus* spp. (garlic beetles) and *Dyspessa ulula* (garlic carpenterworm)

Treatment: **T101-e-2** MB in 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 1.5 hrs |
| 80-89 °F | 2 lbs | 2 hrs |
| 70-79 °F | 2.5 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 4 hrs |

Load limit not to exceed 80 percent of chamber capacity

Treatment is waived for shipments of garlic for food purposes from Italy and Spain when accompanied by an official phytosanitary certificate stating freedom from *Brachycerus* spp. and *Dyspessa ulula* and inspection at port of entry discloses no pests. This exemption from treatment only applies to garlic for food purposes.

## T101-f-2 Ginger (rhizome)

Pest: Internal feeders

Treatment: **T101-f-2** MB in 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 3 hrs |
| 80-89 °F | 2.5 lbs | 3 hrs |
| 70-70 °F | 3 lbs | 3 hrs |
| 60-69 °F | 3 lbs | 3.5 hrs |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-g-2 Ginger (rhizome)

Pest: External feeders

Treatment: **T101-g-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | 19 | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | 24 | — |
| 70-79 °F | 3 lbs | 38 | 29 | 24 | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-h-2 Grape

Pest: *Lobesia botrana* (vine moth)

Treatment: **T101-h-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-h-2-1 Grape

Pest: *Ceratitis capitata* (Mediterranean fruit fly) or *Ceratitis capitata* and *Lobesia botrana* (vine moth)

Treatment: **T101-h-2-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 2 lbs | 26 | 22 | 22 | — | 21 | — |
| 65-69 °F | 2 lbs | 26 | 22 | 22 | — | — | 19 |

## T101-i-2 Grape

Pest: Insects other than *Ceratitis capitata* (Mediterranean fruit fly) and *Lobesia botrana* (vine moth)

Treatment: **T101-i-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

If mealybugs are found, use treatment schedule T104-a-2.

## T101-i-2-1 Grapes from Chile

Pest: External feeders

Treatment: **T101-i-2-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

If mealybugs are found, use treatment schedule T104-a-2.

## T101-j-2 Grapefruit and other kinds of citrus

Pest: *Aleurocanthus woglumi* (citrus blackfly)

Treatment: **T101-j-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 16 | 12 |
| 70-79 °F | 1.5 lbs | 19 | 15 |
| 65-69 °F | 1.75 lbs | 23 | 17 |

## T101-j-2-1 Grapefruit from Mexico

Pest: *Anastrepha* spp.

Treatment: **T101-j-2-1** MB at NAP—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 80-85 °F | 2.5 lbs | 2 hrs |

Load limit not to exceed 80 percent of chamber capacity

Inspect a representative sample of the fruit. If the level of infestation with fruit flies is more than 0.5 percent for the lot, then the fruit is ineligible for fumigation.

## T101-k-2 Green pod vegetables

Snap, string, yard-long beans, peas, and pigeon peas, lablab beans

Two alternative treatments, T101-k-2 or T101-k-2-1

Pest: *Cydia fabivora*, *Epinotia aporema*, and *Maruca testulalis* (exotic legume pod borers) and leaf miners

Treatment: **T101-k-2** MB in 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 0.5 lb | 1.5 hrs |
| 80-89 °F | 1 lb | 1.5 hrs |
| 70-79 °F | 1.5 lbs | 1.5 hrs |
| 60-69 °F | 2 lbs | 1.5 hrs |
| 50-59 °F | 2.5 lbs | 1.5 hrs |
| 40-49 °F | 3 lbs | 1.5 hrs |

## T101-k-2-1 Green pod vegetables

Snap, string, yard-long beans, peas, and pigeon peas, lablab beans

Two alternative treatments, T101-k-2 or T101-k-2-1

Pest: *Cydia fabivora*, *Epinotia aporema*, and *Maruca testulalis* (exotic legume pod borers) and leaf miners

Alternative treatment: **T101-k-2-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |

The term "green pod vegetables" refers to legumes, not peppers nor okra. Do not treat snow peas from Guatemala for Agromyzid leaf miners unless destined for Florida.

## T101-n-2-1-1 Herbs and Spices, Dried*

Pest: Various stored product pests, not including khapra beetle

Treatment: T101-n-2-1-1 MB ("Q" label only) at NAP

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 4 hrs | 16 hrs | 24 hrs |
| 70 °F or above | 2 lbs | 24 | 16 | 10 | — |
| 60-69 °F | 2 lbs | 24 | 16 | — | 10 |
| 50-59 °F | 3 lbs | 36 | 24 | 15 | — |
| 40-49 °F | 3 lbs | 36 | 24 | — | 15 |

*Includes all dried plant parts, as well as seeds.

**Important**

If khapra beetle is intercepted on herbs and spices (dried), do not use this schedule. Contact the Center for Plant Health Science & Technology (CPHST), tel: 1-919-855-7450.

**Important**

Dried herbs and spices are restricted to Allspice (Pimenta dioica), Angelica (Angelica archanagelica), Anise (anise seed) (Pimpinella anisum), Anise star (Illicium verum), Annatto (seed), Balm (lemon baalm) (Melissa officinalis), Basil (Ocimum basilicum), Borage (Borago officinalis), Bumet (Sanguisorba minor), Camomile (Anthemis nobilis), Caper buds (Capparis spinosa), Caraway (Carum carvi), Curaway, black (Nigelia sativa), Cardamom (Elettaria cardamomum), Cassia bark (Cinnamomum aromaticum), Cassia buds (Cinnamomum aromaticum), Catnip (Nepeta cataria), Celery seed (Apicum graveolens), Chervil (dried) (Anthriscus cerefolium), Chive (Allium schoenoprasum), Chive, Chinese (Allium tuberosum), Cinnamon (Cinnamomum verum), Clary (Salvia sciarea), Clove buds (Eugenia caryophyllata), Coriander (cilantro or Chinese parsley) (leaf) (Coriandrum sativum), Coriandor (cilantro) (seed) (Coriandrum sativum), Costmary (Chrysanthemum balsamita), Culantro (leaf) (Eryngium foetidum), Culantro (seed) (Eryngium foetidum), Cumin (Cuminum cyminum), Curry (leaf) (Murrya koenigii), Dill (dillweed) (Anethum graveolens), Dill (seed) (Anethum graveolens), Fennel (common) (Foeniculum vulgare), Fennel, Florence (seed) (Foeniculum vulgare Azoricum Group), Fenugreek (Trigonella foenumgraecum), Grains of paradise (Aframomum melegueta), Horehound (Marrubium vulgare), Hyssop (Hyssopus officinalis), Juniper berry (Juniperus communis), Lavender (Lavendula offinalis), Lemongrass (Cymbopogon citratus), Lovage (leaf) (Levisticum officinale), Lovage (seed) (Levisticum officinale), Mace (Myristica fragrans), Marigold (Calendula officinalis), Marjoram (Origanum spp.) (includes sweet or annual marjoram, wild marjoram or oregano, and pot marjoram), Mustard (seed) (Brassica junceca, B. hirta, B. nigra), Nasturtium (Tropaeolum majus), Nutmeg (Myristica fragrans), Parsley (dried) (Petroselinum crispum), Pennyroyal (Mentha pulegium), Pepper, black (Piper nigrum), Pepper, white, Poppy (seed) (Papaver somniferum), Rosemary (Rosemarinus officinalis), Rue (Ruta graveolens), Saffron (Crocus sativus), Sage (Salvia officinalis), Savory summer and winter (Satureja spp.), Sweet bay (bay leaf) (Laurus nobilis), Tansy (Tanacetum vulagre), Tarragan (Artemisia dracunculus), Thyme (Thymus spp.), Vanilla (Vanillia planifolia), Wintergreen (Gaultheria procumbens), Woodruff (Galium odorata), Wormwood (Artemisia absinthium).

## T101-n-2 Herbs, fresh (Includes all fresh plant parts except seeds)

Pest: External feeders and leaf miners

Treatment: T101-n-2 MB at NAP-tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 25 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 ° F | 3.5 lbs | 43 | 34 |
| 40-44 ° F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

**Important**

Fresh herbs and spices are restricted to Allspice (Pimenta dioica), Angelica (Angelica archanagelica), Anise (anise seed) (Pimpinella anisum), Anise star (Illicium verum), Annatto (seed), Balm (lemon baalm) (Melissa officinalis), Basil (Ocimum basilicum), Borage (Borago officinalis), Bumet (Sanguisorba minor), Camomile (Anthemis nobilis), Caper buds (Capparis spinosa), Caraway (Carum carvi), Curaway, black (Nigelia sativa), Cardamom (Elettaria cardamomum), Cassia bark (Cinnamomum aromaticum), Cassia buds (Cinnamomum aromaticum), Catnip (Nepeta cataria), Celery seed (Apicum graveolens), Chervil (dried) (Anthriscus cerefolium), Chive (Allium schoenoprasum), Chive, Chinese (Allium tuberosum), Cinnamon (Cinnamomum verum), Clary (Salvia sciarea), Clove buds (Eugenia caryophyllata), Coriander (cilantro or Chinese parsley) (leaf) (Coriandrum sativum), Coriandor (cilantro) (seed) (Coriandrum sativum), Costmary (Chrysanthemum balsamita), Culantro (leaf) (Eryngium foetidum), Culantro (seed) (Eryngium foetidum), Cumin (Cuminum cyminum), Curry (leaf) (Murrya koenigii), Dill (dillweed) (Anethum graveolens), Dill (seed) (Anethum graveolens), Fennel (common) (Foeniculum vulgare), Fennel, Floronce (seed) (Foeniculum vulgare Azoricum Group), Fenugreek (Trigonella foenumgraecum), Grains of paradise (Aframomum melegueta), Horehound (Marrubium vulgare), Hyssop (Hyssopus officinalis), Juniper berry (Juniperus communis), Lavender (Lavendula offinalis), Lemongrass (Cymbopogon citratus), Lovage (leaf) (Levisticum officinale), Lovage (seed) (Levisticum officinale), Mace (Myristica fragrans), Marigold (Calendula officinalis), Marjoram (Origanum spp.) (includes sweet or annual marjoram, wild marjoram or oregano, and pot marjoram), Mustard (seed) (Brassica junceca, B. hirta, B. nigra), Nasturtium (Tropaeolum majus), Nutmeg (Myristica fragrans), Parsley (Petroselinum crispum), Pennyroyal (Mentha pulegium), Pepper, black (Piper nigrum), Pepper, white, Poppy (seed) (Papaver somniferum), Rosemary (Rosemarinus officinalis), Rue (Ruta graveolens), Saffron (Crocus sativus), Sage (Salvia officinalis), Savory summer and winter (Satureja spp.), Sweet bay (bay leaf) (Laurus nobilis), Tansy (Tanacetum vulagre), Tarragan (Artemisia dracunculus), Thyme (Thymus spp.), Vanilla (Vanillia planifolia), Wintergreen (Gaultheria procumbens), Woodruff (Galium odorata), Wormwood (Artemisia absinthium)

