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GRAPEVINE TISSUE SAMPLE PREPARATION

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Figure 1. Grape tissue samples should be carefully washed while still turgid to remove residues of foliar sprays and dust.

Tissue sampling is the most accurate method of determining the nutrient status of grapevines. Leaf blade or petiole samples are collected at bloom and veraison for routine analysis, timings that correspond with pesticide applications in many areas of the state. Residues of plant-protectant products such as fungicides and insecticides, foliar fertilizers, and even dust may serve as a source of contamination that can result in artificially high nutrient values (Fig. 1). Researchers at Texas A&M University found increased concentrations of several nutrients (manganese, zinc, sulfur, iron, and phosphorus) in unwashed grapevine tissue samples after an application of mancozeb and phosphorous acid. Manganese and zinc concentrations in unwashed leaf samples that had been sprayed with mancozeb were over 800 percent and 300 percent, respectively, higher than samples that had not been sprayed. Significant contamination remained 7 days later, even after a ½-inch rainfall event. Because many plant-protectant products are tenacious, methodical decontamination is needed to avoid contamination. Simply washing leaves in water will not remove many contaminants.

Viticulturists at Texas A&M carried out six separate experiments to find a simple but effective method to remove pesticide contaminates from leaves. They found that washing tissue samples in water only, as well as solutions of hydrochloric or citric acid, vegetable wash, and dish soap, did not completely decontaminate grape leaf tissue samples. Researchers also tested different methods and various lengths of agitation (15, 20, 30 seconds).

The single best method of tissue decontamination was phosphate-free baby laundry detergent at a rate of ⅓ fluid ounce per gallon of distilled water with 30 seconds of agitation by hand (i.e., gently rubbing tissue samples individually between fingers), followed by a double rinse in distilled water. Tissue samples should then be blotted dry with paper towels and dried under low heat (approximately 80 to 150°F). Samples should be stored in a breathable bag to prevent mold, such as a brown paper bag.

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Figure 2. Leaf blades are more prone to contamination from plant-protectant residues than petioles and require greater effort to decontaminate.

In the washing experiments, leaf blades were consistently more prone to pesticide contamination than petioles (Fig. 2). This was likely due to the greater surface area of leaf blades and the difference in texture. Thus, more careful decontamination is required for blades, and extra effort is likely needed for pubescent grape varieties or those with a rough leaf texture.

Figure 3. Grape varieties that are pubescent or those with a rough leaf texture may require more effort to decontaminate.

Fewer leaf blade samples should be placed in the washing solution at one time, and washing and rinse solutions should be replenished with clean water frequently to avoid cross-contamination. Distilled water should be used for washing and rinsing, as tap water can serve as a source of contamination. Tissue samples should be washed while still turgid and not left in the wash or rinse solution for extended periods of time to prevent leaching of soluble nutrients. Complete removal of washing detergent is necessary to avoid contamination, particularly sodium.

DECONTAMINATION PROTOCOL

1. Add ⅓ fluid ounce of phosphate-free baby laundry detergent to 1 gallon of distilled water.
2. Add 20 leaf blades or petioles and agitate by hand by rubbing the blades or petioles individually between fingers for a total of 30 seconds.
3. Remove samples from the solution and shake off excess washing solution from the samples.
4. Add the samples to the first distilled water (1 gallon) rinse solution and agitate by hand for 15 seconds.
5. Remove the samples from the first rinse solution and add them to the second distilled water rinse solution (1 gallon), then agitate by hand for 15 seconds.
6. Remove the samples, shake off excess rinse water, and blot dry with paper towels.
7. Dry the samples in open air or under low heat up to 150°F until the tissue is dry. This may take up to 48 hours, depending on temperature and humidity.
8. Store the dried samples in a paper bag until they are shipped to the lab for analysis.

Figure 4. Tissue samples should not left in the wash or rinse solution for extended periods of time to prevent leaching of soluble nutrients.