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Post-Harvest Drenching to Certify Containerized or Balled and Burlap Nursery Plants in the Federal Imported Fire Ant Quarantine

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I. BACKGROUND

Nursery plants are potential routes for the movement of imported fire ants because the ants are readily concealed in soil or potting media (*e.g.*, pine bark). To prevent the spread of fire ants to new areas, the Federal Imported Fire Ant Quarantine (FIFAQ) requires the treatment of both balled and burlap (B&B) or containerized nursery stock (with soil or potting media) if moved from the FIFAQ-regulated-area to a non-regulated-area. One method approved for certifying both B&B and containerized nursery stock is a post-harvest drench with an U.S. Department of Agriculture (USDA) approved insecticide active ingredient. The drench treatments serve to eliminate existing fire ant colonies that may be hiding in the nursery stock soil or potting media and to prevent new infestations.

II. CONTAINERIZED NURSERY STOCK DRENCH TREATMENTS

A) Container Approved Insecticides. Bifenthrin and chlorpyrifos are the only insecticide active ingredients approved for FIFAQ drench treatment of containerized nursery stock, which are also available for use in Tennessee. Bifenthrin products currently available in Tennessee with label wording that allows container drenching for the FIFAQ include:

- Attain® Nursery Insecticide/Miticide Microemulsion
- Attain® Nursery CA Insecticide/Miticide Microemulsion
- Quali-Pro™ Bifenthrin Nursery 7.9 Flowable
- Up-Star® SC Lawn and Nursery Insecticide/Miticide
- Menace® GC 7.9% Flowable
- Talstar® Select Insecticide
- Wisdom® Flowable

Chlorpyrifos products currently available in Tennessee for the container drench include:

- Quali-Pro™ Chlorpyrifos 4E
- Chlorpyrifos E-Pro 4 Insecticide
- Chlorpyrifos E-Pro 2 Insecticide

B) Container Drench Procedure. Each container must receive a single drench treatment equal to 1/5 (*i.e.*, 20%) of the container volume. Both the container and soil/media must be drenched (*i.e.*, do not remove plants from the container before drenching). To accurately dispense the correct container volume, a metering device can be used. If it is not possible to measure the drench volume with a metering device, you can approximate the amount of time it takes to dispense the desired solution volume using a count method. The time approximation can be performed by verbally counting (1 Mississippi, 2 Mississippi, 3 Mississippi, etc.) as you dispense water into a measuring container until you achieve the desired solution volume. Then, use this time count while you are drenching your nursery plants to ensure that you apply approximately the right amount of solution per plant. If the volume of your particular container

is unknown, use the following procedure to determine the correct amount of drench solution per container:

1) Place a trash bag inside an empty container of the same size to be treated.
2) Fill the trash bag with water up to the point where the potting soil/media normally stops.
3) Pour the water from the trash bag / container into a measuring container.
4) Multiply the volume in the measuring container by 0.2. The value will be the correct drench amount for the given container size (in the same unit used to measure the water).

C) Container Drench Rates, Exposure Period, and Certification Periods.

1) Chlorpyrifos:
    a) Rates. Chlorpyrifos container drenches are applied at a rate of 4 fl oz/100 gallons water for Quali-Pro™ Chlorpyrifos 4E or Chlorpyrifos E-Pro 4 Insecticide. Chlorpyrifos container drenches are applied at a rate of 8 fl oz/100 gallons water for Chlorpyrifos E-Pro 2 Insecticide.
    b) Exposure Period. Plants are certified for shipping after completion of the chlorpyrifos container drench. However, these chlorpyrifos labels have a 24 hour restricted entry interval for post-treatment handling of treated plants.
    c) Certification Period. Plants are certified for 30 days post-treatment.

2) Bifenthrin:
    a) Rates. Bifenthrin container drenches require a dose rate of 25 parts per million bifenthrin, which is based on the dry weight bulk density of the potting media. To determine dry weight bulk density of your potting media, collect a total of about 0.5 gallons of potting media from at least five different locations in your potting media supply, securely bag the media, place in a box, and mail to:

        USDA-APHIS Plant Protection and Quarantine, Analytical and Natural Products Chemistry Laboratory, 3505 25th Avenue, Building 4, Gulfport, MS 39501. Include the following information with your sample:
        - Nursery name, mailing address, and physical address
        - Phone number (e-mail address if available)
        - Date sample collected
        - Results returned to attention of (Note: results will be returned free of charge after the analysis is completed)
        - Basic media components (*e.g.*, % pine bark, peat moss, sand, etc.)
        - Additional remarks (Indicate previous pesticide treatments of media)

