Impacts of using polyethylene sleeves and wavelength-selective mulch in vineyards I. Effects on air and soil temperatures and degree day accumulation

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Effects on soil and air temperatures of wavelength-selective polyethylene mulch applied in planted rows, and clear polyethylene enclosures (sleeves) applied around vine canes or cordons for seven weeks in the spring were determined in three Merlot vineyards in the Okanagan Valley, British Columbia. Three sleeve configurations were studied: single-layer and closed at bottom; single-layer with bottom ventilation added after five weeks; and double-layer with bottom ventilation added after five weeks. All sleeves were perforated at the top between two supporting trellis catch wires, and were stapled closed at the bottom under the cordon or cane. Sleeve removal was either all-at-once or in two stages by first opening the top then removing the sides six days later. The sleeves increased mean air temperatures by *ca.* 1 to 2EC and maximum temperatures by *ca.* 5 to 8EC, and decreased minimum temperatures by *ca.* 1 to 2EC, depending on the vineyard, measurement period, and sleeve configuration. Adding bottom ventilation to sleeves increased the mean minimum nighttime temperature by *ca.* 1EC at one vineyard but had no effect at the other two sites. Degree day (base 10EC) accumulation inside sleeves was 1.5 to 2 times that of ambient, depending on the site, which increased total degree day accumulations for the season by 4.1 to 7.9%. The polyethylene mulch increased soil temperatures by *ca.* 2EC continuously over the diurnal period at two of the vineyards, but at the third where there was significant weed growth under the mulch the increase was less and only at night.

Impacts of using polyethylene sleeves and wavelength-selective mulch in vineyards II. Effects on growth, leaf gas exchange, yield components and fruit quality of *Vitis vinifera* cv. Merlot

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Response of Merlot vines to wavelength-selective polyethylene mulch in the planted row and clear polyethylene enclosures (sleeves) around canes or cordons for seven weeks in the spring was studied in three Okanagan Valley vineyards. The mulch had no detectable effects on vine development, yield components and fruit quality. The sleeves advanced budbreak by three to six days, depending on the vineyard site, and increased the early growth rate of shoots. Time of budbreak and shoot growth rate were better predicted by cumulative daily mean temperature than by cumulative degree days (base 10EC). On the day sleeves were removed or opened at top, photosynthesis rates were higher in open-top sleeves than under ambient conditions due to higher mesophyll and stomatal conductances. Sleeves advanced the date of 50% bloom in all vineyards by approximately 10 days. Time of bloom, onset of veraison and the rate of fruit maturation were predictable from degree day accumulation. Sleeves advanced fruit maturation by 7 to 26 days, depending on the site, and reduced juice titratable acidity relative to EBrix at the coolest site. Sleeve effects on yield and yield components were inconsistent among sites. Sleeves reduced yield at one site due to lower cluster weights and apparently fewer berries per cluster. At another site, higher berry weights compensated for the apparent reduction in the number of berries per cluster in response to sleeves, and there was no effect on yield. At the third site, berry weights were lower in response to sleeves, likely in compensation for a higher number of berries per cluster. At one site where vines were shoot-thinned to retain primary shoots in the following year, the number of clusters per vine was unaffected by the treatments indicating that they had no effect on bud fruitfulness.