CENTRAL VALLEY POSTHARVEST NEWSLETTER

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Editor

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INTRODUCING MEDALLION: A NEW POSTHARVEST FUNGICIDE

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Emergency Registration for Medallion 50WP (Fludioxonil) on Apricots, Peaches, Nectarines and Plums - A New "Silver Bullet" in Postharvest Fungal Decay Control

A Section 18, Emergency Registration was granted by the United States Environmental Protection Agency (EPA) for postharvest use of fludioxonil on apricots, peaches, nectarines, and plums for 1998. The Novartis (formerly Ciba Geigy) fungicide is classified by EPA as a Reduced Risk Pesticide and it is effective against all the major postharvest decays of stone fruit crops. The new fungicide will be sold as Medallion 50WP and can be immediately obtained from postharvest service companies (e.g., Brogdex, Decco-Elf Atochem, FMC, etc.) or through agricultural chemical distributors.

Since the cancellation of Rovral 50WP (iprodione) for postharvest decay control on stone fruit crops in 1996, we have been actively searching for a replacement material. Rovral when mixed with postharvest wax/oil emulsions was effective against all the major fungal decays including Rhizopus rot, a decay controlled previously for 30 years only with the use of dicloran (Botran or Allisan). Rovral continued to be used by most packinghouses after the cancellation because a canceled product can be legally used until supplies are depleted. The challenge was to find a material that is considered a low risk to human health and is environmentally safe by EPA standards, effective against brown rot (*Monilinia fructicola*), gray mold (*Botrytis cinerea*), and Rhizopus rot (*Rhizopus stolonifer*), and that could be used as a one-to-one replacement for Rovral using existing packingline systems. Thus, a new

"silver bullet" was needed by the stone fruit industries of California and the United States.

In the last two years, we evaluated over thirteen different fungicidal materials in laboratory and field studies at the Kearney Agricultural Center, F. Gordon Mitchell Postharvest Facility. Some fungicides were either registered on other crops, registered for preharvest use on stone fruit crops, or were new to the agricultural industry of the United States. Our screening process involved characterization of materials to determine their protective and eradicative potential against postharvest decays of stone fruit crops. Two materials, tebuconazole (Elite 45DF) and fludioxonil (Medallion 50WP previously Maxim 50WP), were identified that provided excellent control of the three major postharvest decays. Elite was the most effective as a wound-protection treatment, whereas Medallion protected fruit prior to or after wounding. Elite was initially our first choice for a new postharvest material because it was already registered for preharvest use on stone fruit crops and it protected wounds. Following the Food Quality Protection Act, EPA considered Elite a higher risk than Medallion due to its existing registrations on stone fruit and other crops. With time running out for a Section 18 request for the 1998 season and supplies of old-labeled Rovral nearly exhausted, Medallion was therefore selected for the emergency registration. As a new fungicide on stone fruit crops with a registration only on potatoes and its Reduced Risk classification by EPA, Medallion was the fungicide that met all the efficacy and safety requirements of the University of California, industry, and regulation agencies.

Fludioxonil will continue to be evaluated in the IR-4 program during 1998 and will be fully registered as a postharvest fungicide with no preharvest registrations on stone fruit crops. The active ingredient degrades in sunlight and thus, preharvest registrations on all crops will be minimal. Fludioxonil is a phenylpyrrole class of fungicide. No other fungicide registered on stone fruit crops is of this class. This and its "one-application" postharvest usage will greatly reduce any potential development of resistant populations of target decay fungi to this fungicide.

The Section 18 label specifies a rate of 8 oz per 100 gal per 200,000 lb of fruit using a high-volume (T-Jet) spray application system. Concentrate applications can be made with low-volume applicators (controlled droplet application) provided that 8 oz is applied to the same tonnage of fruit. This is one fourth the rate of the previously registered Rovral. The fungicide can also be mixed with a postharvest wax/oil emulsion. The emergency registration has also established a tolerance (maximum residue) of 5 ppm for apricots, peaches, nectarines and plums. Tentative "working" residues of approximately (0.5-1.0 ppm) are expected to be sufficient for management of all major decays on a commercial usage basis.

Working together with the California Tree Fruit Agreement (CTFA), the California Grape and Tree Fruit League, the IR-4 Federal Program for registration of pesticides on minor crops, and Novartis Crop Protection, Inc., we successfully identified and developed this new class of fungicide for management of postharvest decays of summer tree fruit crops. In a time when most consider that there are no more "silver bullet" pesticides and that all pesticides are dangerous, Medallion just may be setting a new standard in effectiveness and safety in the postharvest industries of California and the United States.

