

## RESPONSE OF ERECT BLACKBERRIES TO IMPROVED WATER AND NUTRIENT MANAGEMENT

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A few years ago we planted an acre of newer varieties of erect blackberries including thornless varieties Apache, Arapaho, Navaho, Chester and Ouachita, and thorny ones including Shawnee, Kiowa and Chickasaw. The planting was made on old recycled plasticulture strawberry beds after which pumpkins had been grown, followed by sweet corn, so these beds had been succession-cropped four years--two in strawberries, one in pumpkins, one in sweet corn. Plant nutrients for succession crops had been supplied via fertigation through the drip irrigation lines based on soil tests of the beds before each succession crop, and on our experience with succession plantings on plastic mulch.

After spraying beds with Round-Up vegetation killer herbicide two weeks earlier, old plastic mulch, tattered and torn, was hand removed, as were the old drip lines. Blackberry tissue-culture plug plants were set into the undisturbed beds using hand bulb setters to make planting holes every four feet apart in-row, one row per bed. Every other bed was planted to provide ten feet between rows. Under each plug plant about two teaspoons of three-month, slow-release Osmocote 14-14-14 was hand placed, then covered with about one-half inch of soil to prevent direct contact of young, tender plant roots with the fertilizer pellets. Twice during that summer at six-week intervals, one-eighth cup of 10-20-20 granular fertilizer was side-dressed on the uphill side of plants (beds are on the contour of this hillside site). In the second and third years in early springs we side-dressed 300 pounds/acre of 10-20-20 fertilizer on the uphill side of the beds 4 to 6 inches away from plant stems.

Ram 17 heavy wall drip line tubing with fused-in emitters spaced every two feet apart was placed on each bed top about three inches from plants on the uphill side of each row. Frequent timely rains that first summer and the next eliminated the need to hook up and use the drip irrigation system. In hindsight, those rains apparently lulled us right to sleep! The third spring we had a drought of over six weeks duration beginning just as plants began to wake up and make new spring growth, lasting well into bloom time. During bloom earlier side-dressed fertilizer was still somewhat visible on top of the beds and unavailable to the plants.

Like all growers during spring months, we were very busy with many enterprises including strawberry frost control in other fields, finishing up blueberry and seedless grape pruning, raspberry fertilization and trellis construction, asparagus planting, and on and on. No thought was given to irrigating the blackberries this early in the season, assuming (assumptions will get you every time) that "heck, blackberries are tough as weeds, they'll be fine."

An abundant blackberry bloom period occurred during this extremely dry period, especially bountiful on the vigorous variety Apache. We had visions of canes soon to be loaded with big, tasty, juicy, sweet blackberries! But suddenly pollinated blooms began to abort along with very young fruit, even though bees and native pollinators were abundantly present. We made almost no crop that summer, with Apache especially the hardest hit. Surprise! Cultivated, high yield blackberries are not a crop for arid desert conditions! We searched high and low for something to blame, but there was no one but us. We checked with other blackberry growers in Kentucky and North Carolina, with plant breeders, horticulturists and with growers at the annual North American Bramble Growers Association winter conference.

Several growers in other areas also experienced the same dry spring conditions and reported similar plant response, especially with Apache plants. Soil and plant tissue analysis in early summer showed that our levels of phosphorous, potassium and calcium were low in both soil and plants--not surprising since side-dressed fertilizer was still right there unused, unavailable, sitting on top of the beds where it had been placed at least six weeks earlier.

We then quit the search for the culprit, finally accepting the reality that it was us, and so we went to work, vowing to avoid future moisture stress on the blackberries: We hooked up the drip irrigation system already in place and actually began to use it on a regular basis.

We began to irrigate the blackberries as we have always done with blueberries and primocane raspberries: at least twice a week when rains do not come, especially during bud, bloom and fruit development, then all summer long. Also, we began an intense, supplemental foliar feeding that includes calcium phosphite, potassium, and a plant bio-stimulant from seaweed extract along with very small amounts of nitrogen, applied with an air-blast sprayer every two weeks throughout the growing season.

The plant response was immediate! With regular, more constant soil moisture, plants could begin to extract fertilized soil nutrients previously unavailable to them on the dry beds. Supplemental light foliar "spoon feedings" of soluble plant nutrients twice monthly plus the catalyst effect of the bio-stimulant enhancing nutrients absorption and utilization and the resulting plant growth, kept us busy summer topping and pruning! Senescence of stems and leaves was delayed, and we wondered if all this verdant succulent growth might reduce winter hardiness or overly delay fall hardening off of the plants. So, in very early October of each year, we now stop irrigating. We also only foliar feed potassium, twice during October, to help harden and toughen plant cells in preparation for winter dormancy.

This past spring provided the opportunity for the real test: We were hit once again with a very prolonged dry spring, and also with very extended cool weather compared to our averages. We kept day/night temperature records this spring, noting we did not get a 60 degree F. night temperature here until June 5! At first sign of new spring buds and leaves on the blackberries, we began to drip irrigate regularly, also applying supplemental foliar feed twice monthly. Again we had a very abundant and extended bloom season; the Apache plants and all varieties were covered with blooms. What a picture! This time they all "stuck", with no abortions or drying up of very young fruit. We enjoyed a very good crop of large, sweet berries from late July until late September over all of the varieties. Apache was a very heavy yielder of very large berries, so we feel we have learned, finally, how to manage these newer varieties for profitable production into the future.

Summarizing the two main management points necessary for success:

1. Uniform, regularly applied soil moisture maintenance from early spring, and continuing all summer long;
2. Good soil-based plant nutrition has been further enhanced with regular light foliar feedings that include all plant nutrients in the program to balance the normal pattern of heavier spring nitrogen applications.

With plant nutrients and soil moisture working together as a symbiotic team, water and nutrients requirements are met and maintained, resulting in little or no plant stress from these factors. The payoff is in bountiful fruit, healthier plants, and extended harvests. Because better water and nutrients management have worked so well for our blackberries, we began using this same program on all our U-Pick crops including blueberries, all blackberries and primocane raspberries (we retired from strawberries) as well as with our fresh-picked asparagus and seedless grapes. So, bring on those three-berry cobbler pies and ice cream!

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