Evaluation of the Effects of Disease and Insect Management Strategies in High Brix Niagara Grape Production

Progress Report

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OBJECTIVES

1. Compare the effects of fungicide and insecticide programs for early and late harvest Niagara with respect to disease and insect control, cluster weight, and vine growth/vigor.
2. Determine the relationship between hang time/crop maturity and the manifestation of fruit rot during ripening of Niagara grape.
3. To articulate the costs of new spray guidelines and/or the economics of increased risk associated with high brix Niagara.

This proposal addresses National Grape and Wine Initiative priority 4, to improve integrated pest/pathogen management.

First Year Results

This project was originally propsosed to take place in grower vineyards. Unfortunately, a delay in receiving word that the project had been funded resulted in a change to working in blocks at the Cornell Lake Erie Research and Extension Laboratory and the North East Lab. Two insect and disease management strategies in early (low brix) and late (high brix) harvested Niagara grapes were used. The first strategy was to use a current grower standard with the second being an IPM strategy that will build upon the grower standard program by utilizing weather and pest information found on the Network for Environment and Weather Applications (NEWA) website http://newa.cornell.edu.

Insect management in the grower standard used the Grape Berry Moth Risk Assessment protocol that has been widely utilized in vineyards that are harvested prior to Concord in a typical year. The second strategy will use the Grape Berry Moth (GBM) Phenology-based degree day model (developed by entomologists from Penn State (Saunders and Timer), Cornell (Loeb) and Michigan State (Isaacs)) to more accurately time insecticide applications for grape berry moth. It was hoped that by reducing the amount of late season grape berry moth damage, thus reducing the number of berries where feeding has opened a doorway for the rots to get established, the occurrence of late season rot complexes could be reduced as result.

Following is an example of the disease management protocols used in the project. These spray timings and materials that follow are from the Penn State portion of the project but are quite similar to those applied at CLEREL. For simplicity of reporting only the timings for the Penn State sprays are listed. For the grower standard spray protocol an application of mancozeb (Penncozeb) and fenarimol (Vintage) was applied at the 10-16” shoot stage. Eleven days later, a second application was made immediately before bloom; mancozeb + fenarimol. A final application was made about 10 days after that (first post-bloom; ziram + kresoxim methyl

(Sovran)). Subsequent applications for downy mildew leaf infections at mid and late season were based on scouting and harvest date. In the second strategy (Late harvest protocol), a mancozeb spray was applied at the 3-6" shoot stage to target *Phomopsis*. This application has been shown to prevent crop loss due to rachis infections and may provide some reduction in fruit infection as well. This early spray can also help to reduce the buildup of carry-over inoculum in shoots/canes that increase the potential for fruit infections in subsequent seasons (we plan to examine plots over three years). The next application occurred at the 10-16" shoot stage, as in the grower standard. Subsequently, Revus Top (mandipropamid + difenoconazole) replaced fenarimol immediately before bloom and Pristine (boscalid + pyraclostrobin) replaced Sovran for the first post-bloom fungicide application. This was designed to bolster control of all fruit diseases during the most critical period for fruit infection and add some suppression of latent Botrytis infections (from the Pristine) that can exacerbate rot development during ripening. An additional post-bloom application of fungicide (second post-bloom) was made to cover continuing threats from downy mildew, black rot, and Phomopsis, while considering minimization of costs (ziram + sulfur). Late season downy mildew applications for both programs consisted of an applications of a phosphorous acid product.

Early spring weather in May was wetter and warmer than average; very conducive to early shoot infections of Phomopsis. However, the post bloom period was relatively dry and much less conducive to fruit infection by all the major pathogens. Wetter conditions resumed in late July and August, and downy mildew rachis infections appeared to take a heavy toll on unsprayed Niagara clusters; cluster stem tissue became necrotic, causing full sized fruit to shell. Both fungicide programs provided commercial levels of control of fruit infection by early harvest (14 brix), and there were no significant differences between treatments. Delaying harvest until 16 brix (late harvest) allowed for greater levels of rot to develop in both treatments at both locations. At the Penn State location the late season harvest protocol had significantly less bunch rot than the grower standard. This was not the case in the CLEREL block (Table 1). One reason for this could be that the CLEREL block had a misapplication of insecticide which resulted in the grower standard receiving an additional insecticide application in midseason. Since it has been hypothesized that reducing grape berry moth damage will reduce fruit rots it is conceivable that the additional insecticide application did just that.