PRECOOLING BEFORE LOADING

Extracted from Loading Makes the Difference by Jim Thompson
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(reprinted from CVPN Vol. 4, No. 2)

Most temperature management problems during transport could be reduced with the use of improved design refrigerated trailers that have deep floors, recessed-groove sidewalls, high capacity fans, pressure bulkheads, and solid state temperature controllers. These features are used in modern marine container vans in which fresh produce is transported for transit times much longer than those occurring in domestic shipments in the United States. A few U.S. truckers now have trailers with these advanced design features. However, problems related to the extra weight of deep floors, the reduced inside width of recessed-groove walls, and their extra susceptibility to damage during loading and unloading have prevented most truckers from purchasing these improved-design trailers. Hopefully, these design and handling problems can be solved. Meanwhile, truckers can contribute to better product transit temperatures and fewer losses by following these recommendations:

Trailers should be precooled to remove the heat contained in the walls, ceiling, floor, and doors before loading with already cooled products. If not removed, this heat would be rapidly conducted to the load. The disadvantage of precooling a trailer before loading is that during loading some warmer air may enter the trailer, resulting in condensation on the trailer's inner surfaces. A useful trailer precooling guide is as follows:

1. Precool trailers, especially during warm weather.
   a) Trailers to be loaded at refrigerated docks should be precooled to their desired thermostat set point.
   b) Trailers to be rapidly loaded (15 to 20 minutes) at non-refrigerated docks should be cooled to about $5^{o}F$ above their desired thermostat set point.
   c) Trailers that will be loaded slowly (30 minutes or more) at non-refrigerated docks should be precooled to about $5^{o}F$ lower than a temperature half way between the ambient air temperature and the desired thermostat set point. For example, if the ambient air temperature is $75^{o}F$ and the desired set point is $34^{o}F$, the trailer should be precooled to $49.5^{o}F$.

$$\frac{75^{o}F - 34^{o}F}{2} = 20.5^{o}F$$

and $75^{o}F - 20.5^{o}F = 54.5^{o}F$

and $54.5^{o}F - 5^{o}F = 49.5^{o}F$

2. This will prevent accumulation of excess moisture on the trailer's inner surfaces and subsequent extensive cycling of the refrigeration unit.

3. Determine and record pulp product temperatures during loading.

4. Load the product away from sidewalls and on pallets or racks, especially during very hot or very cold weather exposure during the trip.

5. Do not load so high that the air delivery chute is collapsed or blocked.

6. Do not load all the way to the rear doors, leave at least 4 inches between the rear of the load and the rear doors.

7. Secure loads properly by bracing or with load-locks.

8. Make sure lengthwise air channels are not blocked in mixed loads.

8. Keep the trailer in optimum condition with regular checks and maintenance.
   - Refrigeration unit operative.
   - Walls, doors, and air delivery chute in good repair.
   - Floor grooves cleaned out.

9. Keep transit times to an absolute minimum by avoiding unnecessary delays en route.

10. When mixed loads of fresh fruits and vegetables are shipped, it is important that the various commodities are compatible with one another with respect to their requirements for temperature, modified atmospheres, relative humidity, and protection from odors or physiologically active gases (ethylene).

11. Load extra packages at the rear end of a palletized or racked load on short pallets or racks to provide air circulation under the load.

CONTAINER LOADING AND PACKAGING GUIDELINES FOR STONE FRUIT AND GRAPE EXPORT

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Package
- Needs adequate strength for 2 to 3 week trip at high humidity.
- Should have venting on box top and bottom to allow vertical air flow.

Pallet
- Deck boards should support box corners and should not block vertical venting.
- Boxes should not overhang pallet.
- Pallets with 4-way entry are needed for most container loading patterns.
- Stabilize load with netting or corner boards and strapping.

Precooling
- Cool stone fruit and grapes to less than 34^{o}F.

Before Loading
- Precool the container before loading. Turn on generator and refrigerator.
- If loading from a warm dock, turn off refrigeration unit when doors are open.
- Do not load a container with trash on the floor or one with damaged walls or door seals.
- Floor drains should be clean and rubber boots in place.

