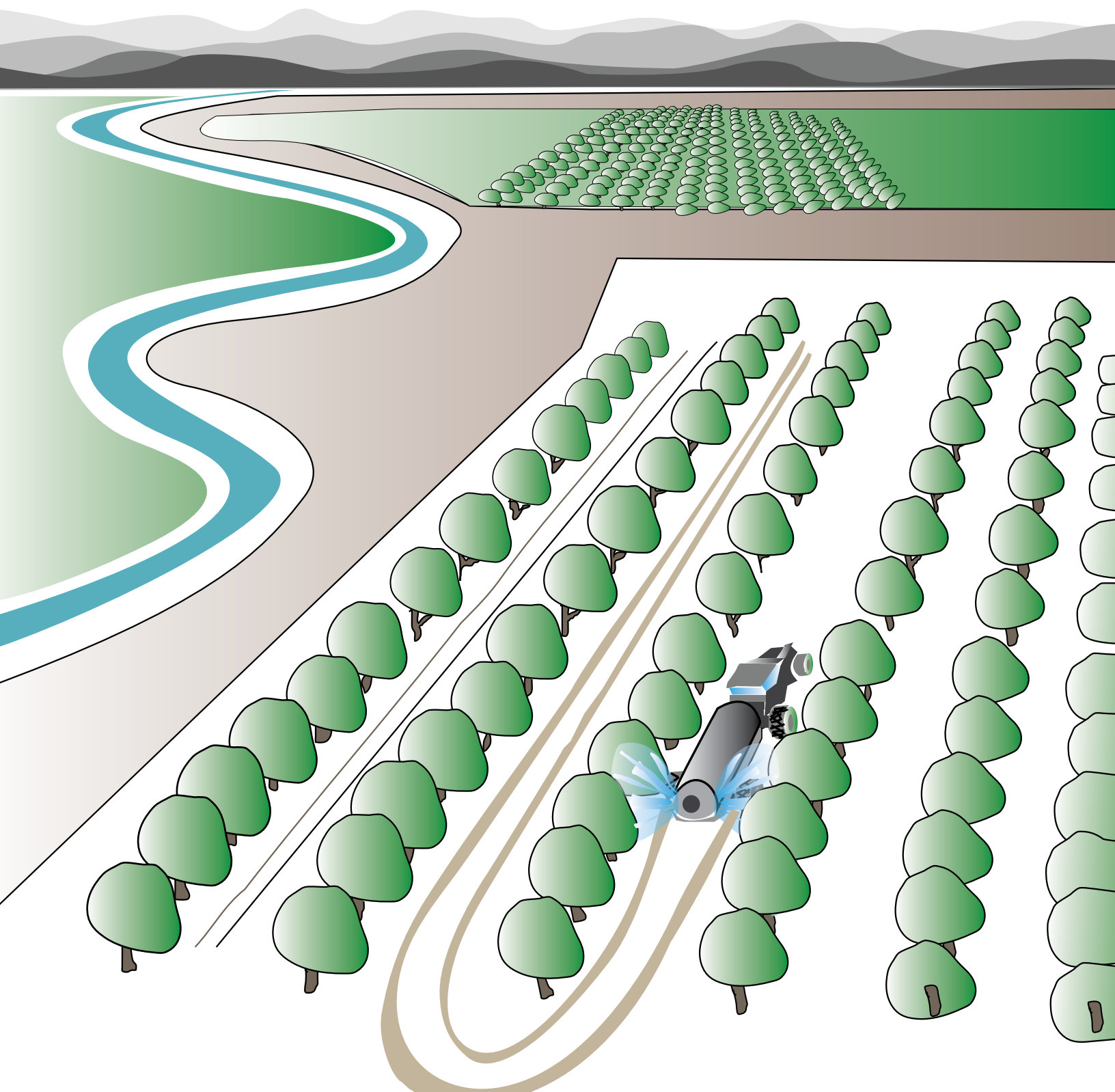


Managing Orchard **Sprayer Drift** to Protect Water Quality



Tips & Techniques

Managing Orchard Spray Drift

To Protect Surface Water

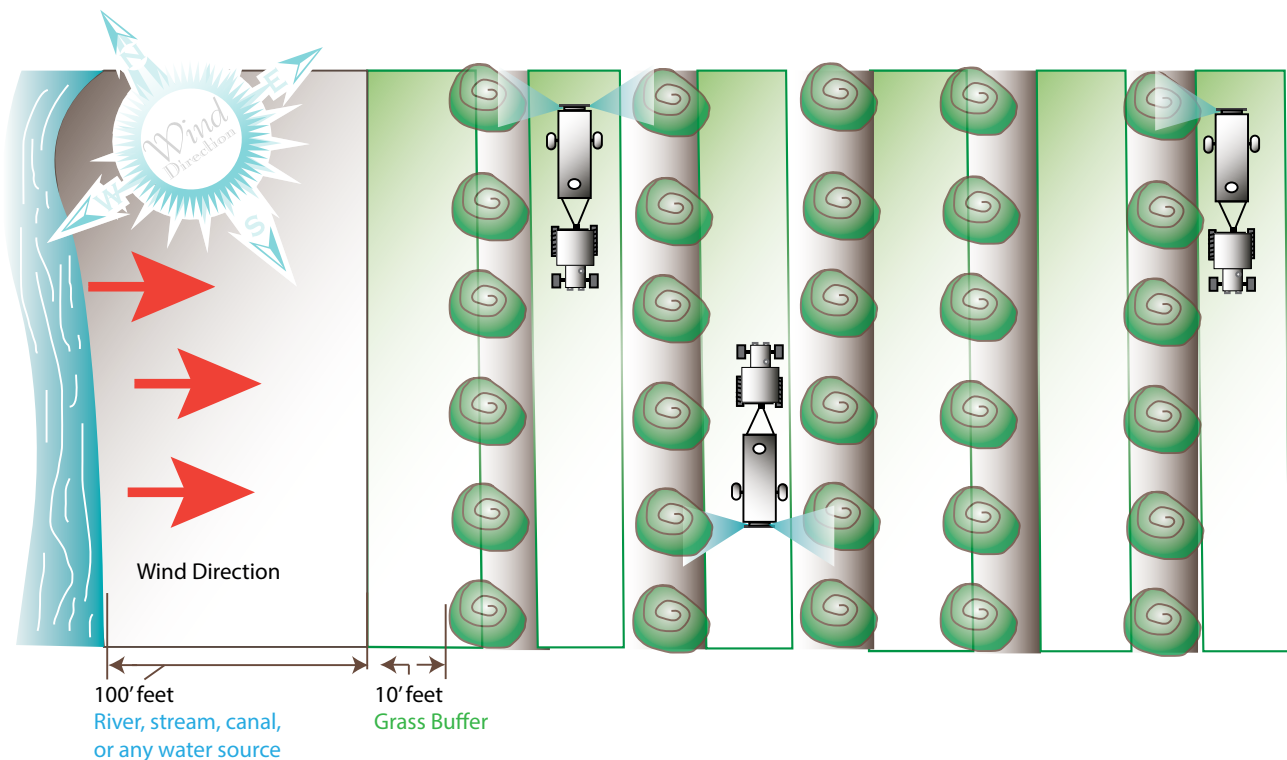
Applying crop protection products (pesticides) carries important responsibilities not only for doing the best job possible to control insects and diseases but for limiting the potential for off target impact of an application. If there is an off-site impact to waterways, it can trigger actions mandated by the Regional Water Board through the Irrigated Lands Regulatory Program.

To prevent problems, equipment operators must take extra care when spraying near field edges, especially when near sensitive sites such as streams, roads, houses, schools, livestock, and pets. Doing the best job takes a thorough understanding of the principles of pesticide application stewardship outlined in this publication.

