Evaluation of Venue, Gramoxone, Aim, and Rely Herbicides for Root and Crown Sucker Control in Apple and Cherry

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Root and crown suckers are unwanted natural vegetative growth commonly produced by many rootstocks of deciduous fruit trees. These are especially common on Mazzard, the most common sweet cherry rootstock. However, there are strains of the apple rootstock Malling 9, such as the "Nic 29," and Budagovski 9 that have this problem, and some pear rootstocks such as Pyrodwarf and individual "Bartlett seedling" produce significant problematic suckers. These rootstocks are planted on about 60,000 acres of Pacific Northwest orchards.

Growers often treat these suckers as they would a perennial weed, but without the option of treating them with a systemic herbicide. In fact, they are compelled to remove the suckers by mechanical or chemical methods prior to the application of glyphosate, the most common herbicide used in orchards, due to concern of excessive uptake of the herbicide into the fruit tree. The removal of the suckers by hand labor is very expensive and only possible when the sucker growth is scant. Even with light sucker growth, labor costs about $50-75 an acre, depending upon the density of the suckers. At times, the suckers are too dense to cut by hand. Labor to do this operation is becoming more expensive and difficult to find.

Sucker removal is most commonly carried out by contact herbicide application, mostly with paraquat (Gramoxone) or glufosinate-ammonium (Rely), and less often, with carfentrazone-ethyl (Aim). Venue is considered an interesting alternative to these current choices.

Sucker removal is a procedure intended to injure or eliminate part of the tree attached to the green young bark at the base of a two or three year old tree. It is critically important that the product used is safe to apply to the young bark of the lower 12 inches of the trunk and the portion of the rootstock above the soil level. If the product is highly effective on suckers, it is also possible that it could damage or kill the young bark, leading to tree death. It is far less likely that a product will damage the corky bark of an older tree. To be most useful, the product must be safe in younger orchards. The paraquat labels prohibit use in orchards with "green stems." Many growers place paper or plastic wraps around the base of young trees to protect the bark from paraquat or glyphosate, but this often protects the crown suckers also, and their hand removal is made difficult by the shielding. In past trials and experience, it appears that to a great extent, it is the concentration of any specific product in solution, rather than the rate per acre that determines the risk of application to green barked trees. For example, 2.5 pints of Gramoxone in 25 gallons per acre of carrier is much more likely to damage the green bark of young trees than the same rate applied mixed with 50 gallons per acre.

Materials & Methods

Two rates of Venue SC (pyraflufen-ethyl) and Non-Ionic Surfactant (NIS 0.25% v/v) were tested for effect on root and crown suckers in apple and cherry. The Venue SC was applied at 3 fluid ounces or 4 fluid ounces per acre in about 40 gallons of water carrier with 1 quart / 100 gallons Regulade NIS. This rate of water was sufficient to fully wet the sucker growth.

The comparison products were Aim ((carfentrazone-ethyl) at 2 fluid ounces per acre + Regulade 0.25% v/v, or Rely ("Liberty," gluphosinate-ammonium) 280 at 56 fluid ounces per acre + 0.25% v/v, or Gramoxone Inteon (paraquat) 2.5 pints per acre, all in about 40 gallons

Apple trees prior to treatment.

Apple trees 14 days after Gramoxone sprays.

Apple trees 14 days after Venue sprays.

Apple trees 10 days after Gramoxone spray.

Comparison of Venue (near) and control (far).

Cherry trees prior to treatment.

Cherry trees 14 days after Gramoxone sprays.

Cherry trees 14 days after Venue sprays.

Cherry trees 30 days after Gramoxone sprays.

Cherry trees 30 days after Venue Sprays.

of water per acre. Damage to near-by tree foliage is common when Aim mist drifts, so we don't recommend its use. This is included for comparison only.