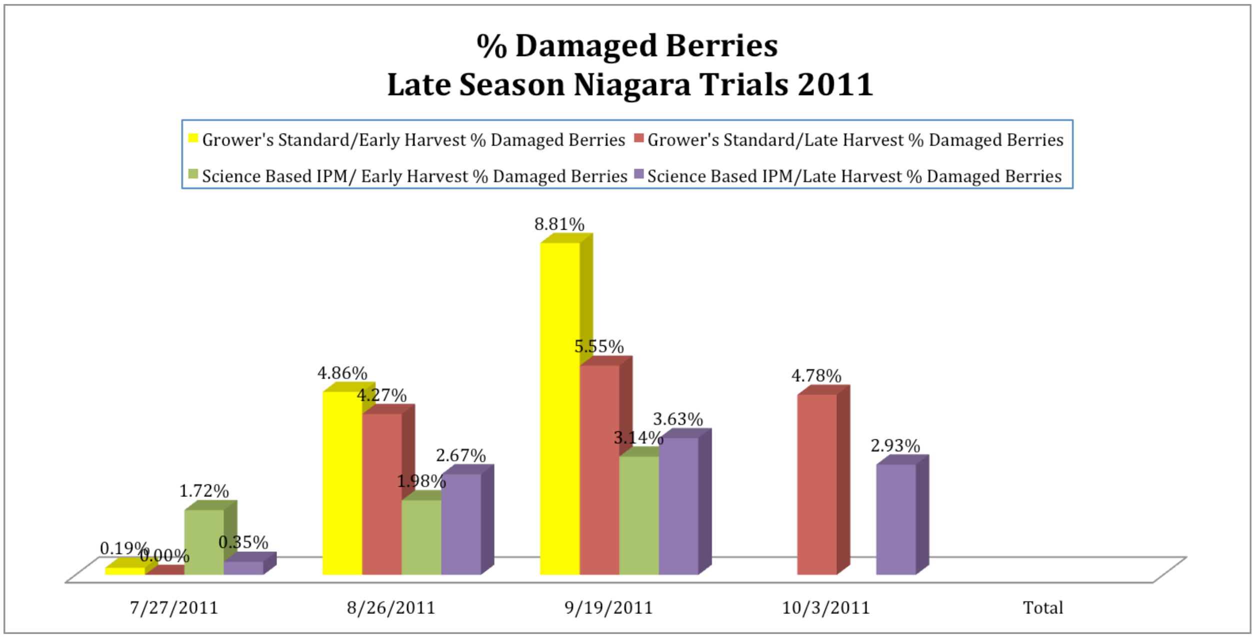
Treatments were rated at harvest (early or late) for cluster rots (Phomopsis fruit rot and bunch rots) and grape berry moth damage, cluster number as well as cluster weight, and berry number (per cluster) and weight.

Table 1. Comparison of early and late harvest spray protocols on percent cluster rots at CLEREL and Penn State research blocks.

	Average % Rot			
	CLEREL		Penn State	
Date	Grower Standard	Late Harvest	Grower Standard	Late Harvest
Early Harvest*	2.3	2.7	2.4	1.26
Late Harvest**	5.7	6.9	11.97	8.65

* September 12 - CLEREL, September 14 - Penn State (approximately 14 Brix)
** October 13 - CLEREL, October 6 - Penn State (approximately 16 Brix)

Figure 1. Comparison of grower standard and late harvest spray protocols by rating damaged berries at the North East Lab in North East, PA.



As shown in Figure 1, with the exception of the July assessment, there was a notable difference between the Grower's Standard and the Science Based IPM (Late Harvest) protocols. These differences were even more pronounced in the Late Season evaluation. As was expected ,there was significantly more damage in both the IPM and Grower's Standard GBM damage between the 9/19 and 10/3 assessments.

The costs of new spray guidelines and/or the economics of increased risk will be articulated to growers and members of the grape industry. This objective will be completed after the third year of the project. During the first year of the project Pristine was included in the late harvest spray protocol. After reviewing the label it was determined that Niagara had been added to the Pristine label as a no-spray variety. After one year of the project, and with Pristine out of the protocol, the late harvest spray protocol has yet to be fully determined.