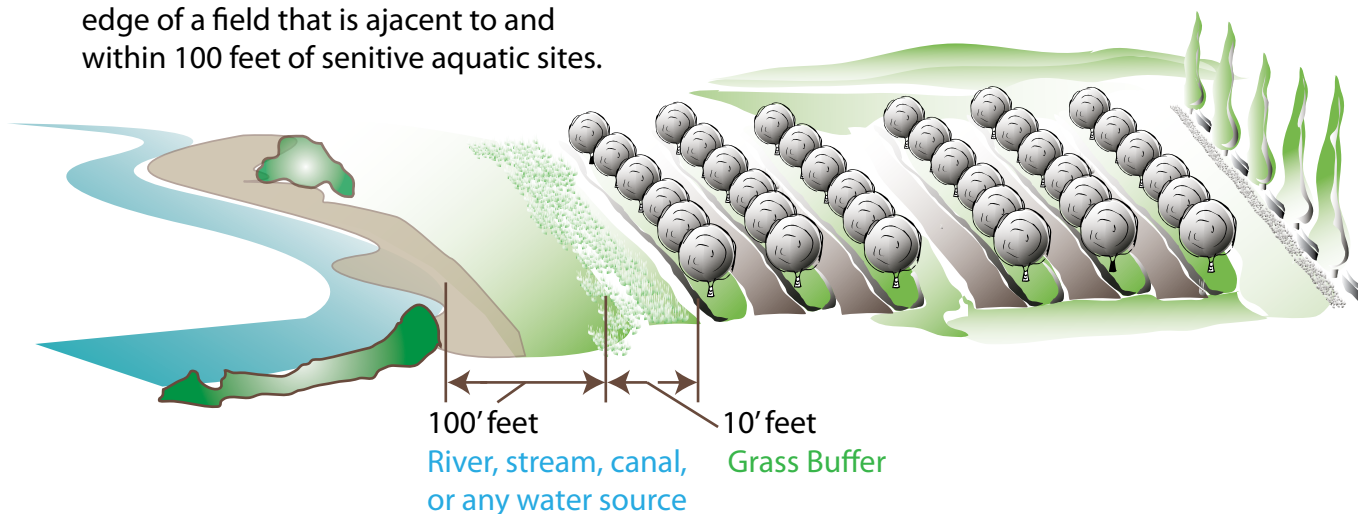
To ensure the spray is delivered at labeled rate, and covers the target foliage, set up your spray equipment with nozzles that minimize drift potential, a fully functioning control system and regularly check the calibration of your equipment.

Make sure you have a clear understanding of the field being sprayed, the expected weather conditions and the environment surrounding the field. That includes sensitive sites and crops, anything that can be harmed by spray drift.

Understand that what you are doing can have wide-reaching implications if mistakes are made. Ultimately, it's the applicators responsibility to safely apply pesticides.



Maintain a vegetative buffer strip a minimum of 10 feet wide from the edge of a field that is adjacent to and within 100 feet of sensitive aquatic sites.



Spraying Stewardship Practices

This information is intended as guidance on orchard spraying good stewardship practices, especially near sensitive sites such as waterways, schools or houses.

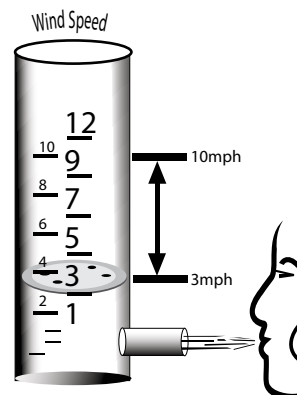
- Applicator must be aware of and comply with county permit conditions and restrictions.
- Maintain an adequate buffer zone (untreated area between sprayed crop and sensitive area) to protect waterways and other sensitive sites. Check the product label or with the county agricultural commissioner for specific state and county requirements.
- Avoid spraying when wind is blowing toward nearby waterways or sensitive sites.
- Applications should only be made when the wind is blowing at least 3 mph away from nearby waterways or other sensitive sites.
- Start spraying only when nozzles are adjacent to the first row of trees.
- Stop spraying when making turns at the end of a row.
- Shut off outward facing nozzles when spraying the outside row, directing spray inward only.
- Always check weather forecasts prior to spraying. Avoid applications just prior to a rainfall event or irrigation (if the field has drainage) to minimize potential for pesticide runoff.

- Make sure applicator has a copy of any required county permit(s) on hand during applications.

Before You Start Spraying

Any orchard being sprayed with pesticides should be evaluated and prior to, and monitored during and after, an application. This requires the person on-site to have a thorough understanding of the field being sprayed, the expected weather conditions, and the location of sensitive sites and waterways in the vicinity of the treated orchard. The individual responsible for the application must be aware of:

- Wind conditions (speed and direction – current and forecast) and whether rainfall is forecast for the next 48 hours.



- Air temperature and humidity (current and forecast).
- Presence/absence of temperature inversion layer.
- Presence/absence of waterways and sensitive areas in the area, especially downwind of the application site and/or connected to the site by drainage ditches, sloughs or canals.

Site Evaluation Check List

- Evaluate each orchard to pinpoint areas where spray drift could pose a potential risk.
- Develop a field layout map and note the location of wells, sink holes, drainage ditches, streams or sloughs.
- Provide the field layout map to all sprayer operators, commercial applicators, Pest Control Advisors or anyone involved in pest management decisions.
- Review the field layout map and flag or stake no treatment buffer zones.