Loading
- Cover the entire floor with pallets or corrugated cardboard from the front to the rear of the container.
- Block exposed pallet openings to prevent air from bypassing around the product.
- Distribute load uniformly for maximum container stability. Insure gross weight and weight distribution of loaded vehicle meets local regulations.
- Brace the load to prevent shifting. Air bags are often used for export. Single pallets are difficult to brace well.
- Do not load above limit line.
- Set thermostat to 34^{o}F or lower for stone fruit and grapes. If container has discharge air temperature control, the thermostat can be set 1^{o}F above the freezing temperature of the product. A unit with discharge and return air control should be set at 2^{o}F above fruit freezing temperature.

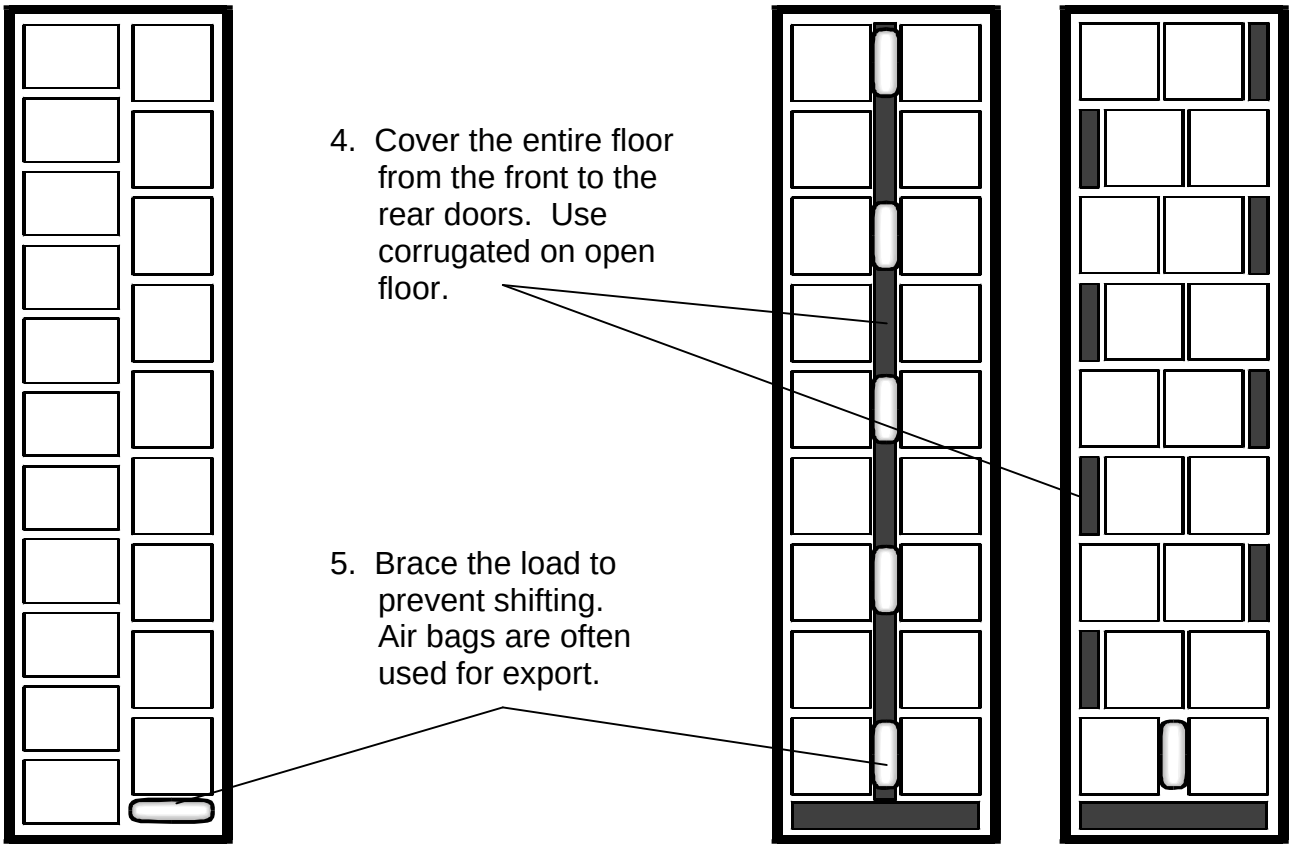
  Freezing temperatures for:

  Grapes 28.4^{o}F
  Peaches and nectarines 30.3^{o}F
  Plums 30.5^{o}F
- Set air exchange, 45 cfm for stone fruit and 15 cfm for grapes.

