

58WG - ICCS 2006 Christchurch, New Zealand

Seasonal growth, dry matter and carbohydrate development in mature 'Concord' grapevines

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Over one year ten whole-vine harvests of 41 year-old, own-rooted 'Concord' grapevines in Fredonia, NY were done with at key stages (fall dormant, spring dormant, budbreak, 25 cm-shoot length, bloom, 2 and 4 weeks after bloom, veraison, harvest and fall dormant). At each date five entire vines were harvested with root excavation from the area allotted per vine down to a depth of 1 meter, and were separated into fine and large roots, root shank, trunk and cordons, 2-year wood, 1-year wood, current shoot stems, leaves and fruit. All were dried, weighed and samples taken for carbohydrate analyses. Seasonal canopy development by leaf area and light interception, leaf photosynthesis, and amounts of dry matter, nutrient and carbohydrate concentrations among the organs of the vine were determined. Dry matter per vine was quite variable, but seasonal patterns were clear. The pattern of dry matter gain was sigmoidal with a slight decline in vine dry weight prebloom as growth used reserves. The greatest dry matter growth was between bloom and veraison with total seasonal dry matter gain/vine before leaf fall of about 4 kg (about 6 tonnes/ha DM) with a yield equivalent to about 23 tonnes/ha. The harvest index was 0.62. The pattern of dry matter gain was well modeled by a model that used radiation interception, photosynthesis and respiration. Over the whole year essentially all the dry matter gain was in current shoots and fruit with little or no apparent net yearly gain in the old structural parts.