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EFFECT OF IRRIGATION WATER QUALITY ON RABBITEYE BLUEBERRY PLANT GROWTH

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Background. Irrigation is needed for establishment and growth of blueberry plants in the acid soil regions of Texas. The quality of water in below-ground aquifers in these regions is questionable for irrigation of blueberries. Quality of irrigation water is influenced by the concentration of salts in the water. At the time this research was started, problems were beginning to occur in blueberry plants irrigated from the Wilcox aquifer. This research compared Wilcox aquifer water at three irrigation rates with rainwater and pond water to determine the effects on rabbiteye blueberry plants. Results of this study were first reported in detail in 1985 and are worth repeating in short form.

Research Findings. Irrigation studies were conducted on three soils. Textures of these soils were clay loam, sandy loam, and loamy sand. The clay loam contained 37.5% clay and 44% sand. The sandy loam contained 13% clay and 58% sand and the loamy sand consisted of 5.2% clay and 73.4% sand.

Water from the Wilcox aquifer tested pH 8.7, electrical conductivity (EC) 695 μmhos , sodium adsorption ratio (SAR) 29.7, and sodium and bicarbonate were 7.83 and 7.89 milliequivalents per liter (meq/L), respectively. Rainwater and surface pond water tested pH- 6.3 and 6.8, EC- 15 and 155 μmhos , SAR- 0.3 and 0.3, sodium- 0.7 and 0.23 meq/L, and bicarbonate- 0.15 and 0.92 meq/L, respectively. Three additional treatments included irrigation with sulfuric acid treated Wilcox aquifer water, irrigation with gypsum saturated Wilcox aquifer water, and leaching the soil treated with Wilcox aquifer water with rainwater to remove the salt buildup. The water treatments were applied at 600 mL per pot (except at the 2x and 3x rates) containing the blueberry plant in 9.7 lb of v/v:soil/peat mix.

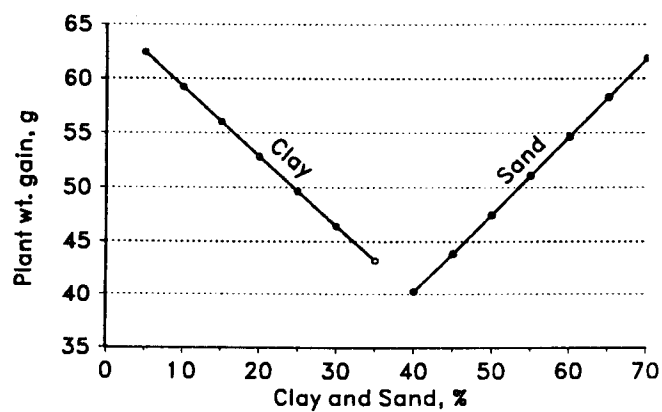


Fig. 1. Effect of clay and sand on blueberry plant weight gain.

Plants were adequately fertilized with nitrogen, phosphorus, potassium, and sulfur.

The three soils had a distinct effect on total plant weight gain (Fig. 1). Increasing clay content caused a decline in total plant weight gain. Increasing sand content caused an increase in total plant weight gain.

Trends show that plant weight in the clay loam soil increased due to increasing rates of deep well water (Fig. 2). The clay loam soil required three times more deep well water to grow plants equal to that produced in the same soil by rainwater and surface pond waters. Plant weight declined in the loamy sand due to increasing

rates of Wilcox aquifer water. Plants growing in the lower clay content soils could not tolerate the increasing levels of salts. The sodium and bicarbonate concentrations in Wilcox aquifer water combine to cause a rapid pH increase in the low buffer-capacity soils.

Plant weight gain in the loamy sand treated with rainwater and surface water was significantly greater than weight gains of plants growing in the same soil treated with 3x the irrigation requirement of Wilcox aquifer water. Sulfuric acidification of Wilcox aquifer water to remove the bicarbonate concentration significantly increased plant growth in the clay loam soil, but had little affect on weight gain of plants grown in the more sandy soils. Saturation of the Wilcox water with gypsum and the leaching treatment improved plant growth compared to Wilcox water alone for the clay loam.

Application. Results of this study show that Wilcox aquifer water is detrimental to blueberry plant growth. Its use on blueberry plants should be avoided. Levels of sodium, bicarbonate, and pH are high in this water source and apparently interfere with blueberry plant metabolism. Good sources of irrigation water for rabbiteye blueberry plants are rainwater or surface pond water. Another source of good quality water can be found in shallow wells, those to 30 or so feet deep, but the volume of this water is usually insufficient to irrigate a significant planting of blueberries.

Fig. 2. Rabbiteye blueberry plant weight gain on individual soils in response to irrigation water treatment

