Producing strawberries in high-pH soil at high elevations

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Strawberries were grown in New Mexico in experiments that determined 16 varieties of strawberries' suitability as potential alternative crops for high elevation, high pH soil conditions. Credit: Shengrui Yao.

Fruit and vegetable production in high-elevation areas can be a difficult enterprise. Variable weather and soil conditions typical of these regions, such as the southwestern United States, present multiple challenges for growers. "High frequency and intensity of late spring frosts in semiarid climates have made fruit production challenging," explained Shengrui Yao, corresponding author of a study in the February 2015 issue of *HortScience*. "Growers may only harvest five to six apple crops during a 10-year period, and, as a result, many are forced to abandon their orchards." To lessen the negative impacts of unreliable weather and soil conditions, growers in the region are looking to alternative crops to help them stay in business. Yao and researchers Steve Guldan, Robert Flynn, and Carlos Ochoa studied multiple strawberry varieties, and found some promising options for growers in the U.S. Southwest.

Looking to strawberries as potential alternative crops for high elevation, high pH soil conditions, the experiments involved studied 16 strawberry cultivars planted with two planting systems. "Strawberry is a possible alternative crop because it matures early and is relatively easy to produce, but late spring frosts still have the potential to delay or reduce harvest," the scientists explained. "Our objectives in this study were to evaluate strawberry cultivars' tolerance to high-pH soil, determine yield potential in high-pH soil, and compare two perennial planting systems for high-elevation areas in the Southwest."

The experiments took place from 2011-2014 with strawberries planted in a black-plastic-covered perennial system (BP) and a matted-row system (MR). The experiments evaluated fruit yield, soil pH tolerance, and winter survival rates, among other traits. "We used two to three applications of 0.67 $g \cdot m^{-1}$ per linear row of 6% chelated iron each year through fertigation to effectively treat leaf chlorosis resulting from high soil pH," Yao noted.

Results showed "great variation" among cultivars in yield and tolerance

to high-pH soil. 'Allstar', 'Chandler', and 'Darselect' were found to be the three most sensitive strawberry cultivars to high soil pH, while 'Wendy', 'Brunswick', 'Honeoye', and 'Clancy' were determined to be the four most tolerant cultivars. "Strawberry adaptation is localized, and each region has its own best-performing cultivars," Yao explained. "For example, 'Allstar' and 'Chandler' were top performers in Maryland, California, and North Carolina, but they were the most sensitive cultivars to high pH/high lime soil among the cultivars tested in this study, which impaired their growth and yield potential."

Early cultivars 'Earliglow' and 'Annapolis', and late cultivars 'L'Amour' and 'Ovation' all had low yields in both years. 'Wendy', 'Chandler', 'Clancy', and 'Jewel' were found to be the most cold-tender cultivars, while 'Mesabi', 'Kent', 'Cavendish', and 'Honeoye' were the hardiest among the strawberries evaluated. "Despite repeated late frosts from mid-April to early May of 2013, and a delayed harvest season, most cultivars produced greater yield than in 2012, with 'Mesabi' and 'Kent' being the greatest," the authors said.

Analyses indicated no significant differences in yields between black-plastic-covered perennial system (BP) and matted row (MR) treatments in 2012 and 2013, but the researchers found that yield in BP was significantly lower than in MR in 2014. "Based on the three harvest years, we would recommend two harvest seasons for the BP system, because plants declined for all cultivars in the third year. Plants in the MR system, however, were good for at least three harvest seasons," they said.

The scientists concluded that winter damage and late frosts can be managed through cultivar selection and overhead sprinkler installation, respectively. "Some cultivars are winter-hardy and tolerant to high soil pH. Growers can grow strawberries successfully with proper cultivar selection, soil fertility, and frost management in high-pH soil at high

elevation in the southwest United States or similar areas," they said.

More information: *HortScience*: hortsci.ashspublications.org/c … nt/50/2/254.abstract

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