# OPTIMIZATION OF ADMIRE APPLICATIONS IN NORTH COAST VINEYARDS

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**Reporting period:** The results reported here are from work conducted from March 2004 to October 2004.

## ABSTRACT
Four treatment regimes for Admire, a soil-applied imidacloprid insecticide, were evaluated in a North Coast Chardonnay vineyard in a cool site with a loam soil (15% clay content) and limited irrigation. None of the treatments resulted in consistent uptake or sustained concentrations of imidacloprid in xylem fluid at levels desired for control of blue-green sharpshooters or other insects. Our results suggest that limiting irrigation in order to manage vine growth and berry size for premium wine production may prevent the effective use of Admire in some cooler growing regions.

## INTRODUCTION
Admire insecticide (Bayer CropSciences) is widely used in grapes and citrus for control of the glassy-winged sharpshooter (GWSS) and to limit the spread of Pierce's disease (PD). It is a soil-applied product that delivers the active ingredient imidacloprid, a neonicotinoid insecticide that has been shown to be very effective against GWSS and other sucking insects (1). In northern California, Admire is sometimes used against populations of blue-green sharpshooters, the most common vector of PD in this region, as well as to treat for other pests.

Most research on uptake and persistence of imidacloprid in grapevines has been done in southern California in warm regions on soils with relatively low clay content (2, 3). In the heavy soils and cooler climates common in North Coast vineyards, there are questions about the best application strategy for Admire in order to ensure effective levels of imidacloprid in grapevines.

Admire is applied to vineyards through a drip system. It is recommended that it be applied to moist soils in order to enhance its downward movement into the root zone and its uptake into vines. Applying Admire early in the growing season (around budbreak) will meet the moist soil requirement. However, early in the season there is little canopy development, temperatures are cool, and therefore little uptake of water by the roots is occurring. In addition, because of the high rainfall and deep soils common in the North Coast conditions, grapevines have extensive root systems well outside the areas served by drip emitters. Early in the season, vines extract water from soil that is distant from the drip zone where Admire would be applied. Therefore, imidacloprid taken up early in the spring could be considerably diluted. Waiting until the soils dry down and the vines have established larger canopies should lead to more concentrated root activity in the drip zone and better uptake. However, the movement of Admire downward through the soil profile could be reduced due to the drier soil conditions.

To address these concerns and questions regarding the uptake of imidacloprid, we established a replicated field trial in the Carneros region of Napa County. Chardonnay vines on 101-14 rootstock were used. The vineyard was planted in 1994 with 8x5 foot spacing. The soil is a Haire loam with 15% clay content. There was one 4-liter/hour emitter for each vine. We chose this site because it presented a number of challenges to a soil-applied insecticide regime: cool growing conditions, non-sandy soil, extensive rooting beyond the drip zone and limited irrigation. These conditions are common among many North Coast vineyards.

## OBJECTIVE
1. Evaluate the uptake and sustained concentrations of imidacloprid in grapevines planted on clay soils in a cool region (Carneros) following different application regimes of Admire insecticide.

## RESULTS
Admire treatments were as follows:
- T1: 32 oz (full rate) in March
- T2: 16 oz in March / 16 oz in May
- T3: 32 oz in May
- T4: 16 oz in May / 16 oz in July

There were three replications of each treatment. Each replicate included three vine rows and extended the length of the vineyard block (136 vines). There was an untreated buffer row between each replicate. The vineyard was irrigated prior to each Admire application to ensure moist soil conditions, and water was applied for several hours after the injections were completed to move the material into the root zone. We checked each row to ensure that all drip emitters were functioning during our first application. Other than the irrigations made in conjunction with our treatment applications in March, May

and July, the only other irrigations during the growing season were a 4-hour application in May and a 1-hour application in July. An 8-hour post-harvest irrigation was made in September.

Xylem fluid samples were collected one week after the initial applications and continued every two weeks through September. Samples were collected only from the center row of each replicate. At each sampling, 200 microliters of xylem fluid were extracted from each of 8 vines within every replicate, and were kept separate. A different set of vines were sampled each week. Fluid extractions were made using a pressure bomb equipped with a large chamber that could accommodate shoots up to 18 inches in length. Samples were frozen on dry ice in the field and subsequently held in a freezer. Samples were shipped frozen overnight to UC Riverside and analyzed using a commercial ELISA detection kit (EnviroLogix, ME) (2).

None of the treatments resulted in effective uptake of imidacloprid. Average imidacloprid concentrations (N=24) for each treatment on each sampling date ranged from 0 to 3.71 ppb. 74% of the average values were less that 1 ppb. Ten ppb is considered to be a minimum threshold level for insecticidal activity in grapevines (3).

In many case, all samples within a treatment had undetectable levels on a given week. During the course of the season, some vines were positive for imidacloprid in each replicate of each treatment, at both ends of the vineyard block. This indicates that Admire was effectively distributed with our injections. However, uptake by the vines was very limited. Some vines did take up some imidacloprid, but many apparently did not. Since different vines were sampled on each sampling date, our average values fluctuated on each sampling date. In no case was there evidence of sustained effective levels of imidacloprid in vines resulting from the treatments.

Table 1 summarizes our sampling results. It shows that the majority of samples were less that 4 ppb, the detection limit for this ELISA test. While Treatment 2 had the most samples with values greater than 4 ppb, these were just 12% of the samples. Only 4 out of the 1008 samples analyzed had imidacloprid levels that exceeded the minimum threshold for insecticidal activity of 10 ppb.

**Table 1:** Number of individual samples with imidacloprid concentrations in the ranges shown.

| | <4 ppb | 4-6 ppb | 6-8 ppb | 8-10 ppb | >10 ppb |
|---|---|---|---|---|---|
| **T1** | 278 | 8 | 2 | 0 | 0 |
| **T2** | 253 | 20 | 9 | 4 | 2 |
| **T3** | 206 | 7 | 0 | 1 | 2 |
| **T4** | 211 | 4 | 1 | 0 | 0 |

## CONCLUSIONS

None of the Admire treatments resulted in consistent levels of imidacloprid in xylem fluid necessary to control blue-green sharpshooters or other sucking insects. The conditions presented by the vineyard used in this trial are not uncommon in many North Coast vineyards. The vines have widely distributed root systems in relatively deep, non-sandy soils with abundant soil moisture in the spring as a result of high winter rainfall. Evapotranspiration (and therefore water uptake) is less than in other growing regions due to smaller canopies and a cooler climate. Because of this, root activity is not concentrated in the drip zone until well into the growing season.

Nonetheless, our May and July applications did not result in any significant improvement to Admire uptake, at a time when more root activity within the drip zone was expected. Apparently, a key component limiting the uptake of Admire in this trial is the minimal level of irrigation.

In the production of North Coast grapes for premium wines, irrigation is often used sparingly in order to manage grapevine canopy development and to reduce berry size for optimal fruit and wine quality. This is especially true in the cooler growing regions and on heavier soils. In sites such as these, the uptake of Admire will be greatly limited and it is unlikely that it will have the desired insecticidal activity to justify its use.

## REFERENCES


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