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THE USE OF IRRIGATION METHODS AND MULCHING TO REDUCE SALT DAMAGE OF BLUEBERRIES IRRIGATED WITH A SODIC WATER

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Irrigation of blueberries with water from the Wilcox aquifer is not recommended, but is sometimes necessary. This water contains sodium bicarbonate in amounts detrimental for blueberry plants. Water having greater than 50-70 ppm sodium should be avoided. However, some growers already have their irrigation systems connected to deep wells. The objective of this study was to determine if certain irrigation/soil management practices could be used to reduce the harmful effects of this irrigation water.

MATERIALS AND METHODS

'Tifblue' rabbiteye blueberries were established in 1983 with one of three irrigation treatments: one 2 gph emitter, two 1 gph emitters, or one low volume spray emitter (LVSE) per plant. In combination with the irrigation treatment, plants received either a 4 inch sawdust mulch treatment or a no mulch treatment. Plants were irrigated to maintain the soil moisture tension between 10 and 20 centibars, as measured by soil tensiometers. In September of 1985, the severe symptoms of salt damage were evident on some of the treatments. Soil samples were taken at that time to determine which irrigation/mulch treatment maintained the lowest levels of soil sodium, and soluble salts - electric conductivity (EC).

RESULTS AND DISCUSSION

Fruit yield and growth levels were greatest for mulched plants and for plants irrigated with LVSE followed by plants irrigated with the one emitter treatment (see discussion of data in the paper entitled "Comparison of drip emitters, low volume spray emitters, and mulching on plant establishment of rabbiteye blueberries"). Plants irrigated with two - 1 gph emitters per plant without mulch had the greatest level of salt damage as measured by leaf necrosis (Figure 1). All other treatments resulted in only minor salt burn. Mulch reduced soil sodium across all irrigation treatments. Soil sodium levels were highest with the LVSE treatment without mulch (Figure 2). The

distribution of total salts in the soil for each treatment is shown in Figure 3. The major locations of the plant rootzone shown on these graphs is the 0 cm sample distance away from the plant (the base of the plant trunk) at the 0-22 cm depth. For adequate plant production to occur that zone must have an EC below 1.5 dS/M. This occurred for all treatments except the two emitter plant treatment without mulch. Since salts move in the outer part of the wetting front, placing an emitter on either side of a plant forces salts to concentrate at the base of the plant and cause severe damage. All other irrigation treatments kept salts below the toxic level. Regardless of the irrigation treatment, the use of mulch not only reduced the total salt levels in the soil but also made the salt profile in the soil more uniform with depth and distance away from the plant. The beneficial effects of mulch on salt distribution is the result of mulch decreasing the surface water evaporation and increasing the amount of water leaching through the soil profile.

CONCLUSIONS

These results indicate that if a grower has poor quality irrigation water they can achieve adequate plant productivity if they irrigate to maintain soil moisture below 20 centibars, use a heavy application of mulch and use either a single emitter at the base of the plant or an LVSE. If plants are too large to be irrigated with only 1 emitter, then the second or third emitter should also be placed at the base of the plant.

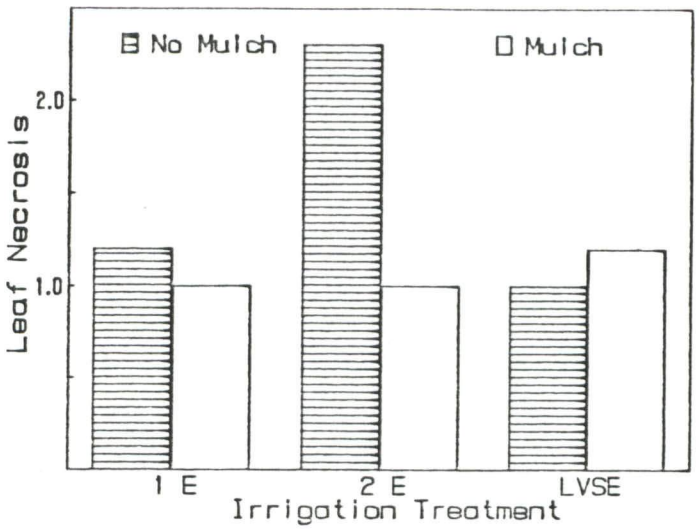

Figure 1. Effect of irrigation treatment and mulching on leaf necrosis of blueberries (1 = green leaves, 5 = plant death).

