

**I) The First Fungicide Treatment**

- A)** The first field-application of the fungicide treatment of zinc-copper-lime treatment is **required** for all oranges planned for exportation to Korea.
- B)** The treatment **must be made between October 15 and November 30, 2009**, for all California oranges (Navels and Valencias) shipped to Korea.
- C)** Specifically, **the zinc-copper-lime treatment can be made as follows (see Table 1):**
1. When using zinc sulfate (neutral and acidic forms) and copper hydroxide, copper oxide, or basic copper sulfate (i.e., **fixed or basic coppers**):
    - (a) The rate of metallic zinc equivalent (mze) must contain a minimum of 2.5 lbs mze per acre. The rate of metallic copper equivalent (mce) per acre must be a minimum of 1.65 lbs mce per acre. A minimum of 2 lbs hydrated lime should be added when using 1.65 lbs copper (mce) and a minimum of 4 lbs hydrated lime when using 4 lbs copper (mce) per acre. The material must be applied as a dilute application of no less than 400 gallons per acre.
    - (b) Higher rates of zinc, copper and lime may be used as local conditions warrant or if higher disease levels were experienced last season. Field observations of Septoria spot symptoms on fruit or a positive detection of the disease based on the NAVEK report last season indicates potentially higher inoculum levels going into this growing season. Rates should not exceed manufacturers' labeled rates (See the attached Tables).
  2. **Bordeaux sprays** with the addition of zinc also meet the preharvest requirements for exporting oranges to Korea in accordance with UC guidelines. If zinc-copper Bordeaux applications are used, 3.3 lbs metallic zinc, 1.65-2.45 lbs metallic copper, and 20-67 lbs hydrated lime per acre in dilute application of no less than 400 gal/acre will meet the minimum requirement. (See Table 2)
  3. Remember the **mix order of these ingredients: zinc, then copper, followed by lime.**
  4. **Adjusted spray requirements for young trees** (6 years old or less). If the orange trees have been planted less than or equal to six years ago, the following modification to the copper spray may be applied. Using the zinc-copper-lime formulation instructions posted on the CCQC website, you may apply 200-400 gallons to blocks of young trees (one to six years after planting). It is suggested that you turn off the nozzles that would have gone over the top of the young trees. Full tree coverage is, however, still required
- D) The spray must cover the entire tree canopy.** Skirt sprays are not acceptable and would render any block treated by this procedure ineligible for the Korea program. All active ingredients in the spray mix (i.e., zinc, copper, and lime) are required to be reported to the county. This spray record information for all three ingredients must be available at the packinghouse before any phytosanitary certificate can be issued.

**II) The Second and Third Fungicide Treatments**

- A)** The second and third field-application of the fungicide zinc-copper-lime treatments (additional tables similar to Tables 1 and 2 will be provided to the industry as the season progresses) or **USDA-APHIS approved efficacious alternatives** will only be required if the **UC-based**

**forecast model for Septoria spot indicates sufficient risk for disease.** You will be notified as conditions warrant. For the alternative materials to copper-zinc-lime treatments, industry and UCCE newsletters will announce their legal availability. Follow label and regulatory instructions. Additional applications may be required depending on the occurrence of favorable environmental conditions for disease development.

- B) Timing of the second and third fungicide treatment will be based on the accumulation of temperatures below -1°C and subsequent accumulation of precipitation (mm). Categories 1 to 4 represent increasing risk for disease. Advisories will be made at category 1 (green) or 2 (yellow) based on actual or highly probable, forecasted weather conditions. The following is the risk assessment table that will be followed:**

**Numerical Risk Model for forecasting Septoria Spot**

Hrs with T < -1 C	Precipitation (mm)				
	31-60	61-90	91-120	121-150	151-180
<10	0	1	2	3	4
10-20	1	2	3	4	4
21-30	2	3	4	4	4
>30	3	4	4	4	4

- C) Timing of the second and third applications based on environmental monitoring is critical for effective management.** Once favorable environmental conditions have occurred, the application of preventative treatments must be made within the allocated time period to protect fruit (approximately 30-45 days). Please monitor for industry announcements by checking e-mail and visiting CCQC and CCM websites frequently in December, February, and March.

1. **Strict enforcement of application timings will be followed.** Grower lots not in compliance **will be eliminated** from the program for the rest of the growing season.
2. **There will be no extensions** once the allotted time period for the application has passed.
3. When growers elect not to apply the second or third application, **additional NAVEK lab testing of grower lots may be required** resulting in shorter time periods between lab submissions (**e.g. 20-35 days**). Environmental conditions will dictate the need for submitting additional samples of oranges that will not receive a required second or third application. This requirement, if needed, will be stipulated in the announcements for the second and third treatment applications.