## T101-l-2 Horseradish

Pest: *Baris lepidii* (imported crucifer weevil)

Treatment: **T101-l-2** MB in 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |

## T101-n-2 Kale (Brassica oleracea var. acephala)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-m-2 Kiwi

Pest: External feeders, *Nysius huttoni* (wheat bug)

Treatment: **T101-m-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-m-2-1 Kiwi

Pest: *Ceratitus capitata* (Mediterranean fruit fly)

Treatment: **T101-m-2-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 2 lbs | 26 | 22 | 21 | — |
| 65-69 °F | 2 lbs | 26 | 22 | — | 19 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Kohlrabi (Brassica oleracea var. gongyiodes)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Leafy vegetables

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

**Important**

Leafy vegetables, EPA Crop Group 4, (Except Brassica Vegetables) are restricted to amaranth (leafy amaranth, Chinese spinach, tampala) (Amaranthus spp.); arugula (Roquette) (Eruca sativa); cardoon (Cyanara cardunculus); celery (Apium graveolens var. dulcea); celery, Chinese (Apium graveolens var. secalinum); celtuce (Lactuca sativa var. angustana); chervil (Anthriscus cerefolium); chrysanthemum, edible-leaved (Chrysanthemum coronanium var. coronanium); chrysanthemum, garland (Chrysantesmum coronarium var. spatiosum); corn salad (Valerianella locusta); cress garden (Lepidium sativum); cress upland (yellow rocket, winter cress) (Barbarea vulgaris); dandelion (Taraxacum offincinale); dock (sorrel) (Rumex spp.); endive (escarole) (Cichorium endivia); fennel, Florence (finochio) (Foeniculum vulgare Azoricum Group); lettuce, head and leaf (Lactuca sativa); Orach(Atriplex hortensis); parsley (Petroselinum crispum); purslane, garden (Portulaca oleracea); purslane, winter (Montia perfoliata); radicchio (red chicory) (Cichorium intybus); rhubarb (Rheum rhabarbarum); spinach (Spinacia oleracea); spinach, New Zealand (Tetragonia tetragonioides, T. expansa); spinach, vine (Malabar spinach, Indian spinach) (Basella alba); swiss chard (Beta vulgaris var. cicia). Reference 40 CFR 180.34 (f)(a)(iv)(A)

## T101-q-2 Leeks

Pest: Internal feeders (including leafminers)

Treatment: **T101-q-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | | |
|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | — | — | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | — | — | — |
| 70-79 °F | 3 lbs | 38 | 29 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 26 | 26 | — | — |
| 50-59 °F | 3 lbs | 38 | 26 | — | 26 | — |
| 40-49 °F | 3 lbs | 38 | 26 | — | — | 26 |

## T101-n-2-1 Lemons from Chile

Pest: External feeders and *Brevipalpus chilensis* (Chilean false spider mite of grapes)

Treatment: **T101-n-2-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |

## T101-e-1 Lentils (Dry)

Pest: Bruchidae (seed beetles)

Treatment: **T101-e-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 3 lbs | 38 | — | 24 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 | — |
| 40-49 °F | 3 lbs | 38 | 29 | — | — | — | 24 |

## T101-n-2 Lettuce from Spain

Pest: *Autographa gamma*, *Helicoverpa armigera*, *Mamestra brassicae*, *Spodoptera littoralis*

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber (see Leafy vegetables for treatment schedule)

## T101-n-2-1 Limes from Chile

Pest: External feeders and *Brevipalpus chilensis* (Chilean false spider mite of grapes)

Treatment: **T101-n-2-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |

## T101-b-1-1 Lychee (Litchi)

Pest: Mealybugs (Pseudococcidae)

Treatment: **T101-b-1-1** MB ("Q" label only) at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 2.5 lbs | 32 | 24 |
| 70-79 °F | 3 lbs | 38 | 29 |
| 60-69 °F | 4 lbs | 48 | 38 |

**Important**

T101-b-1-1 is not a substitute for the mandatory cold treatment of lychee from China and Taiwan, T107-h, which targets the pests *Bactrocera dorsalis* (Oriental fruit fly), *Bactrocera curubitae* (melon fly) and ***Conopomorpha sinensis*** (lychee fruit borer). Because mealybugs are not controlled by T107-h, T101-b-1-1 can be used as a follow-up treatment if mealybugs are found.

## T101-o-2 Melons

(Including honeydew, muskmelon, and watermelon)

Pest: External feeders such as Noctuidae spp., *Thrips* spp., *Copitarsia* spp.

Treatment: **T101-o-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above* | 1.5 lbs | 19 | 14 |
| 70-79 °F* | 2 lbs | 26 | 19 |
| 60-69 °F* | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

* Use “MB 100” at 60 °F or above, use MB “Q” label at 40 °F or above

For cantaloupe, see T101-k-1

## T101-n-2 Mizuna (Brassica rapa Japonica Group)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Mustard greens (Brassica juncea)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-n-2 Mustard spinach (Brassica rapa Perviridis Group)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-a-3 Nectarine

Pest: External feeders

Treatment: **T101-a-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-p-2 Okra

Pest: *Pectinophora gossypiella* (pink bollworm)

Treatment: **T101-p-2** MB at NAP—chamber only

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 1 lb | 2 hrs |
| 80-89 °F | 1.5 lbs | 2 hrs |
| 70-79 °F | 2 lbs | 2 hrs |
| 60-69 °F | 2.5 lbs | 2 hrs |
| 50-59 °F | 3 lbs | 2 hrs |
| 40-49 °F | 3.5 lbs | 2 hrs |

Okra may be injured by fumigation if moisture is present.

The term “okra” does **not** include Chinese okra (*Luffa* spp.), which is a cucurbit.

## T101-q-2 Onion*

Pest: Internal feeders (and leafminers)

Treatment: **T101-q-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | | | |
|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | — | — | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | — | — | — |
| 70-79 °F | 3 lbs | 38 | 29 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 26 | 26 | — | — |
| 50-59 °F | 3 lbs | 38 | 26 | — | 26 | — |
| 40-49 °F | 3 lbs | 38 | 26 | — | — | 26 |

*The term “onion” includes dry bulbs. It also includes leeks, shallots and chives for both above ground and below ground parts.

## T101-j-2-1 Oranges from Mexico

Pest: *Anastrepha* spp.

Treatment: **T101-j-2-1** MB at NAP—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 80-85 °F | 2.5 lbs | 2 hrs |

Load limit not to exceed 80 percent of chamber capacity

Inspect a representative sample of the fruit. If the level of infestation with fruit flies is more than 0.5 percent for the lot, then the fruit is ineligible for fumigation.

## T101-g-1 Parsnip

Pest: Internal feeders

Treatment: **T101-g-1** MB chamber, 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2.5 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 3.5 hrs |

## T101-a-3 Peach

Pest: External feeders

Treatment: **T101-a-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-a-1 Pear

Pest: External feeders

Treatment: T101-a-1 MB at NAP-tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-e-1 Peas (Dry)

Pest: Bruchidae (seed beetles)

Treatment: **T101-e-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 3 lbs | 38 | — | 24 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 | — |
| 40-49 °F | 3 lbs | 38 | 29 | — | — | — | 24 |

see also T101-K-2 or T101-K-1 for fresh peas

## T101-a-3 Peppers

Pest: Internal Pests (except fruit flies) and External Pests (except mealy bugs)

Treatment: T101-a-3 MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

This treatment is not effective against fruit flies or mealy bugs. For fruit flies, use T106-b (vapor heat). For mealy bugs, use T104-a-2 (fumigation). Certain varieties of peppers are sensitive to methyl bromide and may develop darkening of the seed cavity.

## T101-r-2 Pineapple

Pest: Internal feeders

Treatment: **T101-r-2** MB ("Q" label only) at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 6 hrs |
| 70 °F or above | 2 lbs | 26 | 22 | 16 |

## T101-s-2 Pineapple

Pest: External feeders

Treatment: **T101-s-2** MB ("Q" label only if under 70 °F, 21.1 °C) at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above* | 1.5 lbs | 19 | 14 |
| 70-79 °F* | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F** | 4 lbs | 48 | 38 |

* Use "MB 100" at 70 °F or above, use MB "Q" label at 40 °F or above

** 40–49°F temperature range may cause pineapple core to turn purple.

## T101-t-2 Plantain

Pest: External feeders such as Noctuidae spp., *Thrips* spp., *Copitarsia* spp.

Treatment: **T101-t-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-a-3 Plum

Pest: External feeders

Treatment: **T101-a-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

## T101-u-2 Potato (white or Irish)

Pest: *Graphognathus* spp. (whitefringed beetles)

Treatment: **T101-u-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 2.5 lbs | 30 | 20 |
| 70-79 °F | 3 lbs | 36 | 24 |

## T101-v-2 Potato (white or Irish)

Pest: *Ostrinia nubilalis* (European corn borer) and *Phthorimaea operculela* (potato tuberworm)

Treatment: **T101-v-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2.75 lbs | 33 | 22 |

## T101-e-1 Pulses, dried

Pest: Bruchidae (seed beetles)

Treatment: **T101-e-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | | |
|---|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 3 lbs | 38 | — | 24 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 29 | — | 24 | — | — |
| 50-59 °F | 3 lbs | 38 | 29 | — | — | 24 | — |
| 40-49 °F | 3 lbs | 38 | 29 | — | — | — | 24 |

## T101-w-2 Pumpkin

Includes calabaza varieties

Pest: External feeders

Treatment: **T101-w-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |

## T101-g-1 Radish

Pest: Internal feeders

Treatment: **T101-g-1** MB chamber, 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2.5 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 3.5 hrs |

## T101-n-2 Rape greens (Brassica napus)

Pest: External feeders and leaf miners

Treatment: **T101-n-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 2 lbs | 26 | 14 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 45-49 °F | 3.5 lbs | 43 | 34 |
| 40-44 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

Of these, cabbage (Brassica oleracea) (labeled treatment T101-j-1) is the only vegetable in this group not covered by a FIFRA Section 18 Exemption.