1. Precool the container before loading. Turn on generator and refrigerator.

2. If loading from a warm dock, turn off refrigeration unit when doors are open.

3. Do not load a container with trash on the floor, plugged floor drains or one with damaged walls, drain boots or door seals.



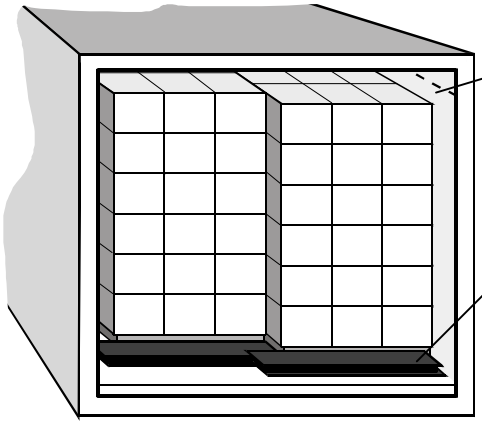
4. Cover the entire floor from the front to the rear doors. Use corrugated on open floor.

5. Brace the load to prevent shifting. Air bags are often used for export.

20 pallets

18 pallets straight in

18 pallets staggered



6. Do not load above limit line.

7. Block exposed pallet openings and cover floor to prevent air from bypassing around product.

8. Set thermostat and air exchange

HOW TO CENTERLINE LOAD HIGHWAY TRAILERS

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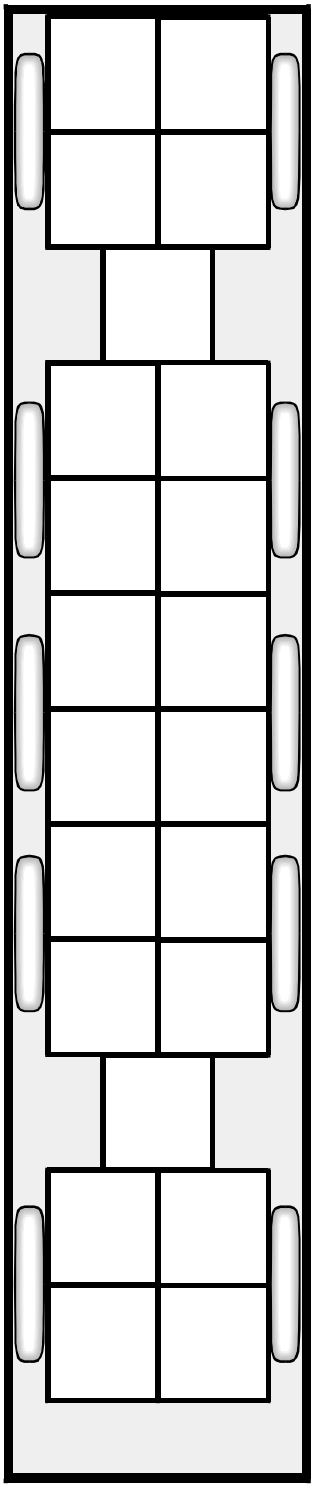
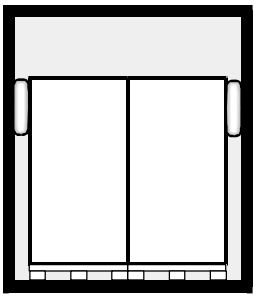
Centerload Shipping Technologies, San Carlos, CA 94070

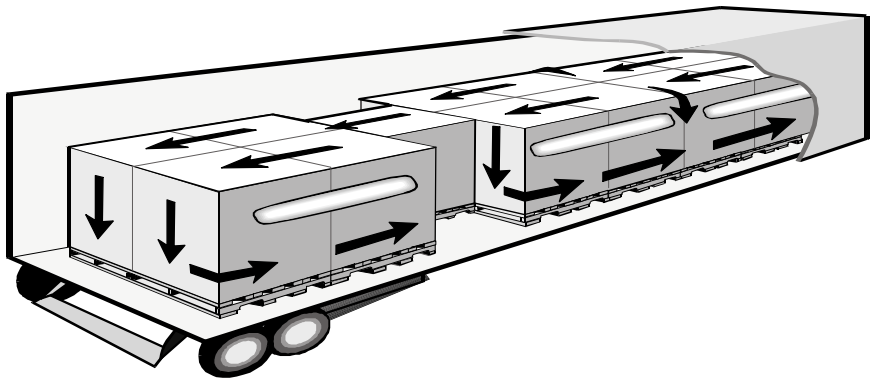
The objective of centerline loading is to keep the produce away from the sidewalls of the truck to prevent the transfer of outside temperature conditions to the produce.