**III) Copies of the Pesticide Use Reports for applications of zinc, copper, and lime or approved alternatives (see above) must be on file at the packing facility prior to issuance of the Federal Phytosanitary Certificate.**

**IV) Evaluation and sampling guidelines:**

- A) All grower lots from Fresno and Tulare Co. and orange orchards North of Highway 176 E or Highway 58 W of Bakersfield in Kern Co., as well as, all lots previously identified as positive in Kern Co., must be evaluated by field scouting and samples must be collected and submit to the NAVEK lab. Submitted samples of fruit must have symptoms.**

1. Follow the guidelines for Categories I, II, III, and IV (refer to the Septoria Symptom Handout on CCQC's website at [www.citrusresearch.com](http://www.citrusresearch.com)). Do not submit fruit with Category V (other than mechanical injuries for early season fruit) or fruit that are symptom-less. Any lot found positive in Korea for Septoria spot in the last season (2008-09) will need to go through **re-participation** procedures – a 2X sampling of fruit for the first collection sample.
  2. Fruit samples from Kern Co. that are required for compliance with the “Work Plan” will be included in the packinghouse allocations. See VI-G below.
- B) Grower lots in other areas of Kern Co. (South of Highway 176 E or Highway 58 W of Bakersfield)**
1. Normal scouting practice: Scouting should be done (***strongly recommended***) as described in IV(A) above for all grower lots planned for shipment to Korea. Fruit samples may be ***voluntarily*** submitted to the NAVEK lab for evaluation.
  2. Fruit samples from these latter Kern Co. areas as described above will not be included in the packinghouse allocations. See VI-G below.
- C) All samples must be submitted with a completed 2009-10 NAVEK Sampling Labeling Form. We strongly recommend using the online form which includes GPS information, as well as helpful prompts and multiple choices that assist packinghouses in filling out and submitting the form correctly. Using this form reduces overall costs of the NAVEK program to the industry.**
- D) Evaluation and collection of fruit. Fifty fruit on 20 trees in each grower lot must be directly evaluated on the tree for Septoria spot following symptom Categories I-IV.**
- Fruit samples must also be taken as follows:
1. **For fruit shipments to Korea through Feb. 7th:**
    - a) **Normal sampling practice:** For grower lots shipped to Korea that were negative for Septoria spot last year, samples must consist of 20 fruit (as described in 1 A above).
    - b) **Re-participation requirements:** For grower lots found positive for Septoria spot last year (in NAVEK or NPQS), samples must consist of 40 fruit (as described in 1 A above). This is a 2X sample for the first submitted sample of the year. After clearance of the first sample, subsequent samples submitted will follow as described in “1a” above (if lot was cleared prior to Feb. 7, only 30 pieces of fruit are required)
  2. **For fruit shipments to Korea after Feb. 7th:**
    - a) **Normal sampling practice:** For grower lots shipped to Korea that were negative for Septoria spot last year, samples must consist of 30 fruit (as described in 1 A above).
    - b) **Re-participation requirements:** For grower lots found positive for Septoria spot last year (in NAVEK or NPQS), samples must consist of 60 fruit (as described in 1 A above). This is a 2X sample for the first submitted sample of the year for any grower lot. After clearance of the first sample, subsequent samples submitted will follow as described in “2a” above.
- E) Sample frequency, incubation duration, and longevity of test.** Upon submission of the sample, fruit will be pre-screened for signs of the pathogen. Fruit tissue with symptoms will then be subjected to a 7-day incubation test or a molecular assay.
1. If Septoria spot is found in a grower lot, then the lot is considered **positive** and thus, fruit harvested from this grower lot **cannot** be shipped to Korea.

2. If Septoria spot is not found in a grower lot, then the lot is considered **negative** and thus, fruit harvested from this grower lot can be shipped to Korea within **45 days** from the date the report is issued from the incubation lab.
3. If fruit is harvested from a sampled grower lot after 45 days from the first report date, then a second sample must be submitted.
4. **It is highly recommended that shorter intervals be used (e.g. 35 days) for fruit sampled in Feb. and March.**

#### F) Sampling method (trees and fruit to evaluate in the field) and design.

1. **Total number of trees to be evaluated per grower lot = 20.**
2. **Total number of fruit to be evaluated per tree = 50.**
3. Fruit numbers to collect (see above IC)
  - a) **Normal sample:**
    - i. Through Feb. 7: Total number of fruit to collect with symptoms = 20 (C1a) or **1 fruit per tree.**
    - ii. After Feb. 7: Total number of fruit to collect with symptoms = 30 (C2a) or **1 fruit for odd-numbered trees and 2 fruit for even-numbered trees.**
  - b) **Re-participation sample:**
    - i. Through Feb. 7: Total number of fruit to collect with symptoms = 40 (C1b) or **2 fruit per tree.**
    - ii. After Feb. 7: Total number of fruit to collect with symptoms = 60 (C2b) or **3 fruit per tree.**
4. **Sampling design:**
  - a) Count the total number of rows and divide by 4 (e.g.,  $100/4 = 25$ ). Rows 25 and 75 will be sampled. For fractions, round up.
  - b) Count the total number of trees/row and divide by 10 (e.g.,  $100/10 = 10$ ). Thus, every 10th tree will be sampled.
  - c) Number fruits collected 1-20 or 1-30 for normal sample. Number fruit collected 1-40 or 1-60 for re-participation sample. Use a felt-tip marker or Sharpie.
  - d) **Summary:** A "U" shaped walking pattern can be done through the grove to bring the person sampling back to or near the starting point.