## T101-x-2 Raspberry

Pest: External feeders such as Noctuidae spp., *Thrips* spp., *Copitarsia* spp., Pentatomidae spp.

Treatment: **T101-x-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-q-2 Shallots

Pest: Internal feeders (including leafminers)

Treatment: **T101-q-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | | |
|---|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs | 3 hrs | 3.5 hrs |
| 90 °F or above | 2 lbs | 26 | 19 | — | — | — |
| 80-89 °F | 2.5 lbs | 32 | 24 | — | — | — |
| 70-79 °F | 3 lbs | 38 | 29 | — | — | — |
| 60-69 °F | 3 lbs | 38 | 26 | 26 | — | — |
| 50-59 °F | 3 lbs | 38 | 26 | — | 26 | — |
| 40-49 °F | 3 lbs | 38 | 26 | — | — | 26 |

## T101-y-2 Squash (winter, summer, and chayote)

Pest: External feeders

Treatment: **T101-y-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

If zucchini, see T101-h-3

If pumpkin, see T101-w-2

## T101-z-2 Strawberry

Pest: External feeders

Treatment: **T101-z-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |

## T101-b-3-1 Sweet Potato *(Ipomoea)*

Pest: External and internal feeders

Treatment: **T101-b-3-1** MB at NAP—tarpaulin or chamber

This treatment is also required for the interstate movement from Hawaii.

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 4.0 hrs |
| 90 °F or above* | 2.5 lbs | 32 | 20 | 20 |
| 80-89 °F* | 3 lbs | 38 | 24 | 24 |
| 70-79 °F* | 3.5 lbs | 44 | 28 | 28 |
| 60-69 °F | 4 lbs | 50 | 32 | 32 |

* Use “MB 100” at 70°F or above, use MB “Q” label at 60 °F or above

NOTICE

Temperatures below 70°F may cause injury to sweet potatoes. Fumigation below 70 °F is to be made only on specific request from the importer.

NOTICE

Sweet potatoes should be cured, free from surface moisture, and held at the fumigation temperature for 24 hours following treatment. This is not mandatory; however, following this advise will help maintain the quality of the fumigated product.

## T101-c-3 Tomato (from Hawaii)

Pest: *Ceratitis capitata* (Mediterranean fruit fly)

Treatment: **T101-c-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3.5 hrs | 4 hrs |
| 70 °F or above | 2 lbs | 26 | 21 | 21 | — |
| 65-69 °F | 2 lbs | 26 | 21 | — | 19 |

Treatment is marginal as to host tolerance and shipper should be warned of possible injury.

## T101-c-3-1 Tomato (from Chile)

Pest: *Scrobopalpula absoluta* (tomato fruit moth) and *Rhagoletis tomatis* (tomato fruit fly)

Treatment: **T101-c-3-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F or above | 3 lbs | 43 | 33 |

## T101-d-3 Tuna (Opuntia) and all other fruits from cacti (prickly pear, pitahaya)

Pest: *Ceratitis capitata* (Mediterranean fruit fly)

Treatment: **T101-d-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 3.5 hrs |
| 70 °F or above | 2 lbs | 26 | 21 | 21 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-e-3 Tuna (Opuntia) and all other fruits from cacti (prickly pear, pitahaya)

Pest: External feeders and leaf miners

Treatment: **T101-e-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

Do not use this treatment schedule if its FIFRA Section 18 Exemption has expired. For the current exemption status, call your local State Plant Health Director (SPHD).

## T101-g-1 Turnip

Pest: Internal feeders

Treatment: **T101-g-1** MB chamber, 15" vacuum—chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Exposure Period |
|---|---|---|
| 90 °F or above | 2 lbs | 2 hrs |
| 80-89 °F | 2.5 lbs | 2 hrs |
| 70-79 °F | 3 lbs | 2 hrs |
| 60-69 °F | 3 lbs | 2.5 hrs |
| 50-59 °F | 3 lbs | 3 hrs |
| 40-49 °F | 3 lbs | 3.5 hrs |

## T101-f-3 Yam (Dioscorea)

Pest: Internal and external feeders

Treatment: **T101-f-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 4 hrs |
| 90 °F or above | 2.5 lbs | 32 | 20 | 20 |
| 80-89 °F | 3 lbs | 38 | 24 | 24 |
| 70-79 °F | 3.5 lbs | 44 | 28 | 28 |
| 60-69 °F | 4 lbs | 50 | 32 | 32 |

NOTICE

Temperatures below 70°F may cause injury to yams. Fumigation below 70 °F is to be made only on specific request from the importer.

NOTICE

Sweet potatoes and yams should be cured, free from surface moisture, and held at the fumigation temperature for 24 hours following treatment. This is not mandatory; however, following this advise will help maintain the quality of the fumigated product.

## T101-h-3 Zucchini

Pest: External feeders

Treatment: **T101-h-3** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 ft') | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |

If another variety of squash, see T101-y-2

# T102—Water Treatment

**Important**

Whenever water comes into contact with fresh produce, the water's quality dictates the potential for pathogen contamination. To reduce the risk of food-borne illnesses, the water used for washing, treatments, and cooling must be fortified with sodium hypochlorite (household bleach), and constantly maintained at a chlorine level between 50 and 200 ppm.

## T102-b Cherimoya from Chile

Pest: *Brevipalpus chilensis* (Chilean false spider mite of grapes)

Treatment: **T102-b** Soapy water and wax

1. Immerse fruit for 20 seconds in soapy water bath of one part soap solution (such as Deterfruit) to 3,000 parts water.
2. Follow the soapy bath with a pressure shower rinse to remove all the soapy excess.
3. Immerse fruit for 20 seconds in an undiluted wax coating (such as Johnson's Wax Primafresh 31 Kosher fruit coating). The wax coating should cover the entire surface of the fruit.

**Important**

At the port of entry, the PPQ officer should check to make sure the wax coating covers the entire surface of the fruit.

## T102-c Durian and other large fruits such as breadfruit

Pest: External Feeders

Treatment: **T102-c** Warm, soapy water and brushing

1. Add detergent (such as Deterfruit) to warm water (110 ° to 120 ° F) at the rate of one part detergent or soap to 3,000 parts water.
2. Immerse the fruit for at least 1 minute in the warm detergent water.
3. Using a brush with stiff bristles, have the importer or the importer's agent scrub each fruit to remove any insects.
4. Using a pressure shower, have the importer or the importer's agent rinse the fruit free from residue (detergent and dead insects).
5. Inspect each brushed and cleaned fruit. Pay particular attention to external feeders such as mealybugs and scales. If any insects remain, have the fruit retreated or have it destroyed.

## T102-e Limes

Pest: Mealybugs (Pseudococcidae) and other surface pests

Treatment: **T102-e** Hot water immersion

1. Fruit must be treated in a certified hot water immersion treatment tank, and the treatment must be monitored by an inspector.
   - **A.** Fruit must be submerged at least 4 inches below the water's surface.
   - **B.** Water must circulate continually and be kept at 120.2 °F (or above) for 20 minutes. Treatment time begins when the water temperature reaches at least 120.2 °F in all locations of the tank.
2. Cooling and waxing the fruit are both optional, and are the sole responsibility of the processor.

NOTICE

Phytotoxic damage (increased yellowing) may occur if the temperature reaches 125.6 °F or if the treatment duration significantly exceeds 20 minutes.

## T102-b-1 Limes from Chile

Pest: *Brevipalpus chilensis* (Chilean false spider mite of grapes)

Treatment: **T102-b-1** Soapy water and wax

1. Immerse fruit for 20 seconds in soapy water bath of one part soap solution (such as Deterfruit) to 3,000 parts water.
2. Follow the soapy bath with a pressure shower rinse to remove all the soapy excess.
3. Immerse fruit for 20 seconds in an undiluted wax coating (such as Johnson's Wax Primafresh 31 Kosher fruit coating). The wax coating should cover the entire surface of the fruit.

**Important**

At the port of entry, the PPQ officer should check to make sure the wax coating covers the entire surface of the fruit.

## T102-d-1 Longan fruit from Hawaii

Pest: *Ceratitis capitata* (Mediterranean fruit fly) and *Bactrocera dorsalis* (Oriental fruit fly)

Treatment: **T102-d-1** Hot water immersion

**Important**

Fruit must be at ambient temperature before the treatment begins

1. Submerge the fruit at least 4 inches below the water's surface in a hot water immersion treatment tank certified by APHIS.
2. Keep the fruit submerged for 20 minutes after the water temperature reaches at least 120.2 °F in all locations of the tank. The water must circulate continually and be kept at 120.2 °F (or above) for the duration of the treatment.

**NOTICE**

Phytotoxic damage (increased yellowing) may occur if the temperature exceeds 121.1 °F.

3. Cool the fruit to ambient temperature. Hydrocooling for 20 minutes at 75.2 °F is recommended, though not required, to prevent injury to the fruit from the hot water immersion treatment.

## T102-d Lychee (litchi) fruit from Hawaii

Pest: *Ceratitis capitata* (Mediterranean fruit fly) and *Bactrocera dorsalis* (Oriental fruit fly)

Treatment: T102-d Hot water immersion

1. Lychees must be thoroughly examined at the packinghouse by an inspector and found free of ***Cryptophlebia spp.*** (Lychee fruit moth) and other plant pests[1]
2. Fruit must be grown and treated in Hawaii, under monitoring of an inspector, in a certified hot water immersion treatment tank.[2]
   - **A.** Fruit must be submerged at least 4 inches below the water's surface.

1 Because ***Eriophyes litchii*** (lychee mite) cannot be effectively detected by inspection, and would not be effectively eliminated by hot water immersion, the lychees may not be shipped into Florida. Each carton must be stamped "Not for importation into or distribution in Florida."

2 Use of Treatment T102D is at the risk of the shipper. Limited research on fruit quality after treatment application indicated that fruit quality varies among cultivars. 'Kaimana' and 'Kwai Mi' ('Tai So') tolerate the treatment better than 'Brewster' and 'Groff'; no other cultivars were tested.

**B.** Water must circulate constantly, and be kept at 120.2 °F (or above) for 20 minutes. Treatment time begins when the water temperature reaches at least 120.2 °F in all locations throughout the tank.[3]

Temperatures exceeding 121.1 °F can cause phytotoxic damage.

**3.** Hydrocooling for 20 minutes at 75.2 °F is recommended, though not required, to prevent injury to the fruit from the hot water treatment.

