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 that require treatment as a condition of entry, refer to the Fruits and Vegetables Manual (Nonpropagative) for the specific treatment. Also, monitor aeration. see page 2-4-35. 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, monitoring aeration is required.

T101—Methyl Bromide Fumigation

T101-a-1 Apple and Pear[1]

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[2], Peach, Plum[2], 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-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

1 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

2 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T101-a-3 provided they are treated as a **Section 18 Crisis Exemption**.

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, *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, *Thrips* spp., *Copitarsia* spp., Pentatomidae, 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) and *Anastrepha fraterculus* (South American 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-n-2-1 Clementine, Lemon, Lime, Mandarin, and Tangerine 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-j-2-1 Clementines (Tangerines) from Mexico and quarantine areas of the U.S.

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% 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).

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

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-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
70-79 °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 and quarantine areas of the U.S.

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% 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 archangelica*), Anise (Anise seed) (*Pimpinella anisum*), Anise star (*Illicium verum*), Annatto (seed), Balm (Lemon balm) (*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 (*Apium 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 (*Chyrsanthemum balsamita*), Culantro (leaf) (*Eryngium foetidum*), Culantro (seed) (*Eryngium foetidum*), Cumin (*Cuminum cyminum*), Curry (leaf) (*Murrya koenigii*), Dill (dillweed) (*Anthemum graveolens*), Dill (seed) (*Anthmum graveolens*), Fennel (common) (*Foeniculum vulgare*), Fennel, Floronce (seed) (*Foeniculum vulgare Azoricum* group), Fenugreek (*Trigonella foenumgraecum*), Grains of paradise (*Afromomum melgueta*), Horehound (*Marribium 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) (*Pestroselinum crispum*), Pennyroyal (*Mentha pulegium*),Pepper, black (*Piper nigrum*), Poppy (seed) (*Papaver somniferum*), Rosemary (*Rosemarinus officinalis*), Rue (*Ruta graveolens*), Saffron (*Crocus sativus*), Sage (*Salvia officinalis*), Savory summer and winter (*Saturega* spp.), Sweet bay (bay leaf) (*Laurus nobilis*), Tansy (*Tanacetum vulgare*),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 archangelica*), Anise (Anise seed) (*Pimpinella anisum*), Anise star (*Illicium verum*), Annatto (seed), Balm (Lemon balm) (*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 (*Apium 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 (*Chyrsanthemum balsamita*), Culantro (leaf) (*Eryngium foetidum*), Culantro (seed) (*Eryngium foetidum*), Cumin (*Cuminum cyminum*), Curry (leaf) (*Murrya koenigii*), Dill (dillweed) (*Anthemum graveolens*), Dill (seed) (*Anthmum graveolens*), Fennel (common) (*Foeniculum vulgare*), Fennel, Floronce (seed) (*Foeniculum vulgare Azoricum* group), Fenugreek (*Trigonella foenumgraecum*), Grains of paradise (*Afromomum melgueta*), Horehound (*Marribium 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) (*Pestroselinum crispum*), Pennyroyal (*Mentha pulegium*),Pepper, black (*Piper nigrum*), Poppy (seed) (*Papaver somniferum*), Rosemary (*Rosemarinus officinalis*), Rue (*Ruta graveolens*), Saffron (*Crocus sativus*), Sage (*Salvia officinalis*), Savory summer and winter (*Saturega* spp.), Sweet bay (bay leaf) (*Laurus nobilis*), Tansy (*Tanacetum vulgare*),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 (*Chrysanthemum 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-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-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 and quarantine areas of the U.S.

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[3]

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

3 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

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: *Tuta 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 not to exceed 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[4]
2. Fruit must be grown and treated in Hawaii, under monitoring of an inspector, in a certified hot water immersion treatment tank.[5]
   - **A.** Fruit must be submerged at least 4 inches below the water's surface.

4 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."