    To determine the correct fl oz of bifenthrin to mix with 100 gallons water, multiply the potting media bulk density (lb/yd^3) by 0.012. For example, if your potting media bulk density result was 600 lb/yd^3, then $600 \times 0.012 = 7.2$ fl oz of bifenthrin/100 gallons water (and this solution would then be applied to each container in a volume equal to 20% of the container size volume). [**Note:** The 0.012 multiplication factor only works with a bifenthrin 7.9% formulation. All bifenthrin products currently available for use in the FIFAQ and in Tennessee are 7.9% bifenthrin formulations. If new bifenthrin products enter the market with labeling that permits FIFAQ drenching, but with formulations other than 7.9% bifenthrin, then the 0.012 multiplication factor will not give the correct amount of bifenthrin to use].
    b) Exposure Period. Plants are certified for shipping after completion of the bifenthrin container drench. However, these bifenthrin labels have a 12 hour restricted entry interval for post-treatment handling of treated plants.
    c) Certification Period. Plants are certified for 180 days post-treatment.

III. BALLED AND BURLAPPED (B&B) NURSERY STOCK DRENCH TREATMENTS

A) B&B Approved Insecticides. Chlorpyrifos is the only insecticide active ingredient approved for drench treatment of B&B nursery stock in the FIFAQ at the present time. Chlorpyrifos products that are currently available in Tennessee with label wording that allows B&B drenching for the FIFAQ include:

- Quali-Pro™ Chlorpyrifos 4E
- Chlorpyrifos E-Pro 4 Insecticide
- Chlorpyrifos E-Pro 2 Insecticide.

B) B&B Drench Procedure. Each B&B root ball must be treated to the "point-of-runoff" with a chlorpyrifos solution twice daily for three consecutive days. "Point-of-runoff" means that the solution runs off of the B&B plant on all sides following the drench and that the root ball is thoroughly wetted. The volume of solution needed to achieve runoff during each drench depends on the B&B root ball size, but typically is about 1/30 (*i.e.*, 3.3%) of the total B&B root ball volume (Table 1). At the completion of six drenches applied at runoff, a total solution volume equivalent to 1/5 (*i.e.*, 20%) of the B&B root ball volume should have been applied to each root ball (Table 1). Table 1 is intended to provide a guide of how much solution volume will be needed to achieve runoff and is not an absolute volume standard. Burlap and wire baskets should remain on the plants during the drenching process. A surfactant or wetting agent will increase the effectiveness of the drench treatment. Recent research indicates rotation of the B&B root ball (*e.g.*, after the third consecutive drench) will greatly improve the effectiveness of treatment by allowing direct drenching of the opposite side of the B&B root ball. Although not presently required by the FIFAQ, rotating the B&B root ball is recommended as a best management practice to reduce the likelihood of shipping fire ants. It is possible that root ball rotation may become mandatory in the future based on the improved control that has been demonstrated.

C) B&B Drench Rates, Exposure Period, and Certification Periods

Chlorpyrifos:

a) Rates. Chlorpyrifos B&B drenches are applied at a rate of 4 fl oz/100 gallons water for Quali-Pro™ Chlorpyrifos 4E or Chlorpyrifos E-Pro 4 Insecticide. Chlorpyrifos B&B drenches are applied at a rate of 8 fl oz/100 gallons water for Chlorpyrifos E-Pro 2 Insecticide.

b) Exposure Period. Plants are certified for shipping after completion of the chlorpyrifos B&B drench. However, these chlorpyrifos labels have a 24 hour restricted entry interval for post-treatment handling of treated plants.

c) Certification Period. Plants are certified for 30 days post-treatment.

IV. DRENCH EQUIPMENT

A breaker nozzle mounted on a drench wand is a good method to apply drench solutions (Figs. 1A - 1D). A drench wand with an on-off switch is useful for stopping drenching activities (Fig. 1E). Adding a second on-off switch, which can be left "always-on", allows you to keep your flow setting each time you stop your drench activities (Fig. 1E). A specific flow setting also enables you to consistently dispense the same quantity of drench solution for a given amount of time. On-off valves with a longer lever may make the task easier.