## T102-a Mango

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Anastrepha spp.*, *Anastrepha ludens* (Mexican fruit fly)

Treatment: **T102-a** Hot water dip

Fruit must be treated in country of origin at a certified facility and under the monitoring of APHIS personnel.

**1.** Mangoes must be pre-sorted by weight class. Treatment of mixed loads is not allowed.

**2.** Pulp temperature must be 70 °F or above before start of treatment.

**3.** Fruit must be submerged at least 4 inches below the water's surface.

**4.** Water must circulate constantly and be kept at least 115 °F throughout the treatment with the following tolerances:

- ***During the first 5 minutes of a treatment***—temperatures below 113.7 °F are allowed during the first 5 minutes of a treatment only if the temperature is at least 115 °F at the end of the 5 minute period.
- ***For treatments lasting 65 to 75 minutes***—temperatures may fall as low as 113.7 °F for no more than 10 minutes under emergency conditions.
- ***For treatments lasting 90 to 110 minutes***—temperatures may fall as low as 113.7 °F for no more than 15 minutes under emergency conditions.

3 Treatment does not begin until after the fruit is immersed and the water temperature recovers to 120.2 °F (or above). Therefore, before the start of the treatment, fruit pulp temperatures of 70 °F (or above) are recommended to minimize water temperature recovery time and the overall time fruit are immersed in heated water. Fruit quality of treated lychees with initial pulp temperatures below 68 °F has not been studied.

5. Determine the dip time from Tables Table 5-2-1, Table 5-2-2, or Table 5-2-3.

**Important**

Dip times for T102-a are valid if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank.

However, if hydocooling starts immediately after the hot water immersion treatment, then the original dip time must be extended for an additional 10 minutes.

(Hydrocooling is optional and may be done only at temperatures of 70°F or above, for any length of time, or not at all.)

**TABLE 5-2-1: Determine Dip Time Based on Origin of Fruit[1]**

| If the origin of the fruit is: | And the shape of the fruit is: | And the weight is (grams): | Then dip: |
|---|---|---|---|
| Puerto Rico, U.S. Virgin Islands, or West Indies (excluding Aruba, Bonaire, Curacao, Margarita, Tortuga or Trinidad and Tobago) | Flat, elongated varieties[2] | Up to 400 grams | 65 minutes |
| | | 400 to 570 grams | 75 minutes |
| | Rounded varieties[3] | Up to 500 grams | 75 minutes |
| | | 500 to 700 grams | 90 minutes |
| | | 701 to 900 grams | 110 minutes |

1 Vaild if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank.

2 Such as ‘Frances,’ ‘Carrot,’ ‘Zill,’ ‘Ataulfo,’ ‘Carabao,’ ‘Irwin’, and Manila

3 Such as ‘Tommy Atkins,’ ‘Kent,’ ‘Hayden,’ and ‘Keitt.’

**TABLE 5-2-2: Determine Dip Time Based on Origin of Fruit[1]**

| If the origin of the fruit is: | And the shape of the fruit is: | And the weight is (grams): | Then dip: |
|---|---|---|---|
| Mexico or Central America (north of and including Costa Rica) | Flat, elongated varieties[2] | Up to 375 grams | 65 minutes |
| | | 400 to 570 grams | 75 minutes |
| | Rounded varieties[3] | Up to 500 grams | 75 minutes |
| | | 500 to 700 grams | 90 minutes |
| | | 701 to 900 grams | 110 minutes |

1 Vaild if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank

2 Such as ‘Frances,’ ‘Carrot,’ ‘Zill,’ ‘Ataulfo,’ ‘Carabao,’ ‘Irwin.’, and Manila

3 Such as ‘Tommy Atkins,’ ‘Kent,’ ‘Hayden,’ and ‘Keitt.’

**TABLE 5-2-3: Determine Dip Time Based on Origin of Fruit[1]**

| If the origin of the fruit is: | And the shape of the fruit is: | And the weight is (grams): | Then dip: |
|---|---|---|---|
| Panama, South America or West Indies islands of Aruba, Bonaire, Curacao, Margarita, Tortuga, or Trinidad and Tobago | Flat, elongated varieties[2] | Up to 375 grams | 65 minutes |
| | | 375 to 570 grams | 75 minutes |
| | Rounded varieties[3] | Up to 425 grams | 75 minutes |
| | | 425 to 650 grams | 90 minutes |

1 Vaild if the fruit is not hydrocooled within 30 minutes of removal from the hot water immersion tank

2 Such as 'Frances,' 'Carrot,' 'Zill,' 'Ataulfo,' 'Carabao,' 'Irwin.', and Manila

3 Such as 'Tommy Atkins,' 'Kent,' 'Hayden,' and 'Keitt.'

### T102-b-2 Passion Fruit from Chile

Pest: *Brevipalpus chilensis* (Chilean false spider mite of grapes)

Treatment: **T102-b-2** Soapy water and wax

1. Immerse fruit for 20 seconds in soapy water bath of one part soap solution (such as Deterfruit) to 3,000 parts water.
2. Follow the soapy bath with a pressure shower rinse to remove all the soapy excess.
3. Immerse fruit for 20 seconds in an undiluted wax coating (such as Johnson's Wax Primafresh 31 Kosher fruit coating). The wax coating should cover the entire surface of the fruit.

**Important**

At the port of entry, the PPQ officer should check to make sure the wax coating covers the entire surface of the fruit.

## T103—High Temperature Forced Air

### T103-a-1 Citrus from Mexico and infested areas in the United States

Pest: *Anastrepha* spp.

Treatment: T103-a-1 High-temperature forced air treatment

1. Prepare fruit for treatment

   **A.** Place temperature probes into the center of the largest fruit in the load.

   The number and placement of temperature probes must be approved by the Center for Plant Health Science & Technology (CPHST) before Plant Protection and Qurantine

(PPQ) can authorize treatment. CPHST grants approval of treatment equipment and facilities through a chamber certification procedure.

Only fruit varieties listed in Table 5-2-4 are authorized by PPQ for shipment with treatment T103-a-1. Also, this fruit cannot exceed the maximum commercial size for varieties listed in Table 5-2-4. Fruit can be sized before or after the heat treatment. The largest fruit in a load can be identified by either:

- sizing all fruit prior to heating and selecting the largest size class among the load or
- acquiring fruit of the largest permitted maximum commercial size class.

**B.** Place the fruit containing the temperature probes inside the hot air chamber at chamber locations specified by PPQ during the chamber certification.

**TABLE 5-2-4: Maximum Commercial Size of Citrus Varieties Authorized by PPQ for Shipment with Treatment T103-a-1**

| Citrus Variety[11] | Standard Count[22] | Size Container (in bu.) | Max. Weight/fruit (g) | oz. | Max. Diameter (inches) |
|---|---|---|---|---|---|
| Navel Orange | 100 | 1 2/5 | 450 | 15.9 | 3 13/16 |
| Orange (other than Navel Orange) | 100 | 1 2/5 | 468 | 16.4 | 3 13/16 |
| Tangerine | 120 | 4/5 | 245 | 8.6 | Not specified |
| Grapefruit | 70 | 1 2/5 | 536 | 18.8 | 4 5/16 |

1 For tolerance data and research citations, contact USDA-ARS Subtropical Research Center or the Center for Plant Health Science & Technology (CPHST).

2 Standard pack count is an index based on the approximate number of fruit of uniform diameter that fit into a 1 2/5-bushel container (4/5-bushel container in the case of tangerines).

**2.** Increase fruit temperature within specifications

**A.** Increase the fruit center temperature to 44 °C (111.2 °F) within 90 minutes or more (minimum approach time is 90 minutes) for all temperature probes.

**B.** Keep the fruit center temperature at 44 °C (111.2 °F) or hotter for 100 minutes.

Fruit center temperatures must be recorded every two (2) minutes for the duration of the treatment.

The total treatment time will vary with the time required to reach 44 °C (111.2 °F).

EXAMPLE: The center temperature of fruit located in the coolest location inside a forced air chamber required 112 minutes to reach 44 °C. Therefore, the total treatment time for this particular fruit load would be 112 + 100 = 212 minutes

EXAMPLE: The center temperature of fruit located in the coolest location inside a forced air chamber required 80 minutes to reach 44 °C. Therefore, 10 minutes would be added (80+10=90) and the total treatment time for this particular fruit load would be 90 + 100 = 190 minutes

3. Reduce fruit temperature

Reduce the temperature of the fruit after the treatment is completed. (Hydrocooling after treatment is optional.)

## T103-b-1 Citrus from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera dorsalis*** (Oriental fruit fly), and ***B. cucurbitae*** (melon fly)

Treatment: **T103-b-1** High temperature forced air

The steps must occur in order:

1. Insert temperature probes (sensors) into the centers of the largest fruits. The number of sensors must be approved in advance. Sensors shall be physically placed in various parts of the load so that high, middle, and low areas are all represented.

NOTICE

Do not begin treatment until the fruit center temperatures reach ambient temperature.

2. Load fruits (placed in open trays, bulk bins, or ventilated boxes) into the treatment chamber, and attach sensors to the recorder monitor. Set the monitor to record the temperatures from all sensors at least once every 5 minutes.
3. Heat the fruit in the chamber using forced hot air until the fruit center temperature (all sensors) reaches at least 117.0 °F (47.2 °C).

◆ The temperature of the forced air used to heat the fruit in the chamber may be constant (single air temperature) or increased (from ambient air temperature) in a series of two or more steps, or ramped over the treatment duration.

- Treatment time will vary, but in every case it must be at least 4 hours or more in duration. The total time leading up to the end-point temperature (117.0 °F or 47.2 °C) is counted as part of the treatment.

4. Cool the fruit by forced air or hydrocooling. Cooling can be initiated immediately after all sensors reach at least 117.0 °F (47.2 °C).

NOTICE

Tolerance of Citrus to Treatment—Users of this treatment for citrus should test the specific cultivar to determine how well it will tolerate the required heat treatment. Of all citrus species tested to date, grapefruit showed the highest tolerance to this treatment. The tolerance of citrus treated in excess of 7 hours has not been determined. Although the method of cooling fruit after treatment is optional, research indicated that forced air cooling using ambient air temperature produced the least fruit injury.

