Summerland Research & Development Centre
Wine Grape Research

Management of Grape Leafhoppers: it's a lot about timing.

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INTRODUCTION

Leafhoppers are major pests of grapevines in the interior of British Columbia. It is a challenge to manage them following organic production practices, while control with conventional insecticides can be ineffective or lead to outbreaks of other grape pests. Research on various approaches for their control continues under the current funding agreement between AAFC and the Canadian Grapevine Certification Network (CGCN), including evaluation of the effectiveness of oils and new insecticides, the use of feeding deterrents, and studies of egg parasitoids that are their most important natural control agents. Integrated management of leafhoppers under conventional or organic programs is best achieved with a combination of control measures and consideration of the growth and developmental stages of their grapevine host plants. Area-wide calendar spray dates provide minimal guidance due to temperature differences between years and among and within vineyards.

Left: Adult Virginia creeper leafhopper (VCL)

Right: Adult western grape leafhopper (WGL)

The Virginia creeper leafhopper (VCL), *Erythroneura ziczac*, and the western grape leafhopper (WGL), *E. elegantula*, both overwinter as adults. In early spring they feed on a range of plant species before moving to feed on grapevines when the first leaves are available. Eggs of the 1st generation deposited by the overwintered females during May and June are confined largely to a zone from the 2nd leaf to just above the 2nd fruit cluster. Eggs are not deposited into a leaf until the leaf is fully expanded and with enough waxy cuticle to support the developing egg.

MANAGEMENT OF THE 1ST GENERATION

Anagrus wasps parasitize leafhopper eggs.

Yellow sticky tape strung below the vine cordon used by some producers of organic grapes is applied just before **bud break.** Applying, removing and recycling the tape is difficult and time consuming, and this practice is best used for edge rows and small areas with very high overwintering populations. From **late petal fall to around mid-July** marks the time period when additional actions can be taken to control 1st generation leafhoppers: those being early season removal of basal leaves, sprays of materials deterrent to leafhoppers, and applications of oils or insecticides. Although varying from year to year, a rough date for the start of these control actions at SuRDC is around the **3rd week of June.** Spring is a good time to consider planting hardy shrub and bush roses, thorn-less blackberry, ornamental or commercial *Prunus*, and other members of the Rosaceae plant family that serve as winter hosts for tiny *Anagrus erythroneurae* wasps that can parasitize large numbers of WGL eggs.

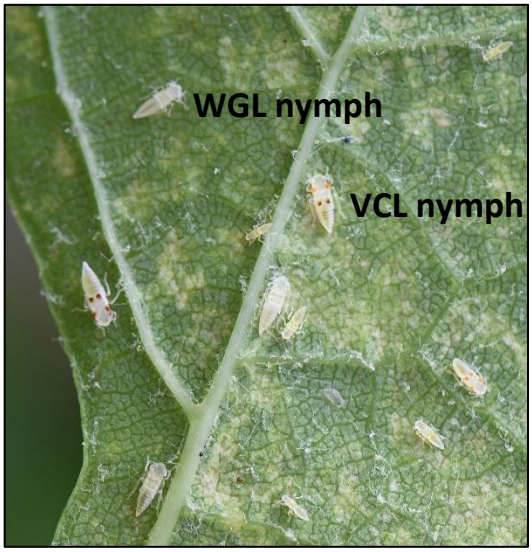
A newly hatched and a hatching VCL nymph.