* 48" x 40" pallets are run straight into the truck, with the 48" dimension along the length of the trailer.
* Depending on the weight of the produce and trailer length, 1 or 2 single pallets may be required.
* To obtain the most stability on the single pallets, they should be turned 90 degrees.
* To prevent load-shift, each pallet should be braced.
* Use one 18" x 54" air bag to brace 2 pallets.



* The air bag needs to be place din the top third of the pallet. This is where most of the movement is generated.
* Start by inflating one bag on the left side, then lock in the load by inflating another bag on the right side.
* After inflating the air bags, check that they are securely in place by punching the bag from the top down. If the bag moves, put more air in it.
* Pallets should be well stabilized with bands or wrapped.
* Rear pallets should be braced away from rear doors with load loacks.



HIGH QUALITY STONE FRUIT STARTS ON THE TREE

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With the recent rapid increases in stone fruit production, why is consumption lagging behind? Consumer surveys have revealed complaints about lack of ripening (hard fruit) and internal breakdown symptoms (flesh mealiness, browning and lack of flavor). As the volume of shipments is still high, attention must be given to the production and delivery of high quality stone fruits to satisfy consumers.

Limited studies associated high soluble solids concentration (SSC - e.g., sugars) stone fruit with high consumer acceptance. Unfortunately, more factors are involved, such as acidity (TA), the sugar to acid ratio, phenolic acids, volatiles, etc. in consumer acceptance than just the simple SSC values. Since we do not understand enough about consumer acceptance and stone fruit chemical composition during ripening, we are not able to propose any quality standards without a detailed study to support it. Furthermore, the variability of SSC among fruit from different seasons, orchards, and even within a single tree is so large that it is impossible to set any standard.

What is important to know is that SSC doesn't increase during fruit ripening off the tree as it does in kiwifruit, apples, and other commodities. However, ripening/softening stone fruit before consumption is critical to allow consumers to perceive fruit quality. Thus, in addition to producing and maintaining high quality fruit, we are recommending controlled fruit ripening to deliver "ready-to-buy" fruit to consumers.

The best way to ensure high quality stone fruit is by using techniques in the orchard such as training systems, pruning, thinning, canopy manipulation, good irrigation and fertilization practices, etc., in combination with delaying harvesting. In general, a fruit picked at or later than the California Well Mature will have larger size, better flavor, higher SSC, higher red color, and will be softer than the same fruit picked earlier at the U.S.-Mature stage. Fruit drop, cracking, high bruising, and decay susceptibility are the main limitations on how late you can pick. It is important when you determine how late you can pick to maximize quality without injury to your fruit due to the rigors of postharvest handling and distribution.

At the Kearney Agricultural Center, Dr. R. Scott Johnson, Kevin R. Day and I are investigating these two avenues to improve stone fruit quality. Requests for more information on any of these topics can be directed to the following address: Carlos Crisosto and/or Scott Johnson, UC Kearney Ag. Center, 9240 S. Riverbend Ave., Parlier, CA 93648.

QUICK QUALITY TIPS

- Utilize cultural practices to increase your "orchard quality potential" without losing income. Shoot for high volume of high quality fruit per acre.
- Manage your trees to improve canopy light interception. Outside canopy fruit has considerably higher levels of SSC, red color, and postharvest life potential than shaded fruit located inside the canopy.
- Identify cultivars with high soluble solids concentration levels, low acidity, relatively low susceptibility to impact bruising, and with relatively slow ripening (flesh softening) characteristics. Cultivars with these characteristics are well adapted for delayed harvesting.
- Use delayed harvesting only to maximize your orchard quality potential without jeopardizing fruit postharvest market life.
- Determine your maximum maturity index by using fruit critical bruising susceptibility based on fruit firmness and your packinghouse bruising potential. This maximum maturity index will allow you to determine how late you can pick without inducing bruising in your operation.
- Establish a quality control system to evaluate your changes in cultural practices and keep a record of your fruit quality.
- Consider establishing a Hazard Analysis Critical Controlled Points (HACCP) system.
- At the end of each season, summarize and analyze your records. Make your adjustments for the next season.