## T103-c-1 Mango from Mexico

Pest: *Anastrepha ludens* (Mexican fruit fly), *Anastrepha obliqua* (West Indian fruit fly), and *Anastrepha serpentina* (black fruit fly)

Treatment: **T103-c-1** Single-stage high temperature forced air

Size of fruit—standard sizes 8 to 14

Weight of fruit—Must not exceed 1 1/2 pounds. (700 grams)

The steps must occur in order:

1. Probe at least three of the largest mangoes at the seed's surface. Insert probes into the thickest portion of the fruit's pulp.
2. Record temperatures at least once every two minutes until the treatment is concluded.
3. Introduce air heated to 122 °F (50 °C) in the chamber.
4. Conclude the treatment once the temperature at the seed's surface (based on the coolest part of the fruit) reaches 118 °F (48 °C).

NOTICE

Treatment time will vary depending on the size of the fruit and the number of boxes treated.

## T103-d-1 Mountain Papaya from Chile

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera dorsalis*** (Oriental fruit fly), and ***B. cucurbitae*** (melon fly)

Treatment: **T103-d-1** High temperature forced air

The steps must occur in order:

1. Insert temperature probes (sensors) into the centers of the largest fruits. The number of sensors must be approved in advance. Sensors shall be physically placed in various parts of the load so that high, middle, and low areas are all represented.

NOTICE

Do not begin treatment until the fruit center temperatures reach ambient temperature.

2. Load fruits (placed in open trays, bulk bins, or ventilated boxes) into the treatment chamber and attach sensors to the recorder monitor. Set the monitor to record the temperatures from all sensors at least once every 5 minutes.
3. Heat the fruit in the chamber using forced hot air until the fruit center temperature (all sensors) reaches at least 117.0 °F (47.2 °C).

- The temperature of the forced air used to heat the fruit in the chamber may be constant (single air temperature) or increased (from ambient air temperature) in a series of two or more steps, or ramped over the treatment duration.
- Treatment time will vary, but in every case it must be at least 4 hours or more in duration. The total time leading up to the end-point temperature (117.0 °F or 47.2 °C) is counted as part of the treatment.

4. Cool the fruit by forced air or hydrocooling. Cooling can be initiated immediately after all sensors reach at least 117.0 °F (47.2 °C).

NOTICE

If papayas are hydrocooled with water lower than 54.5 °F (12.5 °C), the fruit may be damaged.

NOTICE

Tolerance of Papayas to Treatment—To enable the papayas to tolerate the treatment, the fruit may first have to be conditioned. Such conditioning is the responsibility of the shipper and at the shipper's risk.

## T103-d-2 Papaya from Belize and Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera dorsalis*** (Oriental fruit fly), and ***B. cucurbitae*** (melon fly)

Treatment: **T103-d-2** High temperature forced air

The steps must occur in order:

1. Insert temperature probes (sensors) into the centers of the largest fruits. The number of sensors must be approved in advance. Sensors shall be physically placed in various parts of the load so that high, middle, and low areas are all represented.

NOTICE

Do not begin treatment until the fruit center temperatures reach ambient temperature.

2. Load fruits (placed in open trays, bulk bins, or ventilated boxes) into the treatment chamber and attach sensors to the recorder monitor. Set the monitor to record the temperatures from all sensors at least once every 5 minutes.
3. Heat the fruit in the chamber using forced hot air until the fruit center temperature (all sensors) reaches at least 117.0 °F (47.2 °C).

- The temperature of the forced air used to heat the fruit in the chamber may be constant (single air temperature) or increased (from ambient air temperature) in a series of two or more steps, or ramped over the treatment duration.
- Treatment time will vary, but in every case it must be at least 4 hours or more in duration. The total time leading up to the end-point temperature (117.0 °F or 47.2 °C) is counted as part of the treatment.

4. Cool the fruit by forced air or hydrocooling. Cooling can be initiated immediately after all sensors reach at least 117.0 °F (47.2 °C).

NOTICE

If papayas are hydrocooled with water lower than 54.5 °F (12.5 °C), the fruit may be damaged.

NOTICE

Tolerance of Papayas to Treatment—To enable the papayas to tolerate the treatment, the fruit may first have to be conditioned. Such conditioning is the responsibility of the shipper and at the shipper's risk.

## T103-e Rambutan from Hawaii

Pest: *Ceratitis capitata* (Mediterranean fruit fly), and *Bactrocera dorsalis* (Oriental fruit fly)

Treatment: T103-e High temperature forced air

1. Raise the temperature of the fruit using forced hot air until the fruit center temperature (all sensors) reaches at least 117.0 °F (47.2 °C) in a minimum time of 1 hour or longer . Heat the fruit in the chamber

2. Hold the fruit temperature at 117 ° F (47.2 ° C) or above for 20 minutes. During the treatment, the relative humidity must be maintained at 90 per cent or greater.
3. Cooling the fruit is optional

## T104—Pest Specific/Host Variable

For the treatments that follow, never exceed the labeled or Section 18 dosage and time for the specific commodity at the given temperature. Moreover, the specific commodity being treated determines if the schedule is a labeled treatment or one authorized under a Section 18 exemption. For example, oranges cannot be treated for hitchhikers using T104A-1 at 40-49 °F because this schedule requires 4 pounds of methyl bromide/1,000 $ft^3$. Whereas, the methyl bromide "Q" label allows a maximum of only 3 pounds at this temperature range. Therefore, the oranges would have to be raised to at least 50 °F before fumigation could be initiated because at 50 °F a dosage of only 3 pounds/1,000 $ft^3$ is required.

Although the following treatments are pest specific, the treatment schedule for the associated host will determine if and when a pest specific treatment can be used. Always check the schedule for the host before selecting the proper treatment schedule. Also, consult the methyl bromide labeling brochure, and do not exceed the restrictions on dosage and exposure time.

## T104-a-1 Various Commodities*

Pest: Hitchhikers and surface pests such as: thrips, aphids, scale insects, leafminers, spider mites, lygaeid bugs, ants, earwigs, and surface feeding caterpillars.

Treatment: **T104-a-1** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 1.5 lbs | 19 | 14 |
| 70-79 °F | 2 lbs | 26 | 19 |
| 60-69 °F | 2.5 lbs | 32 | 24 |
| 50-59 °F | 3 lbs | 38 | 29 |
| 40-49 °F | 4 lbs | 48 | 38 |

**Important**

* To comply with dosage restrictions imposed by the methyl bromide "Q" label, the following fruits and vegetables may be fumigated only at the following temperatures (the items bolded are under FIFRA Section 18 Exemption. For the current exemption status, call your local State Plant Health Director (SPHD):

40 °F or above (maximum dosage, 4 pounds/1,000 $ft^3$):
Apple, apricot, asparagus, **banana**, **blackberry**, cabbage, **cactus fruit (tuna)**, cantaloupe, **celery**, chayote, cherry, chestnut, **chicory**, cippollino, cucumber, **Dasheen**, **endive**, fava bean (dried), **fresh herbs**[1], grape, honeydew melon, **kiwi**, **leafy vegetables**, muskmelon, nectarine, peach, **pear**, pepper, pineapple, **plantain**, plum, **raspberry**, **snow peas**[2]**,** squash (summer, winter), stone fruit, sweet potato, watermelon, yam.

50 °F or above (maximum dosage, 3 pounds/1,000 $ft^3$):
Bean, beet, carrot, citron (ethrog), coconut, Corn-on-the-cob (sweet corn), eggplant, garlic, **ginger**, grapefruit, green pod vegetables, horseradish, Jerusalem artichoke, kumquat, lemon, lime, okra, onion, orange, parsnip, pea, potato, radish, rutabaga, salsify, strawberry, sugar beet, tangelo, tangerine, tomato, turnip.

60 °F or above (maximum dosage, 2.5 pounds/1,000 $ft^3$):
Pimento, pumpkin, zucchini.

70 °F or above (maximum dosage, 2 pounds/1,000 $ft^3$):
**Avocado**, blueberry, cocoa bean.

1 Fresh herbs must be on the approved list shown under T101-n-2, Herbs, fresh (Includes all fresh plant parts except seeds).

2 Snow peas may be damaged at dosages higher than 3 lbs,/1000 cu. ft., and the dosage used in the 40 °F or above temperature range, 4 lbs./1000 cu. ft., should be used only at the importer's request.

## T104-a-2 Various Commodities*

Pest: Mealybugs (Pseudococcidae)

Treatment: **T104-a-2** MB at NAP—tarpaulin or chamber

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 80 °F or above | 2.5 lbs | 32 | 24 |
| 70-79 °F | 3 lbs | 38 | 29 |
| 60-69 °F | 4 lbs | 48 | 38 |

**Important**

* To comply with dosage restrictions imposed by the methyl bromide "Q" label, the following fruits and vegetables may be fumigated only at the following temperatures (the items bolded are under Section 18 Exemption. FIFRA Section 18 Exemption. For the current exemption status, call your local State Plant Health Director (SPHD):

60 °F or above (maximum dosage, 4 pounds/1,000 $ft^3$):
Apple, apricot, asparagus, **banana**, **blackberry**, cabbage, cantaloupe, **celery**, chayote, cherry, chestnut, **chicory**, cipolini, cucumber, **dasheen**, **endive**, fava bean (dried), grape, **fresh herbs**[1], honeydew melon, **kiwi**, **leafy vegetables**, **lychee (litchi)**, muskmelon, nectarine, peach, **pear**, pepper, pineapple, **plantain**, plum, **raspberry**, **snow peas,** squash (summer, winter), stone fruit, sweet potato, watermelon.

70 °F or above (maximum dosage, 3 pounds/1,000 $ft^3$):
Bean, beet, carrot, citron (ethrog), coconut, corn-on-the-cob (sweet corn), eggplant, garlic, **ginger root**, grapefruit, green pod vegetables, horseradish, Jerusalem artichoke, kumquat, lemon, lime, okra, onion, orange, parsnip, potato, radish, rutabaga, salsify, scallion, shallot, strawberry, sugar beet, tangelo, tangerine, tomato, turnip.

80 °F or above (maximum dosage, 2.5 pounds/1,000 $ft^3$):
Peppers, pimento, pumpkin, zucchini.

1 Fresh herbs must be on the approved list shown under T101-n-2, Herbs, fresh (Includes all fresh plant parts except seeds).

# T105—Irradiation

## T105-a-4 Abiu from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-5 Atemoya from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-9 Bell pepper from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-2 Carambola from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-10 Eggplant from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-b-1 Fruits and Vegetables

Pest: ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: T105-b-1 Irradiation

The minimum absorbed dose of gamma irradiation shall be 250 Gray (25 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)
—At the maritime ports of Gulfport, MS; or Wilmington, NC; or the airport of Atlanta, GA if the conditions of 7CFR 305.2 (b) are met.