1) **Leaf removal**. Optimal timing for the removal of basal leaves up to the 2nd cluster corresponds with the time when about 5-10% of the eggs have hatched. Presence of the first small nymphs (wingless immatures) on the undersides of basal leaves can be a good indicator, though these can be very hard to see with the naked eye. Removing leaves beginning at **late petal fall** should work fine. Based on earlier research conducted in the Okanagan on 2 cultivars at each of 2 vineyards over multiple years, removing the basal leaves by hand at this time reduced leafhopper numbers by about 70%. This practice is also helpful for the management of bunch rots and other vine diseases.
2) **Repellents**: Laboratory choice test bioassays and field spray trials have shown that certain strobilurin fungicides and organosilicone surfactants deter leafhoppers. Pristine® fungicide applied at the recommended field rate **in June** was shown to reduce leafhopper nymph counts by as much as ~95% relative to a water only control, while Flint® and the surfactant Sylgard® were less effective. Applications of a stobilurin fungicide, or addition of an organosilicone surfactant to the tank mix, **following the removal of basal leaves,** should help reduce leafhopper numbers. If early season removal of basal leaves is not carried out, these materials could be applied earlier to deter adults and reduce egg laying (oviposition). **Note:** the lengthy re-entry interval for Pristine and other strobilurin fungicides makes it difficult to fit them into a spray program when there is a need to conduct shoot thinning and other vineyard activities.
3) **Oil sprays**. PureSpray Green Spray Oil® has been shown to be more effective than Vegol® or soap against leafhopper nymphs, but it is not yet registered for the control of leafhoppers on grapes in Canada. However, sprays of PureSpray Green applied to control mites, or Vegol applied for other

pests, can be timed to also help manage leafhoppers. Targeting small nymphs of the 1st generation in July allows for sprays to be directed against a narrower zone up to just above the 2nd fruit cluster. It is difficult to achieve good coverage of the undersides of leaves with most conventional air blast sprayers. Best results are achieved with high volume sprays to runoff using sprayers equipped with turbine heads directed slightly forward and upward to provide better coverage. Oils can also be applied using a handheld spray gun attached with a long hose to a sprayer, or a backpack sprayer can be used for spot treatment of small areas. Consult the label for precautions regarding the incompatibility of oils and fungicides containing sulphur. Timing of oil sprays is best based on monitoring of egg hatch (using a hand lens or microscope), with the 1st of possibly 2 sprays applied when most eggs have hatched. Depending on the vineyard location and year, oils targeting 1st generation nymphs will likely be most effective in **early to mid July**.

4) **Insecticide sprays**. Whether organic or conventional, insecticides are best timed against the more susceptible nymph stage. Some neonicotinoid (Class 4) insecticides are repellent to adults; chasing them to unsprayed areas or to neighbouring vineyards. They are also persistent and will usually control leafhoppers for more than a year. Care must be taken to avoid outbreaks of mealybug or soft scale in subsequent year(s). Pyganic® insecticide is the only effective insecticide available for use on organic grapes in BC. As for the synthetic pyrethroids (e.g. Pounce®), it has a broad spectrum of activity and is damaging to beneficial insects, but it remains active for only a short time. Sprays of conventional or organic materials for control of 1st instar nymphs are best timed as for oils.

MANAGEMENT OF THE 2ND GENERATION



Hopefully the actions taken to control the 1st generation have been successful, as it is more difficult controlling leafhoppers of the 2nd generation. The peak in numbers of nymphs is broader by this time and the timing more variable due to differences in temperature between years. Peak numbers between the 2 leafhopper species will be farther apart due to the WGL's slightly slower rate of growth. Rather than a narrow zone of leaves, the entire vine will need to be sprayed.

Depending on the production area, monitoring numbers of leafhopper nymphs on leaves in a zone above the 2nd cluster to mid-vine will likely show peak numbers **around mid-August**. Applying repellent fungicides or surfactants before this time will reduce egg-laying and deter feeding by developing nymphs; oil sprays are best used after more nymphs have hatched. As a final action, if an insecticide spray is needed, consult with your product supplier or see "*Pest Control Products Recommended for Use on Grapes in British Columbia*", posted online by the BCMA, for suitable insecticides. Please follow all label instructions.

Partly grown VCL nymph, left, and WGL nymph, right.

Conducting counts of leafhopper eggs and nymphs with the aid of a magnifying lens or microscope and taking note of critical stages in their development and the corresponding growth stages of their host grapevines will assist in the management of leafhoppers. Although variable from year to year, maintaining records of critical dates is beneficial. Ultimately, research to create temperature models of leafhopper development and vine phenology stages would help to accurately time the various control measures undertaken each year. Additional research on feeding deterrents is required to determine their optimum use. On-going efforts will support the registration of new insecticides, particularly those widely used elsewhere for the control of leafhoppers on grapes that are more compatible with sustainable and organic production systems.

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