THE RELATION OF SOIL MOISTURE TO PEAR TREE WILTING IN A HEAVY CLAY SOIL

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The conclusions reached by various workers as to the availability to plants of soil moisture above the permanent wilting percentage as defined by Hendrickson and Veihmeyer (9) differ rather definitely. In this report further evidence in support of the conclusion that all moisture above that point is not equally available is presented and a hypothesis supporting this conclusion, heretofore presented by Vasquez (16), Magness (13), and Lewis, Work, and Aldrich (12), is further amplified.

Bartholomew (5) says, "The leaves themselves may not wilt until the wilting coefficient of the soil has been reached, but the fruits may begin to suffer long before." He concluded that the root system of a lemon tree, even with highly available soil moisture, is unable to afford the fruit enough water to prevent suffering of the fruit during periods of high transpiration opportunity.

Furr and Degmen (7) report that, "The data ... indicate that the relative amount of available soil moisture had a measurable, though slight, influence on fruit growth and a marked influence on stomatal behavior while the soil moisture is several per cent above the wilting percentage."

As a result of studies of the irrigation requirements of pear trees, Aldrich and Work (1) and Lewis, Work, and Aldrich (12) found that differential amounts of soil moisture within the available range exert a profound influence upon pear fruit size and consequent yield. Aldrich and Work (2) have also shown that soil moisture variations within the available range influence the amount of fruit bud formation.

With pear trees in heavy clay soil the senior author found (20) that during periods of relatively uniform weather conditions moisture is lost from all soil depths at a decreasing rate as the moisture content decreases, beginning, ordinarily, when from 50 to 60% of the available soil moisture is still present.

The conclusions of this group of workers may be summarized by the statement that fruit trees may suffer for water, as evidenced by slowing up in the growth rate of fruit and by decrease in the rate of extraction of soil moisture, long before the moisture content of the soil of any material portion of the root zone is reduced to the permanent wilting percentage.

On the other hand, other workers conclude that soil moisture above the permanent wilting percentage is readily available to plants and that trees do not

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3Figures in parenthesis refer to "Literature Cited", p. 134.