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing**" is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-b-2 Fruits and Vegetables

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly)

Treatment: T105-b-2 Irradiation

The minimum absorbed dose of gamma irradiation shall be 225 Gray (22.5 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)
—At the maritime ports of Gulfport, MS; or Wilmington, NC; or the airport of Atlanta, GA if the conditions of 7CFR 305.2 (b) are met.

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing"** is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-b-3 Fruits and Vegetables

Pest: ***Bactrocera cucurbitae*** (melon fly)

Treatment: T105-b-3 Irradiation

The minimum absorbed dose of gamma irradiation shall be 210 Gray (21 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)
—At the maritime ports of Gulfport, MS; or Wilmington, NC; or the airport of Atlanta, GA if the conditions of 7CFR 305.2 (b) are met.

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing"** is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-b-4 Fruits and Vegetables

Pest: ***Anastrepha fraterculus*** (South American fruit fly), ***Anastrepha suspensa*** (Caribbean fruit fly), ***Anastrepha ludens*** (Mexican fruit fly), ***Anastrepha obliqua*** (West Indian fruit fly), ***Anastrepha serpentina*** (Sapote fruit fly), ***Bactrocera tryoni*** (Queensland fruit fly), and ***Bactrocera jarvisi*** (No common name), ***Bactrocera latifrons*** (Malaysian fruit fly),

Treatment: T105-b-4 Irradiation

The minimum absorbed dose of gamma irradiation shall be 150 Gray (15 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)
—At the maritime ports of Gulfport, MS; or Wilmington, NC; or the airport of Atlanta, GA if the conditions of 7CFR 305.2 (b) are met.

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing**" is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-c Fruits and Vegetables

Pest: ***Sternochetus mangiferae*** (Mango seed weevil)

Treatment: T105-c Irradiation

The minimum absorbed dose of gamma irradiation shall be 300 Gray (30 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)
—At the maritime ports of Gulfport, MS; or Wilmington, NC; or the airport of Atlanta, GA if the conditions of 7CFR 305.2 (b) are met.

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing"** is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-a-6 Longan from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

**Important**

Longan from Hawaii is prohibited into Florida. All cartons in which the litchi or longan is packed must be stamped, "**Not for importation or distribution in FL.**"

## T105-a-3 Lychee (Litchi) fruit from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

**Important**

Lychee (Litchi) fruit from Hawaii is prohibited into Florida. All cartons in which the litchi or longan is packed must be stamped, "**Not for importation or distribution in FL.**"

## T105-a-11 Mango from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly), ***Sternochetus mangiferae*** (formerly known as Cryptorhynchus mangiferae)(Mango seed weevil)

Treatment: Use T105-a-11 Irradiation

The minimum absorbed dose of gamma irradiation shall be 300 Gray (30 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)

**NOTICE**

The papayas, carambolas and lychees destined for irradiation treatment may arrive in the same container, but must not be commingled with other fruits and vegetables.

These shipments must be accompanied by a Limited Permit (PPQ Form 530).

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing"** is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-a-1 Papaya from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: T105-a-1 Irradiation

The minimum absorbed dose of gamma irradiation shall be 250 Gray (25 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)

**NOTICE**

The papayas, carambolas and lychees destined for irradiation treatment may arrive in the same container, but must not be commingled with other fruits and vegetables.

These shipments must be accompanied by a Limited Permit (PPQ Form 530).

**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

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## T105-a-12 Pineapple (other than smooth Cayenne) from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-7 Rambutan from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-8 Sapodilla from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

## T105-a-13 Squash (Italian) from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

## T105-a-15 Sweetpotato from Hawaii

Pest: ***Elytrotreinus subtruncatus*** (ginger weevil), ***Euscepes postfasciatus*** (sweetpotato scarabee), ***Omphisa anastomosalis*** (sweetpotato stem borer),

Treatment: Use T105-a-15 Irradiation

The minimum absorbed dose of gamma irradiation shall be 400 Gray (40 krad), but shall not exceed the 1000-Gray (100 krad) limit imposed by Food and Drug Administration regulations. Documentation of the dosage shall accompany the shipment.

Dose mapping is required for each commodity and/or size. Different configurations, packaging, and/or mixed commodities should also be dose mapped.

**Important**

The treatment shall be conducted only on Hawaiian-grown produce, and treated at an approved facility, which may be located in any of the following
—Hawaii
—In areas of the mainland United States that do **not** support fruit files (any State except AL, AZ, CA, FL, GA, KY, LA, MS, NV, NM, NC, SC, TN, TX, or VA)

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**Important**

When designing the facility's dosimetry system and procedures for its operation, the facility operator must address guidance and principles from American Society for Testing Materials (ASTM) standards or an equivalent standard recognized by the Administrator of APHIS.

(The American Society for Testing and Materials (ASTM) publication, 51261-2002 (E), "**Standard Guide for Selection and Calibration of Dosimetry Systems for Radiation Processing"** is available from: ASTM, 100 Barr Harbor Drive, West Conshohocken, Pennsylvania, USA 19428-2959).

## T105-a-14 Tomato from Hawaii

Pest: ***Ceratitis capitata*** (Mediterranean fruit fly), ***Bactrocera cucurbitae*** (melon fly), and ***Bactrocera dorsalis*** (Oriental fruit fly)

Treatment: Use T105-a-1 Irradiation

# T106—Vapor Heat

## T106-b-1 Bell Pepper

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-1 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

**Important**

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-a-1 Clementine from Mexico

Pest: *Anastrepha* spp. (includes Mexican fruit fly, *A. ludens*)

Treatment: T106-a-1 Vapor heat

Raise fruit pulp temperatures gradually to 110 °F until center of fruit reaches that temperature in 8 hours. Hold temperature at 110 °F for 6 hours.

## T106-a-1-1 Clementine or Orange from Mexico (Alternate treatment)

Treatment: T106-a-1-1 Vapor heat

Raise fruit pulp temperature to 110 °F until the center of fruit reaches that temperature in 6 hours. Hold temperature at 110 °F for 4 hours. During the initial raising of fruit temperature, the first 2 hours should raise the temperature rapidly, the increase over the next 4 hours should be gradual.

## T106-b-2 Eggplant

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-2 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

**Important**

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-a-2 Grapefruit from Mexico

Pest: *Anastrepha* spp. (includes Mexican fruit fly, *A. ludens*)

Treatment: T106-a-2 Vapor heat

Raise fruit pulp temperatures gradually to 110 °F until center of fruit reaches that temperature in 8 hours. Hold temperature at 110 °F for 6 hours.

## T106-f Litchi from Hawaii

Pest: *Ceratitis capitata* (Mediterranean fruit fly), and *Bactrocera dorsalis* (Oriental fruit fly)

Treatment: T106-f Vapor heat

1. Place the temperature probes in the approximate center of the largest fruits at the seed surface.
2. Raise temperature of the fruit to 117 ° F (47.2 ° C). The total run-up time for all sensors must take at least 60 minutes.
3. Hold the fruit temperature at 117 ° F (47.2 ° C) or above for 20 minutes. During the treatment, the relative humidity must be maintained at 90 per cent or greater.
4. Hydrocool the fruit under a cool water spray until the fruit sensors reach ambient temperature.
5. Inspect the fruit for live species of quarantine significant pests. If live species of quarantine significant pests are found, reject the treatment.

**Important**

The inspector must perform a careful visual inspection of the treated fruit to confirm the absence of other live pest species of quarantine significance. If any of the following are found live, the inspector will reject the treatment: *Cryptophlebia illepida* (koa seedworm), *Cryptophlebia ombrodelta* (litchi fruit moth), *Epiphyas postvittana* (light brown apple moth), *Eriophyes litchi* (litchi rust mite).

## T106-a-3 Mango* from Mexico

Pest: *Anastrepha* spp. (includes Mexican fruit fly, *A. ludens*)

Treatment: T106-a-3 Vapor heat

Raise fruit pulp temperatures gradually to 110 °F until center of fruit reaches that temperature in 8 hours. Hold temperature at 110 °F for 6 hours.

**Important**

* Manila variety only.

## T106-d-1 Mango from the Philippines (the island of Guimaras only)

Pest: *Bactrocera occipitalis*, *B. cucurbitae* and *B. philippinensis*

Treatment: T106-d-1 Vapor heat

1. Size the fruit before the treatment. Place temperature probes in the center of the large fruits.
2. Raise the temperature of the fruit by saturated water vapor to 114.8°F (46°C), measured at the center of the fruit, in a minimum of 4 hours. (The temperature of the saturated water vapor should be 117.5°F (47.5°C)
3. Hold fruit temperature at 114.8°F (46°C) for 10 minutes.

**Important**

During the run-up time, temperature should be recorded from each pulp sensor once every 5 minutes. During the 10 minute holding time, temperature should be recorded from each pulp sensor every minute.

During the last hour of treatment, which includes the 10 minute holding time, the relative humidity must be maintained at 90 percent of higher.

## T106-d Mango from Taiwan

Pest: *Bactrocera dorsalis* (Oriental fruit fly) and *B. cucurbitae*

Treatment: **T106-d** Vapor heat

1. Size the fruit before the treatment. Place temperature probes in the center of the large fruits.
2. Raise the temperature of the fruit by saturated water vapor at 117.5°F until the pulp temperature near the seed reaches 115.7°F.
3. Hold pulp temperature at 115.7 °F or above for 30 minutes, then cool immediately.

## T106-b-3 Mountain Papaya

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (fly)

Treatment: T106-b-3 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

NOTICE

This schedule is not being used at the present time because Taiwan has no preclearance program in place.

Important

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-a-4 Orange from Mexico

Pest: *Anastrepha* spp. (includes Mexican fruit fly, *A. ludens*)

Treatment: T106-a-4 Vapor heat

Raise fruit pulp temperatures gradually to 110 °F until center of fruit reaches that temperature in 8 hours. Hold temperature at 110 °F for 6 hours.

## T106-b-4 Papaya

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-4 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

**Important**

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-c Papaya

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-c Vapor heat (Quick run-up)

1. Raise temperature of article until approximate center of fruit reaches 117 ° F (47.2 ° C) in a time period of 4 hours or more. During the last hour of treatment, the relative humidity (RH) in the chamber must be maintained at 90 per cent or greater.

