

Title: Determination of ethylene regulated changes in anthocyanin composition during ripening in blueberry

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Blueberry has emerged as a major specialty crop in the United States. The two main types of cultivated blueberry in Georgia (GA) are southern highbush and rabbiteye blueberry. During ripening, individual blueberry fruit on the branch matures at different rates resulting in non-uniform ripening. Ethylene-releasing plant growth regulators (PGRs) were found to increase the rate of ripening in blueberries by increasing the number of ripe fruits. Further, we were interested in studying the effect of ethylene releasing PGRs (ethephon and ACC) on individual anthocyanin concentrations. These studies were conducted in two rabbiteye cultivars, ‘Premier’ and ‘Powderblue.’ First, fruit samples were taken from the five developmental stages and categorized as S4, S5, S6, S7, and S8 developmental stages. The S4 (<9 mm) and S5 (>9-<13mm) were selected based on size (diameter). The S6, S7, and S8 were selected based on color (S6: 25-50% light pink skin, S7: predominately light to dark pink skin with some blue, and S8: blue skin). In addition, ethephon and ACC at the rate of 250 ppm were applied to the plants when 30-35% of fruits were ripe in 2020. Before applying PGRs, all ripe fruits were removed from all treatments. Three branches were tagged for the sampling. Then fruit samples were taken randomly at 0, 3, 5 days after treatment (DAT) from the tagged branches, and only ripe fruits were harvested at 10 DAT. In total 15 anthocyanins were detected. The anthocyanins start to accumulate during ripening initiation at the S6 stage and continue to increase with the highest concentrations present at the ripe (S8) stage. In addition, both PGRs increased the anthocyanin concentration at 3 and 5 DAT, with ethephon being more effective in increasing anthocyanin concentration. However, at 10 DAT, anthocyanin concentration in ripe fruit were similar in PGR-treated and control fruits. These data suggest that ethylene releasing PGRs increased the rate of ripening and the rate of anthocyanin accumulation during blueberry fruit ripening. However, there may be a maximum limit to the accumulation of anthocyanins since ripe fruit harvested 10 DAT had similar anthocyanin concentrations in PGR-treated and control fruits.