Screening Grapevine Cultivars for Adaptability to Soil and Climatic Conditions in Wyoming

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Grapevine production is traditionally confined to subtropical regions of the United States. The development of new cold-hardy grape cultivars has led to the possibility of sustainable grape production in colder regions of the United States, including Wyoming. The Wyoming grape industry, although small, continues to grow and generate interest among producers seeking to diversify crop production. Grape production and quality is governed by the complex interaction of cultivars with prevailing soil and climatic conditions. Thus, choice of cultivar is a critical factor for successful vineyard establishment.

Objectives

The goal is to identify promising grapevine cultivars for Wyoming, thus helping to overcome obstacles to initial vineyard establishment. This could result in increased production and earlier financial returns.

Materials and Methods

A grape germplasm comprising 52 cultivars and rootstocks was obtained from the U.S. Department of Agriculture’s (USDA) cold-hardy grape germplasm repository in Geneva, New York. Stock vines were vegetatively propagated in a mist chamber to produce plants for the field trials. A one-acre vineyard site was established at the Sheridan Research and Extension Center (Figure 1). A five-feet-tall wire cordon trellis system was constructed using wooden posts (8 feet tall) at 20 feet distance within rows and two wires at 3 and 5 feet (12.5 gauge aluminum wire). End posts were securely anchored in the ground using 40-inch earth anchors. Wire tension on rows was adjusted using a wire vise tensioning tool. All supplies for vineyard establishment were purchased from Orchard Valley Supply Inc., North Carolina. A smaller test site (120 by 40 feet) was established at the Powell

Figures 1 and 2. Test plots in Sheridan (left) and Powell (right).

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Research and Extension Center (Figure 2). Vines were planted at 10 feet by 5 feet spacing in 11.8-inch deep holes filled with compost and supplemented with 1.8 ounces 19:6:12 slow-release fertilizer. A drip irrigation system was installed at both locations to provide irrigation during periods of extreme drought. A total of 350 vines were planted at Sheridan and 100 at Powell. Vineyard irrigation was terminated at the end of September to initiate grapevine acclimation for winter conditions. Bud break and vine survival rates were recorded in spring 2014 to estimate vine winter damage and cold-hardiness of various cultivars. Fruiting in vines was discouraged by removing any inflorescences to ensure vine establishment and enhance cold-hardiness in the subsequent winter season.

**Results and Discussion**

Preliminary results indicated significant variations among grapevine cultivars in timing of bud break and vine survival rates at the two locations (Figures 3). Bud break following dormancy among cultivars ranged from early (May 14) to late (June 9). A higher vine survival rate following winter damage was recorded in Sheridan (73%) compared to Powell (40%). Among the various cultivars studied, 100% survival was recorded in several, including 'Frontenac', ‘Marechal Foch’, and ‘Osceola Muscat’, at Sheridan, while 60% survival and regrowth was recorded in ‘Frontenac Gris’ and ‘Elvira’ at Powell. Grapevine cultivars exhibit a wide variation in growth and developmental response to varying soils and climate. Vine establishment following planting, growth and development, flowering, berry development, and ripening also varies regionally. Such variation in survival rates may be attributed to differences in soil, climate, and topography of the two test sites.

Based on preliminary results, grapevine cultivars ‘Elvira’ and ‘Frontenac Gris’ exhibited higher vine survival rates following winter damage in Powell whereas ‘Frontenac’, ‘Marechal Foch’, and ‘Osceola Muscat’ performed well in Sheridan. We will continue to screen grapevine cultivars at the two locations for several years before any recommendations on cultivars suitable for this region can be made.

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