**Important**

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

## T106-b-5 Pineapple (other than smooth Cayenne)

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-5 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

**Important**

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-e Yellow Pitaya (*Selenicereus megalanthus*) from Colombia

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Anastrepha fraterculus* (South American fruit fly)

Treatment: T106-e Vapor heat

1. Raise temperature of article by saturated water vapor at 116.6°F until approximate center of fruit reaches 114.8 °F within a minimum time period of 4 hours.
2. Hold fruit temperature at 114.8 °F or above for 20 minutes.

**Important**

Pretreatment conditioning and post-treatment cooling are optional and the responsibility of the shipper.

If post-treatment cooling is conducted, wait 30 minutes after the treatment to start the forced cooling process.

## T106-g Rambutan from Hawaii

Pest: *Ceratitis capitata* (Mediterranean fruit fly), and *Bactrocera dorsalis* (Oriental fruit fly)

Treatment: T106-g Vapor heat

1. Raise the internal temperature of the fruit by saturated water vapor until the approximate center of fruit reaches 117 ° F (47.2 ° C) in a minimum time of 1 hour or longer.
2. Hold the fruit temperature at 117 ° F (47.2 ° C) or above for 20 minutes. During the treatment, the relative humidity must be maintained at 90 per cent or greater.
3. Cooling the fruit is optional

## T106-b-6 Squash

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-6 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

Important

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-b-7 Tomato

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-7 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

Important

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

## T106-b-8 Zucchini

Pest: *Ceratitis capitata* (Mediterranean fruit fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Bactrocera cucurbitae* (melon fly)

Treatment: T106-b-8 Vapor heat

1. Raise temperature of article by saturated water vapor at 112 °F until approximate center of fruit reaches 112 °F within a time period designated by the PPQ officer.
2. Hold fruit temperature at 112 °F for 8.75 hours, then cool immediately.

Pretreatment conditioning is optional and is the responsibility of the shipper. Treatment is required for shipments from Hawaii.

Important

Commodities should be exposed at 112 °F to determine tolerance to the treatment before commercial shipments are attempted.

# T107—Cold Treatment

### Pulp of the Fruit

The pulp of the fruit must be at or below the indicated temperature at time of beginning treatment for all cold treatments.

## Fruits for Which Cold Treatment Is Authorized

The following cold treatment schedules are authorized by Plant Protection and Quarantine (PPQ) for the control of specific pests associated with shipments of fruit. The cold treatment schedule that must be used for a specific commodity from a specific country is listed in the Fruits and Vegetables Section of the PPQ Nonpropagative Manual. These cold treatment schedules indicate the specific pests for which they are designed to control.

Treatment upon arrival may be accomplished at authorized ports as named in the permits.

Treatment in transit may be authorized for specifically equipped and approved vessels or containers and from approved countries, for entry at ports named in the permits. Intransit cold treatment authorization must be preceded by a visit to the country of origin by a PPQ official to explain loading, inspection, and certification procedures to designated certifying officials of country of origin. Refrigerated compartments on carrying vessels and cold storage warehouse must have prior certification by PPQ. Authorization of cold treatments from countries with direct sailing time less than the number of days prescribed for intransit refrigeration treatment must be contingent on importer understanding that prescribed intransit refrigeration period must be met before arrival of vessel at the approved U.S. port.

Gaps in the cold treatment data print-out for pulp sensors and air sensors shall be allowed or disallowed on a case-by-case basis, taking into account the number of gaps, the length of each gap, and the temperatures before and after. Air temperatures may occasionally exceed treatment temperatures during defrost cycles; however, fruit temperatures should not rise appreciably during this time. During non-defrost times, the temperatures of the air sensors should never exceed the maximum allowable treatment temperature.

**Important**

The fruit must be precooled at or below the target treatment temperature prior to loading. A certified USDA representative must sample the fruit pulp temperatures during loading in all sections of the lot until precooling has been accomplished.

## T107-a

## Apple, Apricot, Avocado,Cape Gooseberry Cherry, Ethrog, Grape, Grapefruit, Kiwi, Loquat, Litchi (Lychee), Nectarine, Orange, Ortanique, Peach, Pear, Persimmon, Plum, Plumcot, Pomegranate, Pummelo, Quince, Sand Pear, Tangerine (includes Clementine)

Pest: *Ceratitis capitata* (Mediterranean fruit fly) and *Ceratitis rosa* (Natal fruit fly)

Treatment: T107-a Cold treatment

| Temperature | Exposure Period |
|---|---|
| 34 °F (1.11 °C) or below | 14 days |
| 35 °F ( 1.67 °C) or below | 16 days |
| 36 °F (2.22 °C) or below | 18 days |

**Important**

Pretreatment conditioning for avocado (heat shock or 100.4 °F (38.0 °C) for 10 to 12 hours) is optional and is the responsibility of the shipper. The pretreatment conditioning, which may improve fruit quality, is described in HortScence 29 (10): 1166-1168. 1994. and 30(5): 1052-1053 (1995)

## T107-a-1

## Apple, Apricot, Cherry, Grape, Grapefruit, Kiwi, Mandarin, Nectarine, Orange, Peach, Pear, Plum, Pomegranate, Quince, Sweet orange, Tangelo, Tangerine (includes Clementine)

Pest: *Ceratitis capitata* (Mediterranean fruit fly) and species of *Anastrepha* (other than *Anastrepha ludens)*

Treatment: T107-a-1 Cold treatment

| Temperature | Exposure Period |
|---|---|
| 34 °F (1.11 °C) or below | 15 days |
| 35 °F ( 1.67 °C) or below | 17 days |

## T107-b

## Apple, Apricot, Cherry, Citron, Ethrog, Grapefruit, Litchi, Longan, Orange, Peach, Persimmon, Plum, Pomegranate, Tangerine (includes Clementine), White Zapote

Pest: *Anastrepha ludens* (Mexican fruit fly)

Treatment: **T107-b** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 33 °F (0.56 °C) or below | 18 days |
| 34 °F (1.11 °C) or below | 20 days |
| 35 °F ( 1.67 °C) or below | 22 days |

## T107-c Apple, Apricot, Carambola, Cherry, Grape, Grapefruit, Orange, Pomegranate, Tangerine (includes Clementine)

Pest: Species of *Anastrepha* (other than *Anastrepha ludens)*

Treatment: **T107-c** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 32 °F (0 °C) or below | 11 days |
| 33 °F (0.56 °C) or below | 13 days |
| 34 °F (1.11 °C) or below | 15 days |
| 35 °F ( 1.67°C) or below | 17 days |

## T107-d Apple, Grapefruit, Kiwi, Orange, Pear, Tangerine (includes Clementine)

Pest: *Bactrocera tryoni* (Queensland fruit fly)

Treatment: **T107-d** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 32 °F (0 °C) or below | 13 days |
| 33 °F (0.56 °C) or below | 14 days |
| 34 °F (1.11 °C) or below | 18 days |
| 35 °F ( 1.67°C) or below | 20 days |
| 36 °F (2.22 °C) or below | 22 days |

## T107-e Apricot, Grape, Nectarine, Peach, Plum

Pest: *Thaumatotibia leucotreta* (false codling moth) and *Ceratitis rosa* (Natal fruit fly)

Treatment: **T107-e** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 31 °F ( -0.55°C) or below[1] | 22 days |

1 The treatment shall not commence until all sensors are reading 31°F (-0.55°C) or below. If the temperature exceeds 31.5°F (-0.27°C), the treatment shall be extended one-third of a day for each day or part of a day the temperature is above 31.5°F (-0.27°C). If the exposure period is extended, the temperature during the extension period must be 34° F (1.11°C) or below. If the temperature exceeds 34°F (1.11°C) at any time, the treatment is nullified. Also, some freeze damage to the fruit may occur if the pulp temperature is allowed to drop below approximately 29.5°F (-1.38°C) (This varies with the commodity.)

## T107-f Carambola, Litchi (Lychee), Sand Pear, and Ya Pear

Pest: *Bactrocera cucurbitae* (Melon fly), *Bactrocera dorsalis* (Oriental fruit fly), and *Eutetranychus orientalis* (Oriental citrus mite)

Treatment: **T107-f** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 32 °F (0 °C) or below | 10 days |
| 33 °F (0.56 °C) or below | 11 days |
| 34 °F (1.11 °C) or below | 12 days |
| 35 °F ( 1.67 °C) or below | 14 days |

**Important**

If the fruit is shipped from an area where Mediterranean fruit fly also occurs in combination with melon fly and/or Oriental fruit fly, use T107-a

## T107-k Citrus

Pest: *Thaumatotibia leucotreta* (false codling moth) and *Ceratitis rosa* (Natal fruit fly)

Treatment: **T107-k** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 31 °F ( -0.55°C) or below[1] | 24 days |

1 The treatment shall not commence until all sensors are reading 31°F (-0.55°C) or below. If the temperature exceeds 31.5°F (-0.27°C), the treatment shall be extended one-third of a day for each day or part of a day the temperature is above 31.5°F (-0.27°C). If the exposure period is extended, the temperature during the extension period must be 34° F (1.11°C) or below. If the temperature exceeds 34°F (1.11°C) at any time, the treatment is nullified. Also, some freeze damage to the fruit may occur if the pulp temperature is allowed to drop below approximately 29.5°F (-1.38°C) (This varies with the commodity.)

## T107-g Pecans and Hickory nuts

Pest: *Curculio caryae* (Pecan weevil)

Treatment: **T107-g** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 32 °F (0 °C) or below | 7 days |

### T107-h Longans, Litchi (Lychee)

Pest: *Bactrocera dorsalis* (Oriental fruit fly), *Bactrocera curcubitae* (melon fly) and *Conopomorpha sinensis* (lychee fruit borer)

Treatment: **T107-h** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 33.4°F ( 0.77 °C) or below | 13 days |
| 33.8 °F ( 0.99 °C) or below | 15 days |
| 34.5 °F ( 1.38 °C) or below | 18 days |

### T107-j Longans

Pest: *Bactrocera dorsalis* (Oriental fruit fly) and *Bactrocera curcubitae* (melon fly)

Treatment: **T107-j** Cold treatment

| Temperature | Exposure Period |
|---|---|
| 33.8 °F ( 0.99 °C) or below | 13 days |
| 34.5 °F ( 1.38 °C) or below | 18 days |

## T108—Fumigation Plus Refrigeration of Fruits

### Fruits for Which Fumigation Followed by Cold Treatment Is Authorized

The following treatment schedules (fumigation followed by cold treatment) are authorized by Plant Protection and Quarantine (PPQ) for the control of specific pests associated with shipments of fruit. The treatment schedule that must be used for a specific commodity from a specific country is listed in the Fruits and Vegetables Section of the PPQ Nonpropagative Manual. These treatment schedules indicate the specific pests for which they are designed to control.