5 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.[6]

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 immersion

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***—Adjusted Tank Temperatures from*Figure 6-1-1* on **page 6-5-3** that are 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***—Adjusted Tank Temperatures from*Figure 6-1-1* on **page 6-5-3** may fall as low as 113.7°F for no more than 10 minutes under emergency conditions.
- ***For treatments lasting 90 to 110 minutes***—Adjusted Tank Temperatures from*Figure 6-1-1* on **page 6-5-3** may fall as low as 113.7°F for no more than 15 minutes under emergency conditions.

6 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* on **page 5-2-52**, *Table 5-2-2* on **page 5-2-52**, or *Table 5-2-3* on **page 5-2-53**.

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
		401 to 570 grams	75 minutes
	Rounded varieties[3]	Up to 500 grams	75 minutes
		501 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
		376 to 570 grams	75 minutes
	Rounded varieties[3]	Up to 500 grams	75 minutes
		501 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
		376 to 570 grams	75 minutes
	Rounded varieties[3]	Up to 425 grams	75 minutes
		426 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

Heat Up Time:	90 minutes
Heat Up Recording Interval:	2 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	44 °C/111.2 °F
Dwell Time:	100 minutes
Dwell Recording Interval:	2 minutes
Cooling Method:	Hydrocooling optional

Size Restrictions	Standard Count	Max. Weight/Fruit		Max. Diameter
	bushel	grams	ounces	inches
Navel Orange	100 per 1 2/5	450	15.9	3 3/16
Orange (other than Navel)	100 per 1 2/5	468	16.4	3 13/16
Tangerine	120 per 4/5	245	8.6	—
Grapefruit	70 per 1 2/5	536	18.8	4 5/16

T103-b-1 Citrus from Hawaii

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

Treatment: T103-a-1 High temperature forced air

Heat Up Time:	4 hours
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.2 °C/117.0 °F
Dwell Time:	5 minutes
Dwell Recording Interval:	5 minutes
Cooling Method:	Forced air or Hydrocooling

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-a-1 High temperature forced air

Heat Up Time:	N/A
Heat Up Recording Interval:	2 minutes
Minimum Air Temperature:	50.0 °C/122.0 °F
Minimum Pulp Temperature at End of Heat Up:	48.0 °C/118.0 °F
Dwell Time:	2 minutes
Dwell Recording Interval:	2 minutes
Cooling Method:	Forced air or Hydrocooling
Size Restrictions:	Fruit weight must not exceed 1 1/2 lbs. (700 grams)

T103-d Mountain Papaya from Chile (T103-d-1) and Papaya from Belize and Hawaii (T103-d-2)

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

Treatment: T103-a-1 High temperature forced air

Heat Up Time:	4 hours
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.2 °C/117.0 °F
Dwell Time:	5 minutes
Dwell Recording Interval:	5 minutes
Cooling Method:	Forced air or Hydrocooling (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-a-1 High temperature forced air

Heat Up Time:	1 hour
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.2 °C/117.0 °F
Dwell Time:	20 minutes
Dwell Recording Interval:	5 minutes
Cooling Method:	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 T104-a-1 at 40-49°F because this schedule requires 4 lbs. of methyl bromide/1,000 ft^3. Whereas, the methyl bromide "Q" label allows a maximum of only 3 lbs. at this temperature range. Therefore, the oranges would have to be heated to at least 50°F before fumigation because at 50°F a dosage of only 3 lbs./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, surface feeding caterpillars and slugs[7]

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, these 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:

40°F or above (maximum dosage, 4 pounds/1,000 ft^3):
Apple, apricot[1], asparagus, **banana**, **blackberry**, cabbage, **cactus fruit (tuna)**, cantaloupe, **celery**, chayote, cherry, chestnut, **chicory**, cippollino, cucumber, **Dasheen**, **endive**, fava bean (dried), **fresh herbs**[2], grape, honeydew melon, **kiwi**, **leafy vegetables**, muskmelon, nectarine, peach, pear[3], pepper, pineapple, **plantain**, plum[1], **raspberry**, **snow peas**[4]**,** 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), clementine, coconut, corn-on-the-cob (Sweet corn), eggplant, garlic, **ginger**, grapefruit, green pod vegetables, horseradish, Jerusalem artichoke, kumquat, lemon, lime, mandarin, 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 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T104-a-1 provided they are treated as a **Section 18 Crisis Exemption.**

2 Refer to list of approved herbs on **page 5-2-28**.

3 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

4 Snow peas may be damaged at dosages higher than 3 lbs. Obtain the importers consent before fumigating at 4 lbs.

7 Quarantine-significant slugs of the families Agriolimacidae, Arionidae, Limacidae, Milacidae, Philomycidae, and Veronicellidae, including the following genera: *Agriolimax, Arion,Colosius, Deroceras, Diplosolenodese, Leidyula, Limax, Meghimatium, Milax, Pallifera, Pseudoveronicella, Sarasinula, Semperula, Vaginulus,Veronicella*. **Slugs must be treated at 60°F (2.5 lbs.) or above.**

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[1], asparagus, **banana**, **blackberry**, cabbage, cantaloupe, **celery**, chayote, cherry, chestnut, **chicory**, cipolini, cucumber, **dasheen**, **endive**, fava bean (dried), grape, **fresh herbs**[2], honeydew melon, **kiwi**, **leafy vegetables**, **lychee (litchi)**, muskmelon, nectarine, peach, pear[3], pepper, pineapple, **plantain**, plum[1], rambutan, **raspberry**, **snow peas**[4]**,** squash (summer, winter), stone fruit, sweet potato, watermelon.

70 °F or above (maximum dosage, 3 pounds/1,000 ft^3):
Bean, beet, carrot, clementine, citron (ethrog), coconut, corn-on-the-cob (sweet corn), eggplant, garlic, **ginger root**, grapefruit, green pod vegetables, horseradish, Jerusalem artichoke, kumquat, lemon, lime, mandarin, 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 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T104-a-2 provided they are treated as a **Section 18 Crisis Exemption.**

2 Refer to list of approved herbs on **page 5-2-28**.

3 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

4 Snow peas may be damaged at dosages higher than 3 lbs. Obtain the importers consent before fumigating at 4 lbs.

T105—Irradiation

Irradiation (IR) is an approved treatment for all imported fruits and vegetables and for fruits and vegetables moved interstate from Hawaii, Puerto Rico, and the U.S. Virgin Islands. In addition, irradiation can be used against particular pests (Refer to *Table 5-2-4* on **page 5-2-61**) of cut flowers and foliage, however, some damage may occur.

Treatment must be conducted at approved facilities in a foreign country, Hawaii, Puerto Rico, US Virgin Islands or any area in the US mainland that does not support fruit flies (any state except AL, AZ, CA, FL, GA[8], KY, LA, MS[8], NV, NM, NC[8], SC, TN, TX, or VA).

Refer to chapter *Certifying Irradiation Treatment Facilities* on **page 6-8-1** of this manual for facility certification requirements.

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, ISO/ASTM 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).

8 IR facilities may be located at the airport of Atlanta, GA, maritime ports of Gulfport, MS, and Wilmingon, NC, provided the conditions listed in CFR 305.31(b) are met.