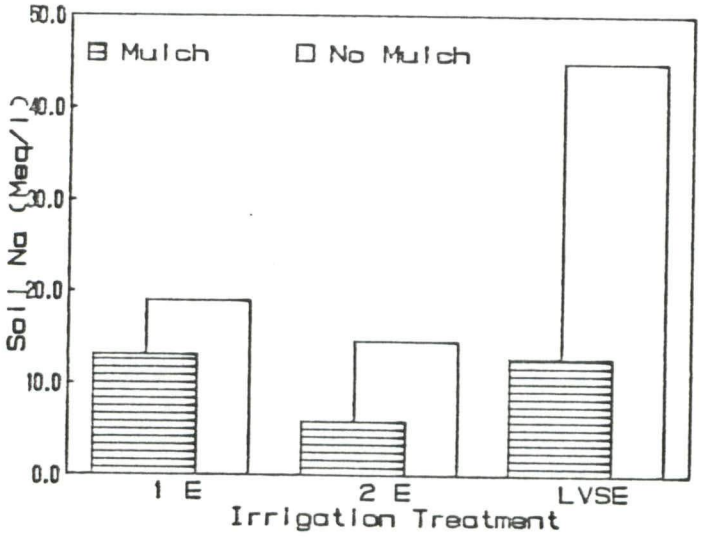

Figure 2. Effect of irrigation treatment and mulching on accumulation of sodium in the plant root zone.

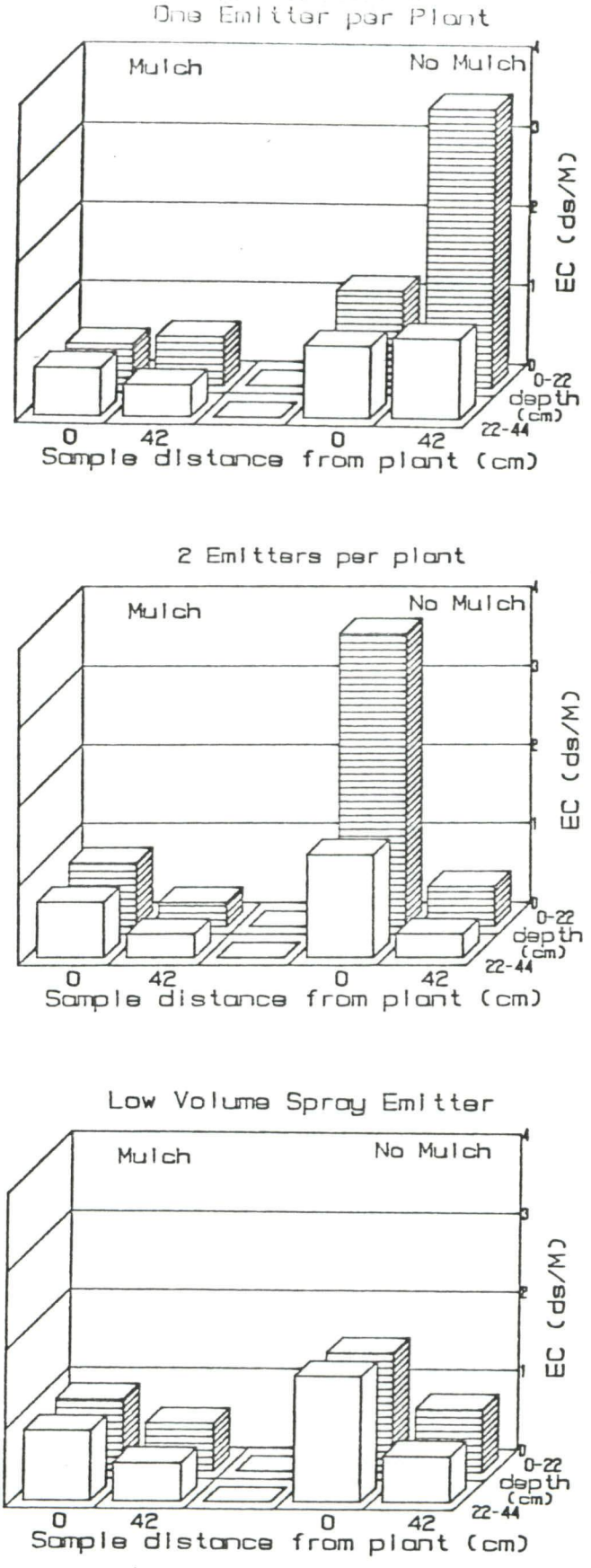

Figure 3. Effect of irrigation treatment and mulching on the distribution of salts in the soil profile. (The majority of plant roots are located at the 0 cm sample distances from the plant at the 0-22 cm depth.)