**Important**

For Hawaiian-grown avocados, research has shown that, during the process of cold treatment (T108-a), a single transient heat spike of no greater than 39.6 °F (4.2 °C) and no longer than 2 hours, during or after 6 days of cold treatment, does not affect the efficacy of the treatment. However, in the absence of supporting research, such a tolerance for heat spikes shall not be extended to other fruits.

**Important**

Cold treatment in break-bulk vessels must be initiated by an APHIS officer when shipments are fromItaly, and Taiwan. However, cold treatment in containers may be initiated by treatment technicians from these countries only because they have been trained to initiate cold treatments for containers and not break-bulk vessels

**NOTICE**

Some varieties of fruit may be injured by exposure to MB. Importers should be encouraged to treat small samples of fruit to determine tolerance levels before shipping commercial quantities. The USDA is not liable for damages caused by quarantine.

## T108-a Apple, Apricot, Avocado, Cherry, Grape, Kiwi, Nectarine, Peach, Pear, Plum, Plumcot, Quince

Pest: *Bactrocera cucurbitae* (melon fly), *Bactrocera dorsalis* (Oriental fruit fly), *Bactrocera tryoni* (Queensland fruit fly), *Brevipalpus chiliensis* (false red mite), *Ceratitis capitata* (Mediterranean fruit fly), *Lobesia botrana* (grapevine moth)

Treatment: **T108-a** Fumigation plus Cold treatment
Three alternative schedules based upon the fumigation exposure time

**Important**

Pretreatment conditioning for avocado (heat shock or 100.4 °F (38.0 °C) for 10 to 12 hours) is optional and is the responsibility of the shipper. The pretreatment conditioning, which may improve fruit quality, is described in HortScence 29 (10): 1166-1168. 1994. and 30(5): 1052-1053 (1995)

**NOTICE**

Check the PPQ Nonpropagative Manual to determine the required treatments for a commodity froma specific country.

**Important**

Some varieties of fruit may be injured by the 3 hour exposure. Importers should be encouraged to test treat small quantities to determine tolerance before shipping commercial quantities

**Important**

Time lapse between fumigation and start of cooling not to exceed 24 hours.

## T108-a-1

Treatment: **T108-a-1** MB at NAP—tarpaulin or chamber followed by cold treatment

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F ( 21.11°C) or above | 2 lbs | 25 | 18 |
| **Followed by cold treatment** | | | |

| Refrigeration | |
|---|---|
| **Temperature** | **Exposure Period** |
| 33 to 37 °F ( 0.56 to 2.77 °C) | 4 days |
| OR 38 to 47 °F ( 3.33 to 8.33 °C) | 11 days |

## T108-a-2

Treatment: **T108-a-2** MB at NAP—tarpaulin or chamber followed by cold treatment

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | |
|---|---|---|---|---|
| | | 0.5 hr | 2 hrs | 2.5 hrs |
| 70 °F ( 21.11°C) or above | 2 lbs | 25 | 18 | 18 |
| **Followed by cold treatment** | | | | |

| Refrigeration | |
|---|---|
| **Temperature** | **Exposure Period** |
| 34 to 40 °F (1.11 to 4.44 °C) | 4 days |
| OR 41 to 47 °F (5.0 to 8.33 °C) | 6 days |
| OR 48 to 56 °F (8.88 to 13.33 °C) | 10 days |

## T108-a-3

Treatment: **T108-a-3** MB at NAP—tarpaulin or chamber followed by cold treatment

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | | | |
|---|---|---|---|---|---|
| | | 0.5 hr | 2 hrs* | 2.5 hrs | 3 hrs |
| 70 °F (21.11°C) or above | 2 lbs | 25 | 18 | 18 | 17 |
| **Followed by cold treatment** | | | | | |

| Refrigeration | |
|---|---|
| **Temperature** | **Exposure Period** |
| 43 °F to 47 °F (6.11 to 8.33 °C) | 3 days |
| OR 48 °F to 56 °F (8.88 to 13.33 °C) | 6 days |

## T108-b Apple, Grape, and Pear

Pest: *Austrotortrix* spp. and *Epiphyas* spp. (light brown apple moth complex), *Bactrocera tryoni* (Queensland fruit fly), *Ceratitis capitata* (Mediterranean fruit fly) and other fruit flies

Treatment: T108-b MB at NAP—tarpaulin or chamber followed by cold treatment

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 50 °F (10 °C) or above | 1.5 lbs | 23 | 20 |
| 40-49 °F (4.44 to 9.44 °C) | 2 lbs | 30 | 25 |
| **Followed by cold treatment** | | | |

| Temperature | Exposure Period |
|---|---|
| 33 ° F (0.56 °C) or below | 21 days |

NOTICE

Alternate treatment for fumigation plus refrigeration of fruits (T108) is refrigeration plus fumigation of fruits (T109).

Important

Load not to exceed 80 percent of chamber capacity. Time lapse between fumigation and start of cooling not to exceed 24 hours.

# T109—Cold Treatment Plus Fumigation of Fruits

## T109-d-1 Apple, grape, and pear from Australia

Pest: *Austrotortrix* spp. and *Epiphyas* spp. (light brown apple moth complex), *Bactrocera tryoni* (Queensland fruit fly), *Ceratitis capitata* (Mediterranean fruit fly) and other fruit flies

Treatment: T109-d-1 Cold treatment followed by MB at NAP—tarpaulin or chamber

| Temperature | Exposure Period |
|---|---|
| 33 ° F (0.56 °C) or below | 21 days |
| **Followed by MB at NAP—tarpaulin or chamber** | |

| Temperature | Dosage Rate (lb/1,000 $ft^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 70 °F (21.11 °C) or above | 2 lbs | 30 | 25 |
| 60 to 69 °F (15.55 to 20.55 °C) | 2.5 lbs | 36 | 28 |
| 40 to 59 °F (4.44 to 15.0 °C) | 3 lbs | 44 | 36 |

Alternate treatment for *Austrotortrix* and *Epiphyas* is fumigation plus refrigeration (T108-b).

Alternate treatment for grapes from Australia as a fruit fly precautionary treatment for *Bactrocera tryoni* and *Ceratitis capitata* is fumigation plus refrigeration (T108-a and T108-b).

NOTICE

Load not to exceed 80 percent of capacity.

## T109a Apple ('Fuji' apple from Japan and Korea)

Pest: *Carposina niponensis* (peach fruit moth), *Conogethes punctiferalis* (yellow peach moth), *Tetranychus viennensis* (fruit tree spider mite), *Tetranychus kanzawai* (Kanzawa mite)

Two alternative schedules based on type of container

### T109-a-1

Treatment: **T109-a-1** (apples in plastic field bins at maximum load factor 50 percent or less) Cold treatment followed by MB at NAP—tarpaulin or chamber

| Temperature | Exposure Period |
|---|---|
| 34 °F (1.11 °C) or below | 40 days |
| **Followed by MB at NAP—tarpaulin or chamber** | |

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 50 °F or (10.0 °C) above | 3 lbs | 44 | 36 |

### T109-a-2

Treatment: **T109-a-2** (apples in only cardboard cartons at maximum load factor 40 percent or less) Cold treatment followed by MB at NAP—tarpaulin or chamber

| Temperature | Exposure Period |
|---|---|
| 34 °F (1.11 °C) or below | 40 days |
| **Followed by MB at NAP—tarpaulin or chamber** | |

| Temperature | Dosage Rate (lb/1,000 ft$^3$) | Minimum Concentration Readings (ounces) At: | |
|---|---|---|---|
| | | 0.5 hr | 2 hrs |
| 59 °F (15.0 °C) above | 2 lbs 6 oz | 35 | 29 |

## T110—Quick Freeze

Treatment: T110 Quick Freeze

Important

**Never** use this treatment for the control of bruchid beetles in dried beans. Research has shown that a treatment of -18°C (-0.4°F) for 14 days would be needed to be efficacious.

1. Initially, lower the commodity's temperature to 0 °F (-17.77 °C) or below.

2. Hold the commodity's temperature at 20 °F (-6.66 °C)or below for at least 48 hours.

   The commodity may be transported during the 48-hour treatment period, but at no time may the commodity's temperature rise above 20 °F (-6.66 °C) prior to release.

All fruits and vegetables* are enterable from all foreign countries after receiving the above treatment in accordance with 7CFR 319.56-2c. Also, interstate movement of all fruits and vegetables from offshore areas of the United States (except mango from Hawaii) is authorized in the frozen state after being quick frozen.

**Important**

Quick freeze may damage fruit.

Of course, freezing will ruin the market quality of most fresh fruits and vegetables, except for thick-skinned items such as durian and coconut. Generally, the Quick Freeze treatment is used on fruits and vegetables that will be processed into another form (e.g., for puree, juice, or mashed vegetables). Also, this treatment is considered an acceptable method of destroying most commodities in lieu of returning them to the country of origin, with the exceptions listed below.

**Important**

**Exceptions*—**Avocados with seeds** are prohibited from South America, Central America, or Mexico; however, avocados from certain areas of Mexico during specific times may enter the United States. **Citrus with peel** is prohibited from Afghanistan, Andaman Islands, Argentina, Bangladesh, Brazil, Caroline Islands, Cambodia, China (People's Republic of), Comoros, Côte d'Ivoire, Fiji Islands, Home Island in Cocos (keeling) Islands, Hong Kong, India, Indonesia, Japan and adjacent islands, Korea, Laos, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Myanmar, Nepal, Oman, Pakistan, Papua New Guinea, Paraguay, Philippines, Reunion Islands, Rodrigues Islands, Ryukyu Islands, Saudi Arabia, Seychelles, Sri Lanka, Taiwan, Thailand, Thursday Island, United Arab Emirates, Uruguay, Vietnam, Yemen, or Zaire. **Mangoes with seeds** are prohibited from Barbados, Dominica, French Guiana, Guadeloupe, Martinique, St. Lucia, and all countries outside of North, Central, and South America and their adjacent islands (which include the Caribbean Islands and Bermuda). **Black currants** are enterable only to areas specified in the import permit. **Corn-on-the-cob** is prohibited from Albania, Algeria, Bosnia and Hercegovina, Croatia, Cyprus, Egypt, France, Greece, Israel, Italy, Lebanon, Libya, Malta, Macadonia, Morocco, Sardinia, Slovenia, Spain, Syria, Tunisia, Turkey, or Yugoslavia (Serbia and Montenegro).