The following table lists pest-specific minimum absorbed doses for use on any fruit, vegetable, cut flower or foliage:

TABLE 5-2-4 Pest-Specific Minimum absorbed dose (Gy)

Scientific Name	Common Name	Minimum Absorbed Dose (Gy)
Anastrepha ludens	Mexican fruit fly	70
Anastrepha obliqua	West Indian fruit fly	70
Anastrepha serpentina	Sapote fruit fly	100
Anastrepha suspensa	Caribbean fruit fly	70
Bactrocera cucurbitae	Melon fruit fly	150
Bactrocera dorsalis	Oriental fruit fly	150
Bactrocera jarvisi	Jarvis fruit fly	100
Bactrocera tryoni	Queensland fruit fly	100
Brevipalpus chilensis	False red spider mite	300
Ceratitis capitata	Mediterranean fruit fly	150
Conotrachelus nenuphar	Plum curculio	92
Cryptophlebia ombrodelta	Litchi fruit moth	250
Cryptophlebia illepida	Koa seed worm	250
Cylas formicarius elegantulus	Sweet potato weevil	150
Cydia pomonella	Codling moth	200
Euscepes postfasciatus	West Indian sweet potato weevil	150
Grapholita molesta	Oriental fruit moth	200
Omphisa anastomosalis	Sweet potato vine borer	150
Rhagoletis pomonella	Apple maggot	60
Sternochetus mangiferae	Mango seed weevil	300
	All other fruit flies of the family Tephritidae which are not listed above	150
	Plant pests of the class Insecta not listed above, except pupae and adults of the order Lepidoptera	400

The minimum absorbed dose for the most-tolerant unmitigated pest is required if more than one pest is present. Refer to *Table 5-2-4* on **page 5-2-61** to determine the required minimum absorbed dose. For example, if a shipment of grapes is infested with both Mediterranean fruit fly and codling moth, the commodity would be irradiated using a minimum dose of 200 Gy.

T105-a-1 Various Commodities

Treatment:T105-a-1 (IR @ 150 Gy)

Pests: All fruit flies from the family Tephritidae (Refer to Table 5-2-4 for other pests that can be treated at 150 Gy or less.) Treat using a minimum absorbed dose of 150 Gy, not to exceed 1000 Gy.

Important

Refer to the **Hawaii/CNMI Manual** for detailed inspection procedures and additional entry requirements for pests not managed by 150 Gy or when a 400 Gy dose may be used instead.

TABLE 5-2-5 Origin and Approved Commodity List for 150 Gy

Origin	Commodity
Hawaii	Abiu, Atemoya, Banana, Breadfruit, *Capsicum* spp., Carambola, *Cucurbita* spp., Curry Leaf, Dragon fruit, Eggplant, Jackfruit, Litchi, Longan, Mangosteen, Melon, Moringa pods (Drumstick), Papaya, Pineapple, Rambutan, Sapodilla, Sweet Potato, and Tomato[1]

1 In addition to these commodities, commodities that are currently admissable with a treatment or systems approach could also use irradiation as an alternative treatment, provided all the pests targeted by the treatment or systems approach are nuetralized by the irradiation dose.

T105-a-2 Various Commodities

Treatment: T105-a-2 (IR @ 400 Gy)

Pests: Fruit flies from the family Tephritidae and all insect pests **except** adults and pupae of the order Lepidoptera

Treat using a minimum absorbed dose of 400 Gy, not to exceed 1000 Gy.

TABLE 5-2-6 Origin and Approved Commodity List for 400 Gy

Origin	Commodity
Ghana	Eggplant, Okra, Pepper
Hawaii	Banana, Breadfruit, Cowpea (pod), Dragon fruit, Jackfruit, Mangosteen, Melon, Moringa pods (Drumstick), and Sweet Potato
India	Mango
Thailand	Litchi, Longan, Mango, Mangosteen, Pineapple, Rambutan
Viet Nam	Dragon Fruit

T105-a-3 Various Commodities

Treatment: T105-a-3 (IR @ 300 Gy)

Pests: *Sternochetus mangiferae* (Mango seed weevil), and all fruit flies from the family Tephritidae

Treat using a minimum absorbed dose of 300 Gy, not to exceed 1000 Gy.