Fields Bordering Waterways

- When sensitive aquatic sites are downwind from orchards, spray the first two rows nearest the aquatic site only when the wind is blowing away from the sensitive site.
- The first two rows at the edge of the field next to sensitive aquatic sites should be sprayed with the outside nozzles turned off.
- Ideal wind speed is 3-10 mph into the field at the application site as measured by an anemometer outside of the orchard on the side nearest and upwind from a sensitive site.

Orchard Sprayer Set Up

- Tree canopy is the best barrier to off-site spray drift: aim for it.
- Know the droplet spectrum of each nozzle (available for some nozzles; check with distributor.)
- Use nozzles with the volume medium diameter (VMD) appropriate to the product being applied (available for some nozzles; check with distributor.)

- Consider spray flow controllers (Raven, etc.) that adjust nozzle output based on ground speed to ensure accurate gallons per acre delivery. Be sure to understand the limitations of the controller and select the proper nozzle for use with the operating speed range.
- Adjust (or open/close) spray nozzles based on the structure of the tree canopy.
- Set nozzle location and size to match tree height and shape.
- Reduce the size of lower nozzles when lower canopy is thin or non-existent.
- For smaller trees, shut off upward facing nozzles where canopy is not present to conserve spray and reduce overspray between tree tops.
- Periodically check a sprayer's coverage by placing water sensitive paper in a few areas of the tree canopy. Compare patterns on cards within the tree to check spray uniformity.
- Spraying some trees with white chalk/clay materials used for sunburn protection can show how uniformly the tree canopy is covered by the nozzle configuration.

Alternative Spray Drift Management Practices

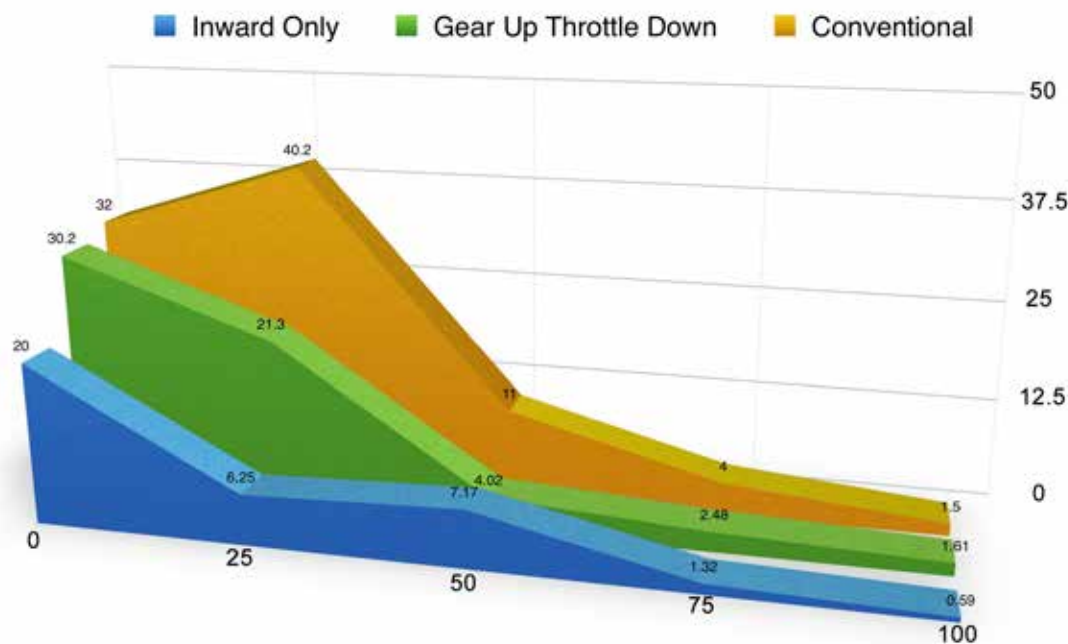
Gear Up, Throttle Down

This technique is based on the concept of increasing sprayer speed (for example, from 2 MPH to 3 or 4 MPH) by shifting to a higher gear and reducing engine/PTO speed (RPMs) while maintaining the same spray volume (gallons per acre). This requires using larger nozzles that produce larger droplets.

- Reducing engine/PTO speed reduces air flow from the fan.
- Larger droplets and less fan air results in a reduced potential for spray droplets to move off site.
- Studies and field experience have shown that, postharvest through bloom, this practice delivers the same pest control as slower ground speeds (2 MPH) and full fan air

(continued on page 5)

Drift From Outer Edge of Orchard



Spray drift was measured from the edge of the orchard following each treatment. Both gear up throttle down and inward only showed reduced drift in comparison to the conventional treatment method.

