CONCENTRATE SPRAYING

The advantages of spray concentrations of greater than 3X may be outweighed by a decrease in effectiveness for some pests (mites, aphids, scale, sporulating scab lesions). Dilute sprays are generally more effective for applying oil, growth regulators and foliar nutrients.

As gallons of water are reduced, errors in calibration or spray pattern become more critical. Concentrate spraying creates greater sensitivity to wind speed (should be no more than 5 mph), drying conditions, sprayer speed (should be no more than 2.5 – 3 mph), and accurate sprayer calibration. Problems with phytotoxicity and incompatibility between spray materials also are increased with higher concentrate sprays. The amount of oil used should not be more than 3 times the recommended rate per 100 gallons dilute even if the spray concentration is over 3X.

The increase in efficiency from using less water per acre reaches a point of diminishing returns and increasing problems when spray concentration is increased beyond 8X.

A 20% reduction from the recommended dilute rate pesticide dosage is typically made when the pesticide is applied in a 3X or higher concentrate spray. This is based on the idea that, compared to a dilute application, less pesticide is needed in a concentrate spray because less is lost to runoff. Concentrate spray dosage reduction seems to work well for most pests and pesticides, but it is not appropriate for some growth regulators. Caution is advised before taking the 20% reduction for situations where coverage or control is difficult. Concentrate pesticide dosage reduction is definitely not recommended for sterol inhibitor fungicides.

EXAMPLE D: Suppose your sprayer is set up to deliver 1/3 of the TRV dilute gallons per acre, and that you are preparing to apply a 50WP formulation with a recommended dosage of 2 lbs./100 gals. dilute. Because this is a 3X spray, the 2 lbs./100 gals. could be tripled to 6 lbs./100 gals. However, because spraying at 3X or higher is thought to result in less chemical being lost to runoff, a 20% reduction in the chemical rate is usually made. Thus, the amount of material used would be 6 x 0.8 = 4.8 lbs./100 gals. for a 3X spray mix.

Even for the materials which have been used successfully with the concentrate spray dosage reduction, the 20% reduction should not be taken as a fixed rule. Consider foliage density, pest biology, pest abundance, application conditions and other factors affecting spray effectiveness before reducing the concentrate spray dosage.

Some (but not all) research indicates that more consistent pesticide dosage can be had by adjusting the estimate of TRV dilute gallonage upward as canopy density increases in the summer. Rather than having to recalculate TRV, an easier way to adjust pesticide dosage is to take less than a 20% reduction in pesticide dosage for concentrate sprays made after first cover. Your own experience and orchard history are the best guide to fine tuning pesticide dosage.

A TRV dosage method used in Maryland and New Jersey calls for spraying at 7.8X, but mixing pesticides at 3–4 times the label rate per 100 gallons dilute, with no further discount for concentrate spraying. The Maryland method calls for lower pesticide dosages than the TRV method described in this guide. For example, in the method recommended for New England, dosage for a spray made at 7.8X would be 7.8 x 0.8 (i.e. taking 20% dosage discount) = 6.2 times the label rate per 100 gallons dilute.

Under the Maryland method, the dosage would be 3–4 times the label rate per 100 gallons dilute.

The Maryland method has not been field tested in New England. There may be regional differences in the pest complex and spraying strategy that make the Maryland method unsuitable for New England.

SPRAY ADJUVANTS

A number of products are sold which are claimed to improve the efficacy of spray applications. These materials are known collectively as adjuvants. Two of the most common adjuvant types are *spreaders* (wetting agent and surfactant are similar) and *stickers*. A spreader is formulated to allow spray droplets to spread more evenly on the leaf or fruit surface. A sticker is formulated to increase adhesion of spray chemicals to a surface in order to reduce loss from weathering. Other uses of spray adjuvants are: to acidify or buffer the pH of the spray solution, to reduce tank foaming, to improve compatibility of tankmixes, to reduce spray drift, to improve uniformity of deposit, to modify spray evaporation,

and to enhance penetration or translocation.

Selecting and using adjuvants requires the same attention to detail that is given to selecting and using pesticides. Read the adjuvant and pesticide labels to see if they are suitable for each other, and for the spraying conditions and other particulars of your situation. Use a jar test to see if the materials are physically compatible. Follow adjuvant label rates. As with pesticides, more is not better and can cause serious problems. If possible, evaluate product performance. For example, if a spreader is used, check spray deposit on foliage. With too much spreading, the spray may just run off the leaves in a straight line.

Adjuvants can be valuable tools. However, many pesticide formulations already include necessary adjuvants, and adding additional materials may cause plant injury (especially with EC formulations), reduce pesticide effect, or provide insufficient benefit to justify the extra cost.

ALTERNATE ROW SPRAYING

By traveling down only every other row when spraying, the amount of time and pesticide used per acre can be cut in half for a given application. Alternate row spraying requires a sprayer that has adequate air volume and velocity to provide at least light spray coverage on at least 90% the tree with each one-side spray. The sprayer should push some mist 10 to 15 feet beyond the tree. For the next spray, the sprayer is driven down the rows that were not traveled during the previous spray.

If alternate row spray coverage is adequate, applications do not have to be made exactly twice as often as an every-row spray. In other cases, applications are made twice as often, but the amount of pesticide used each time is less than half of what would be used for an every-row spray, because of the short interval between renewed pesticide coverage. As a result, pesticide usage over the season can be significantly reduced.

Alternate row spraying may increase the survival of beneficial species, and may reduce the chances of pests developing pesticide resistance. In emergency situations it allows for twice as many blocks to receive some protection in a given time period, as opposed to getting half of the blocks treated with full block application while the other blocks receive no protection at all.

Mention of alternate row spraying in this publication is not meant to be an endorsement. The first spray of the season should achieve full block coverage. Contact the your state Extension for more information.

BORDER ROW SPRAYS

Border row sprays have been used effectively in situations where an insect pest problem arises from from beyond the orchard perimeter. If the pest's behavior is such that it will stop in border row trees before penetrating further into the orchard, then insecticide coverage on border row trees may give sufficient control without having to treat the whole block. In blocks with a history of low or moderate pest pressure, knowledge of hot spots, and monitoring of pest activity and the weather, this tactic may be useful for the beginning and end of the plum curculio and apple maggot egglaying periods. Until further research and grower experience demonstrates otherwise, it may be too risky to depend on border row sprays during the period of peak damage activity for these pests.

Do not spray the edge of woods adjoining the orchard. This is not legal and may disrupt habitat for pest natural enemies.

Border row treatments may not provide satisfactory control if the population of immigrating pests in the surrounding area is very large, if the border trees are small, or if they are lightly cropped. When a border-only treatment is used, monitor for pest activity inside the block to see if pests are penetrating the border.

COMMON SPRAY PROBLEMS

CALIBRATION

Problems with inadequate pesticide efficacy and phytotoxicity are often due to inaccurate sprayer calibration and pesticide dosage. Using the method described in the Sprayer Calibration section before the spray season begins reduces the chance of such errors.

COVERAGE / UNIFORMITY

Sprays applied in early morning, evening or at night are likely to result in higher deposition of chemical on the trees, and greater uniformity through the tree because: 1) wind at these times is usually less; 2) temperature is usually lower; and 3.) humidity is usually higher, resulting in less evaporation of spray droplets in flight.

Best results are obtained when the sprayer has