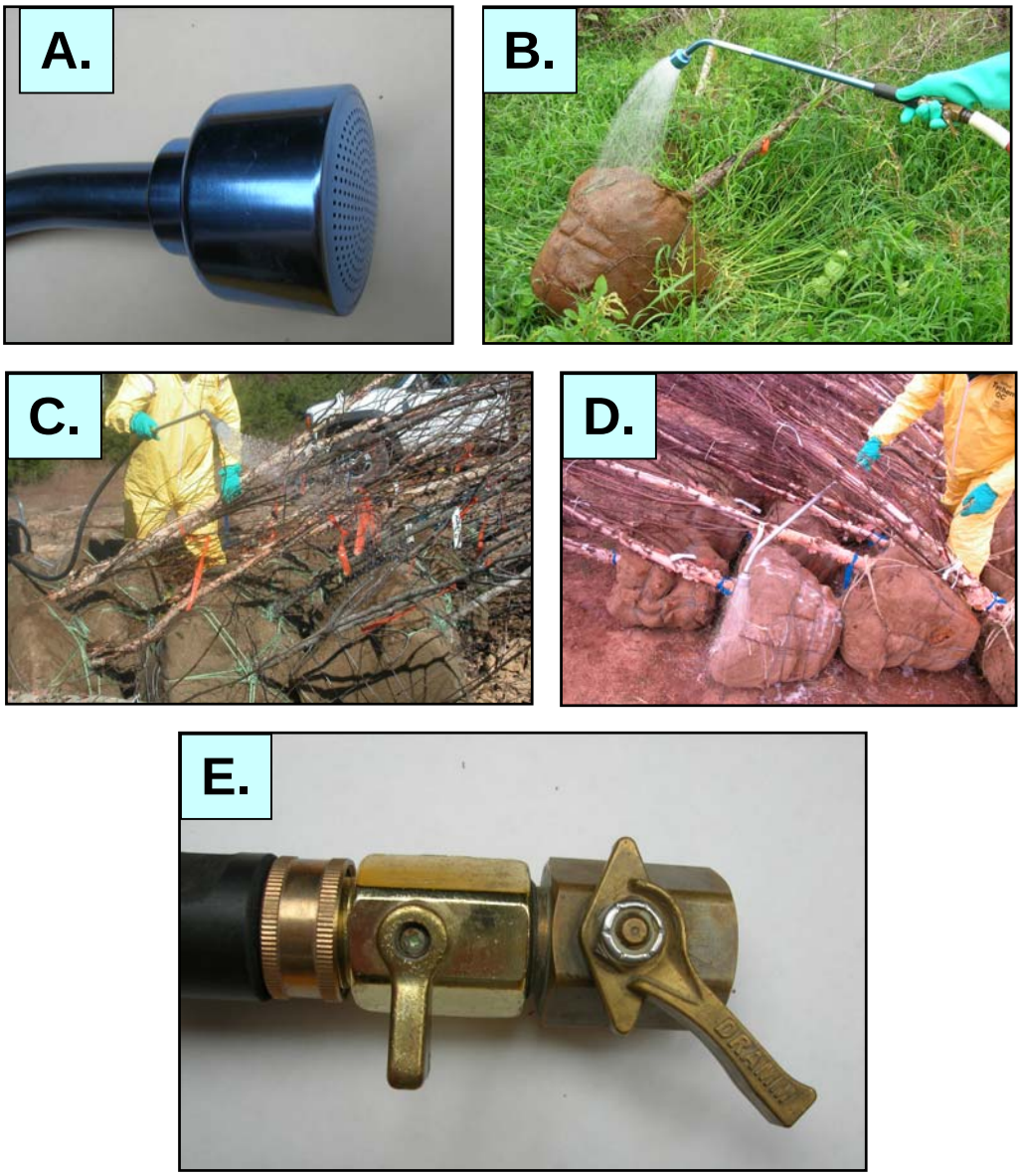

Fig. 1. Images of A) a water breaker or shower head type nozzle on the end of a drench wand, B), C), and D) drenching 24-inch diameter B&B plants with a drench wand and water breaker or shower type nozzle, and E) a hose with two on-off valves (one for turning the drench off and on and another to set the flow rate).

Table 1. Guide to the Approximate Drench Volumes Needed to Achieve "Point-of-Runoff" for Common Balled and Burlapped (B&B) Basket Sizes.