TABLE 5-2-7 Origin and Approved Commodity List for 300 Gy

Origin	Commodity
Hawaii	Mango

T106—Vapor Heat

T106-a Various Commodities from Mexico: Clementine (T106-a-1), Grapefruit (T106-a-2), Mango (Manilla variety only; T106-a-3), Orange (T106-a-4)

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

Treatment: T106-a-1 Vapor heat

Heat Up Time:	8 hours
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	43.3 °C/110.0 °F
Dwell Time:	6 hours
Dwell Recording Interval:	5 minutes
Cooling Method:	N/A

T106-b Bell Pepper (T106-b-1), Eggplant (T106-b-2), Mountain papaya (T106-b-3), Papaya (T106-b-4), Pineapple (T106-b-5), Squash (T106-b-6), Tomato (T106-b-7), Zucchini (T106-b-8)

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

Treatment: T106-b-1 Vapor heat

Heat Up Time:	N/A
Heat Up Recording Interval:	N/A
Minimum Air Temperature:	112.0 F
Minimum Pulp Temperature at End of Heat Up:	44.4 °C/112.0 °F
Dwell Time:	8.75 hours
Dwell Recording Interval:	5 minutes
Cooling Method:	Optional

Important

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

T106-a-1-1 Clementine or Orange from Mexico

Treatment: T106-a-1-1 Vapor heat

Heat Up Time:	6 hours[1]
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	43.3 °C/110.0 °F
Dwell Time:	4 hours
Dwell Recording Interval:	5 minutes
Cooling Method:	N/A

1 During the initial raising of fruit temperature, the temperature should be raised rapidly in the first 2 hours; the increase over the next 4 hours should be gradual.

T106-f Litchi from Hawaii

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

Treatment: T106-f Vapor heat

Heat Up Time:	1 hour
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.2 °C/117.0 °F
Dwell Time:	20 minutes
Dwell Recording Interval:	5 minutes
Cooling Method:	Cool water spray

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

Heat Up Time:	4 hours
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	46.0 °C/114.8 °F
Dwell Time:	10 minutes
Dwell Recording Interval:	1 minute
Cooling Method:	Hydrocooling optional

T106-d Mango from Taiwan

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

Treatment: **T106-d** Vapor heat

Heat Up Time:	N/A
Heat Up Recording Interval:	N/A
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.5 °C/115.7 °F
Dwell Time:	30 minutes
Dwell Recording Interval:	5 minute
Cooling Method:	Cooling required

T106-c Papaya

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

Treatment: T106-c Vapor heat

Heat Up Time:	4 hours
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.2 °C/117.0 °F
Dwell Time:	N/A
Dwell Recording Interval:	N/A
Cooling Method:	Optional

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

Heat Up Time:	4 hours
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	46.0 °C/114.8 °F
Dwell Time:	20 minutes
Dwell Recording Interval:	5 minutes
Cooling Method:	Hydrocooling optional[1]

1 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

Heat Up Time:	1 hour
Heat Up Recording Interval:	5 minutes
Minimum Air Temperature:	N/A
Minimum Pulp Temperature at End of Heat Up:	47.2 °C/117.0 °F
Dwell Time:	20 minutes
Dwell Recording Interval:	5 minutes
Cooling Method:	Optional

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[9], Avocado, Blueberry, Cape Gooseberry, Cherry, Ethrog, Grape, Grapefruit, Kiwi, Lemon, Loquat, Litchi (Lychee), Nectarine, Orange, Ortanique, Peach, Pear, Persimmon, Plum[9], 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°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[10], Blueberry, Cherry, Grape, Grapefruit, Kiwi, Mandarin, Nectaine, Orange, Peach, Pear, Plum[10], 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

9 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T107-a.

10 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T107-a-1.

T107-b

Apple, Apricot[11], Cherry, Ethrog, Grapefruit, Litchi, Longan, Orange, Peach, Persimmon, Plum[11], 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[12], Carambola, Cherry, Grape, Grapefruit, Orange, Pomegranate, Tangerine (includes Clemetine)

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

11 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T107-b.

12 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T107-c.