#### G) Limits on samples submitted to the incubation lab per week.

Sample allocations will be determined by CCQC and will be sent individually and confidentially to each packinghouse by e-mail. Allocations apply to all fruit samples from Fresno County, Tulare County, Kern County north of Highway 176 East or Highway 58 West, and lots found positive in Korea last season. All other fruit samples are voluntary and will not be included in the allocations (thus, they will be considered additional samples to the allocated samples for each packinghouse).

#### V) Postharvest Management Guidelines:

- A. **Fruit treatments** - All fruit destined for Korea upon arrival in the packinghouse must have the following treatments:
  1. **Wash with chlorinated water.**
    - a) Free chlorine must be 100-200 ppm.
    - b) Recommended pH of 7-8.
  2. **Treated with postharvest fungicides.**
    - a) TBZ and/or azoxystrobin must be applied in an aqueous application prior to a fruit coating and/or in a fruit coating or wax. The fruit coating must also include either imazalil (e.g., Fungaflor, Deccocil, Freshgard, etc.), fludioxonil (e.g., Graduate), pyrimethanil (e.g., Penbotec). A pre-mixture of pyrimethanil-

imazalil (e.g., Philabuster) **must** include TBZ or azoxystrobin. The pre-mixture of fludioxonil and azoxystrobin known as Graduate A+ (azoxystrobin and fludioxonil) may be used with or without TBZ in an aqueous application and/or in the fruit coating treatment.

b) TBZ rates: Aqueous (200 – 400 ppm) or fruit coating (3500 – 5000 ppm).

3. **Residues of greater than or equal to 1 ppm of each fungicide must be obtained.**
4. **Current United States and Codex tolerances of postharvest fungicides on orange:**

Crop	Fungicide	US	Codex
Orange	Azoxystrobin	10	15
	Fludioxonil	10	7
	Imazalil	10	5
	Pyrimethanil	10	7
	Thiabendazole	10	7

**B. Grading - All fruit destined for Korea must be graded.**

1. Fruit found in Categories I-II must be evaluated at the NAVEK incubation lab or by an inspector with the County Agricultural Commissioner to determine if the lot should be further considered for Korean export.
2. Lots containing ice-marked fruit as shown in Category IV F-J must not be shipped to Korea and must be diverted to other markets.

**C. Fruit Storage – Recommendations for fruit destined for the Korean market are as follows:**

1. Fruit should be stored at 3-5 C
2. Fruit should not be stored more than one week following packing.
3. Note: Freezing fruit (storage temperatures of 0 to –1C) will result in increased susceptibility for Septoria Spot.
4. Packed fruit destined for Korea Export should be stored separate from domestic or other Export shipments to avoid mixing of the load.

**D. KOR “V” Designation**

1. Packed fruit for Korea Export must be clearly marked after the lot number with a “V” to designate Valencia variety. This is critical to avoid duplicate lot numbers if the same lot number is used for Navels. A KORV lot number designation should be used by all counties submitting samples to the lab and should be used on cartons, sample pallet tags and phyto certificates. All documentation has to match.

**TABLE 1**

**First Application 2009-10 Season  
Zinc-Copper-Lime Applications  
Fixed coppers (e.g., copper hydroxide and copper oxide)**

Application Volume		Metallic Zinc/100 gal	Metallic Copper/100 gal	Hydrated Lime/100 gal
400	gal/A	0.63-1 lb	0.41-0.75 lb	0.5-1.0 lb
600	gal/A	0.42-0.67 lb	0.28-0.5 lb	0.33-0.67lb
800	gal/A	0.31-0.5 lb	0.21-0.38 lb	0.25-0.5 lb
<b>Total*</b>	<b>lb/A</b>	<b>2.5-4</b>	<b>1.65-3</b>	<b>2-4 lbs</b>

\* - If the disease was observed or a positive NAVEK report was issued for Septoria spot in a grower lot last season, use a higher rate of each spray component (e.g., 4 lb metallic zinc, 3 lb metallic copper, and 4 lbs of lime per acre) within the range provided.

**TABLE 2**

**First Application 2009-10 Season  
Zinc-Copper Bordeaux Applications  
(Zinc monohydrate + Copper pentasulfate)**

Application Volume		Metallic Zinc/100 gal	Metallic Copper/100 gal	Hydrated Lime/100 gal
400	gal/A	0.83 lb	0.41-0.62 lb	5-17 lb
600	gal/A	0.55 lb	0.28-0.41 lb	3.3-11 lb
800	gal/A	0.41 lb	0.21-0.31 lb	2.5-8.4 lb
<b>Total*</b>	<b>lb/A</b>	<b>3.3</b>	<b>1.65-2.45</b>	<b>20-67</b>

\* - If the disease was observed or a positive NAVEK report was issued for Septoria spot in a grower lot last season, use a higher rate of each spray component (e.g., 3.34 lb metallic zinc, 2.45 lb metallic copper, and 67 lbs of lime per acre) within the range provided.