Common B&B Basket Sizes (Inches) [a]			Total B&B Basket Volume	Total Solution Needed to Achieve "Point-of-Runoff" on **One** B&B Root Ball at the Given B&B Basket Size [c]					
				Each Drench (1/30 or 3.3% of Total B&B Volume)			Six Drenches (1/5 or 20% of Total B&B Volume		
Top	Bottom	Height	(Gallons) [b]	Gallons	Fluid Ounces	Milliliters	Gallons	Fluid Ounces	Milliliters
16	8	10	5.1	0.17	22	641	1.0	130	3,844
17	10	11	7.0	0.23	30	879	1.4	178	5,276
20	12	12	10.7	0.36	45	1,345	2.1	273	8,072
22	15	13	15.3	0.51	65	1,932	3.1	392	11,589
25	10	12	13.3	0.44	57	1,673	2.7	339	10,039
25	13	16	20.3	0.68	87	2,560	4.1	519	15,362
28	14	13	20.2	0.67	86	2,551	4.0	517	15,304
30	17	18	34.7	1.16	148	4,373	6.9	887	26,240
32	15	15	29.4	0.98	125	3,709	5.9	752	22,253
34	21	24	62.9	2.10	268	7,932	12.6	1,609	47,589
40	20	23	73.0	2.43	311	9,209	14.6	1,868	55,257
60	22	26	159.3	5.31	679	20,093	31.8	4,076	120,556

[a] B&B wire basket dimensions were common sizes available at a wire basket distributor. Height was measured to the top of the basket slightly above where the basket tie down flaps fold over. The row highlighted in gray is the basket size for a standard 24-inch diameter B&B.

[b] B&B volume was calculated using the formula for a truncated cone, which approximates the shape of a B&B root ball, where volume in gallons = (pi (R2 + rR + r2) h / 3) x 0.004329. [R = Radius of top of cone; r = radius of bottom of cone; h = height of cone; pi = 3.1415926535; and 0.004329 = conversion factor from cubic inches to gallons].

[c] Point-of-runoff is required for each plant drenched by the Federal Imported Fire Ant Quarantine when post-harvest treating B&B nursery stock. A "point-of-runoff" volume is equal to about 1/30 or 3.3% of the total root ball volume of each root ball. The Federal Quarantine drench protocol also requires B&B root balls to receive a twice daily for three consecutive days drench in chlorpyrifos for a total of six drenches (*i.e.*, 1/5 or 20% of the total root ball volume of each root ball). The drench solution must be mixed at a rate of 4 fl oz / 100 gal water for Quali-Pro™ Chlorpyrifos 4E or Chlorpyrifos E-Pro 4 Insecticide; or 8 fl oz / 100 gal water for Chlorpyrifos E-Pro 2 Insecticide.

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For more information, contact your local Tennessee State University or University of Tennessee county Agricultural Extension agent. Additional information may be obtained at:

Tennessee State University, School of Agriculture and Consumer Sciences, Cooperative Extension Program, 3500 John A. Merritt Blvd., Box 9635, Nashville, TN 37209-1561
http://agfacs.tnstate.edu/uno/Extension.html

The University of Tennessee Institute of Agriculture, 2621 Morgan Circle, 101 Morgan Hall, Knoxville, TN 37996
http://agriculture.tennessee.edu/

Precautionary Statement

To protect people and the environment, pesticides should be used safely. This is everyone's responsibility, especially the user. Read and follow label directions carefully before you buy, mix, apply, store or dispose of a pesticide. According to laws regulating pesticides, they must be used only as directed by the label.

Disclaimer

This publication contains pesticide recommendations that are subject to change at any time. The recommendations in this publication are provided only as a guide. It is always the pesticide applicator's responsibility, by law, to read and follow all current label directions for the specific pesticide being used. The label always takes precedence over the recommendations found in this publication. Likewise, the Federal Imported Fire Ant Quarantine also takes precedence over the recommendations in this publication. FIFAQ regulations can change, so you should refer to the FIFAQ or the USDA-APHIS Program Aid for Fire Ant Quarantine Treatments for Nursery Stock for updated or additional information, available at: (http://www.aphis.usda.gov/publications/plant_health/content/printable_version/IFA2007.pdf). Use of trade or brand names in this publication is for clarity and information; it does not imply approval of the product to the exclusion of others that may be of similar, suitable composition, nor does it guarantee or warrant the standard of the product. The author(s), Tennessee State University, the University of Tennessee Institute of Agriculture and University of Tennessee Extension assume no liability resulting from the use of these recommendations.

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