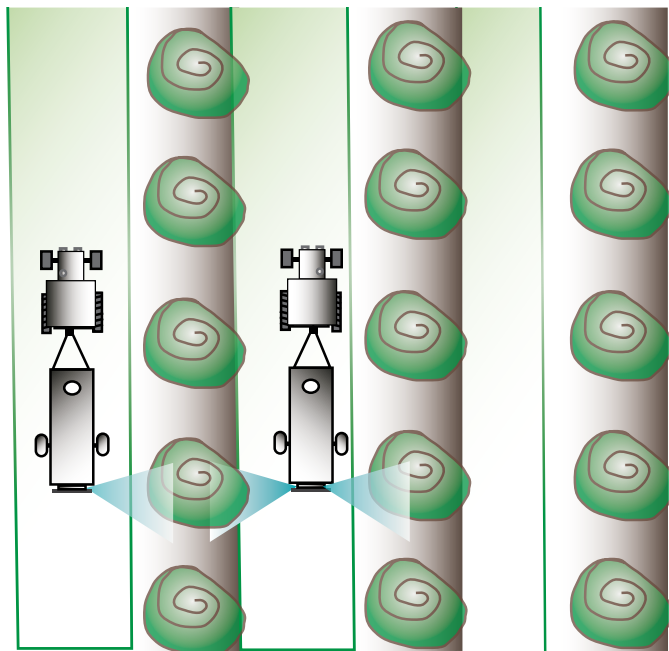
New Drift Management Technique: Interference Perimeter Spraying

Interference perimeter spraying is a new approach for managing spray drift being examined by CURES and University of California researchers.

The technique is simple; two orchard sprayers move through the orchard parallel to each other; one sprayer on the outside row and another between row 1 and 2. The rig between row one and two is spraying normally while the rig on the outside row is running with the fan on and nozzles shut off. The inward air flow pushes any spray material back into the tree.

After the two sprayers complete a pass, a single sprayer runs down the orchard perimeter with the outside nozzle bank shut off and the nozzles facing the tree turned on, allowing for normal spray coverage of the outer side of the row.

A recent field trial in a mature almond orchard showed almost total elimination of spray drift compared to the standard practice. However, the practice still needs further evaluation to ensure that control of the targeted pests is maintained.



In the field trial with this practice, researchers noted that it's important for the sprayers to move exactly perpendicular to each other. Also that both sprayers have identical or near identical fan speed and air volume displacement.

Interference perimeter spraying still needs further study but the concept shows promise as another practice for protecting surface water and other sensitive areas from off site movement of spray drift.

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delivery, when used with equipment matched to the orchard.

- Increase ground speed
 - Run tractor 1 gear higher
 - Reduce engine RPM / PTO speed approximately 20%
- Increase nozzle size
 - Higher spray flow per minute (but same gallons per acre) so there is no change in pesticide rate per tank.
- Savings in time and fuel; less potential for off-site drift.

This practice is most suited for dormant and bloom sprays when there is little to no tree foliage. It is not recommended for large canopy orchards such as mature walnuts and almonds taller than 20 feet.

Spraying Inward Only on the Outer Rows Near Sensitive Sites

Most off-site drift from orchard sprayers comes from applications to the outside rows, which are those rows closest to sensitive sites.

Follow these steps to minimize off site movement:

- On rows #1 and #2, only spray inward (shut off outward facing nozzles).
- Reduce ground speed by one-half on outer two rows to partially compensate for spraying on one side of the tree only. This will require recalibrating sprayer or flipping nozzles to deliver the same pesticide rate as the rest of the orchard.

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Franz Niederholzer, Robert Van Steenwyk and Frank Zalom

Developed with support from:



Maintenance Checklist

Before filling the tank, adding pesticides and beginning the application, perform a thorough inspection of the equipment.

Be aware that according to California state law, even if you are hired to just check equipment used to apply pesticides, you are considered a pesticide “handler” and must be trained accordingly. Training includes knowing the location of the application schedule and labels for the product last used in the equipment.

The label will indicate which personal protection equipment (PPE) needs to be worn when checking application equipment.

Check and make sure:

- Hose connections are sealed and tightened.
- Regulator connections are sealed and tightened.
- Sight gauges are clear and working.
- Clean filters and screen on a daily basis.
- Fix leaking gaskets immediately.
- Pressure gauges are sealed and working.
- All nozzles and metering devices are correct size, not leaking and unplugged.
- All sprayer shields are in place (where appropriate).
- Tank drain plug is in place.
- There is no damage to hoses or piping.



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