T107-e Apricot[13], Grape, Nectarine, Peach, Plum[13]

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-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-h Carambola, Litchi (Lychee), Longan, Sand Pear

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

Treatment: **T107-h** Cold treatment

Temperature	Exposure Period
33.8°F (0.99°C) or below	17 days
34.5°F (1.38°C) or below	20 days

13 **Pluots** and **plumcots** are considered hybrids of plums and apricots and can be treated using T107-e.

T107-j Carambola, Litchi (Lychee), Longan, Sand Pear

Pest: *Bactrocera dorsalis* (Oriental fruit fly)

Treatment: **T107-j** Cold treatment

Temperature	Exposure Period
33.8°F (0.99°C) or below	15 days
34.5°F (1.38°C) or below	18 days

NOTICE

Use T107-j when *Bactrocera dorsalis is* the **ONLY** pest of concern that is identified by APHIS PPQ import requirements.

T107-g Pecans and Hickory Nuts

Pest: *Curculio caryae* (Pecan weevil)

Treatment: **T107-g** Cold treatment

Temperature	Exposure Period
0°F (-17.78°C) or below	7 days

T107-f Ya Pear from China

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

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[14], Avocado, Cherry, Grape, Kiwi, Nectarine, Peach, Pear[15], Plum[14], 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°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 from a 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.

14 **Plumcot** and **pluot** are considered hybrids of plums and apricots and may also be treated using T108-a provided they are treated under a **Section 18 Crisis exemption.**

15 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

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[16]

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

Important

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

16 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

T109—Cold Treatment Plus Fumigation of Fruits

T109-d-1 Apple, Grape, and Pear[17] 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°C)	3 lbs	44	36

Alternate treatment for *Austrotortrix* and *Epiphyas* is fumigation plus refrigeration (*T108-b* on **page 5-2-76**).

Alternate treatment for grapes from Australia as a fruit fly precautionary treatment for *Bactrocera tryoni* and *Ceratitis capitata* is fumigation plus refrigeration (*T108-a* on **page 5-2-74** and *T108-b* on **page 5-2-76**).

NOTICE

Load not to exceed 80% of capacity.

17 Fumigation may cause **severe** damage to Chinese, Japanese, Asian and Sand Pears. Obtain the importer's consent before fumigation.

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% 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°C) above	3 lbs	44	36

T109-a-2

Treatment: **T109-a-2** (apples in only cardboard cartons at maximum load factor 40% 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°C) above	2 lbs 6 oz	35	29

T110—Quick Freeze

There are two alternative Quick Freeze treatments, depending on whether the commodity is to be treated and released or destroyed. The commodities listed in Figure 5-2-1 below are not eligible for this treatment:

Important

Avocados with seeds are prohibited from South America, Central America, or Mexico; **Citrus with peel** is prohibited from Afghanistan, Andaman Islands, Argentina, Bangladesh, Brazil, Cambodia, China (People's Republic of), Comoros, Côte d'Ivoire, Federated States of Micronesia, 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, and 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, and Turkey.

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.

FIGURE 5-2-1 Commodities Ineligible for Quick Freeze Treatment

T110-a

Treatment: T110-a — Quick Freeze

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 (except for the commodities listed in Figure 5-2-1) are enterable from all foreign countries after receiving this 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.

Freezing will ruin the market quality of most fresh fruits and vegetables, except for thick-skinned items such as durian and coconut. Generally, this treatment is used on fruits and vegetables that will be processed into another form (e.g., for puree, juice, or mashed vegetables).

T110-b

Treatment: **T110-b** — Quick Freeze for Destruction

Important

T110-b may ONLY be used with permission from CPHST Treatment Quality Assurance Unit.

Contact 919-855-7457 for offical approval.

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.
3. After treatment, transport the commodity to a landfill for deep burial.

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 in the **Figure 5-2-1 on page-5-2-79** at the beginning of this treatment schedule.