The cherry orchard used for the trial is north and west of the intersection of Edgemont and Steinbach roads in Wenatchee Heights. It is a mature orchard, Sweetheart cultivar on Mazzard roots, and has what would be considered a problem population of root suckers. There are about 1 to 10 root suckers per square foot under the trees in many areas of the block, though this is variable from replicate to replicate. There were very few crown suckers growing from the base of the trunk. All treated replicates had an average of 0.5 to 2 suckers per square foot. The tree trunks trunks are mature, about 12 – 15 inched diameter, with corky bark. At the time of application, the suckers were over optimum maximum height, ranging from 4 to 16 inches height. They were low enough that spray coverage was quite thorough, but coverage was not 100% complete in some heavy patches.

The apples are at WSU Sunrise research orchard, block 1a and 1b, cultivar Fuji or Gala, on various strains of Malling 9 and on Budagovski 9. Suckers were very common on every 5th row, which was planted with the Nic 29 strain of M9, with suckers growing from both roots and the above-surface parts of the rootstock. The sucker growth was perhaps too advanced for optimum results; it would have been better timing about two weeks earlier. (It took time to find these plot sites.) The trunks are immature, 2 – 4 inches diameter, and with thin, lightly corked or unsuberized bark.

All materials were applied with a tractor-carried boom weed sprayer. The apple orchard was treated in a relatively narrow 3 foot wide swath width, about 18 inches out from the young trees on each side of the row. The boom had one 8002 flat fan nozzle on the outside (tractor side) and an OC 02 nozzle on the distal end of the boom to provide for overlap. The boom was about 21 inches above the soil surface, and the nozzle tips were 18 inches from the surface. Nozzles were spaced 12 inches apart on the boom. The tractor drove at 2.5 mph and at 20 psi, the 2 nozzles had a total output of 39 ounces per minute. The carrier rate per acre was calculated: (495 x 0.305 gal) / (2.5 mph x 1.5 ft.) = 40.2 gpa.

The cherry orchard was treated very similarly, but the swath was 7 feet wide, 3.5 feet out from either side of the tree row. Two 8002 flat fan nozzles were added to the tractor side of the boom, for a total of three, with one OC02 nozzle on the end of the boom. This increased the swath width to 3.5 feet. At 22 PSI boom pressure, the total boom output increased to 81 ounces per minute, and a resulting 40.7 gallons per acre application rate. Calculation: (495 x 0.6328 gal. per min) / (2.2 mph x 3.5 ft. swath) = 40.7 gpa.

Results

The various treatments differed in degree of damage to suckers over time, and speed of damage to the suckers. The control of suckers was relatively good by 30 days after treatment with all treatments relative to the untreated check. The paraquat gave rapid, effective results within 7–10 days in both apples and cherries, The Venue was both rapid and ultimately effective in the cherries at both 3 and 4 fl.oz / A, but appeared more practical at the 4 fl.oz./A rate in the apples. While the Mazzard cherry root suckers were very sensitive to Venue, the Budagovski 9 apple rootstock was moderately sensitive, and the Malling 9 was the least damaged. However, the Bud 9 and M9 suckers that recovered somewhat were almost all oversized at the time of application Those apple suckers that were less than 10 – 12 inches in length, and not "woody" at their bases were completely controlled, and had not regrown from below the surface by 60 days after application.

The Aim was also quite effective, more so on the cherries. The Rely was ultimately effective, but took 20-25 days to reach the level of control reached in 10-14 by Venue, Aim and Gramoxone. Growers are usually expecting a product to control and remove the suckers as rapidly as possible to enhance irrigation efficiently. There was no apparent trunk or crown damage in the 4th year small apple trees, despite the relatively "green" bark. There was no apparent damage to the much older cherry trunks.

In summary, all of the products were effective, especially so in the cherries. The paraquat and the Venue at 4 fl.oz. in 40 gpa spray rate seemed to be the most practical. These damaged only the targeted suckers. They are more rapid in effect than Rely, less of a drift hazard to fruit than Aim, but Venue is far less toxicity hazard to the applicator than paraquat. Venue appears to be a good choice for late spring or early summer crown and root sucker control in apples, cherries (and probably pears).

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