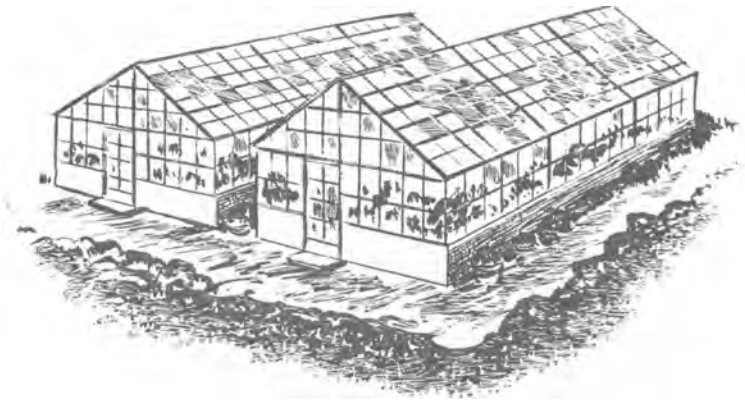

ORGANIC MATTER and WETTABILITY

for Greenhouse Soils

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Continued addition of sphagnum peat to a clay soil in greenhouse benches over a number of years has resulted in a decrease in wettability, according to observations recently confirmed by laboratory evaluation. Water did not penetrate easily, and many of the soil particles remained dry following irrigation. There is no practical method known at this time for preventing the development of non-wettability in these soils, but certain management practices reported here may be helpful in coping with this problem.

GREENHOUSE FLOWER growers have consistently added substantial amounts of coarse organic matter to soil mixes to aid the movement of water by making the soil more porous; improving drainage; lowering the weight of the soil per unit volume; reducing compactability; and increasing the water-holding capacity. However, prolonged use of this practice has been observed to seriously decrease wettability in some cases. Laboratory tests, reported here, have confirmed these field observations.

Samples of soils found increasingly difficult to wet at the Enomoto and Co. glasshouses, San Mateo County, were submitted to the Department of Irrigation and Soil Science, University of California, Los Angeles.

All soil samples except for one, of U.C. Mix, came originally from the field soil (Dublin Clay) located on the property. Sphagnum peat or animal manures had been regularly used on some of these benches dating as far back as 1933. The organic matter on a dry weight basis varied from a low of 7% by weight to a high of 16% for the bench samples, while the field soil was 4% organic matter. The organic matter content of the U.C. Mix sample was 4.2%.

All of the soils tested in the laboratory except the U.C. Mix displayed a tendency to repel water almost to the same degree as would a waxed paper. The U.C. Mix was only moderately unwettable, perhaps because of its shorter history or the large percentage of sand present. Because of the low degree of wettability exhibited by these soils and the difficulty in obtaining accurate measurements, no attempt was made to study differences in wettability among the soils.

Dry samples

These soil samples were dried before the tests were made, which no doubt accentuated the non-wettability. Soils which tend to be non-wettable may be very difficult to rewet once they become thoroughly dried. However, experiences with these greenhouse soils indicate that a degree of non-wettability existed even for soils that were moist. Other research workers have shown in previous tests that non-wettability is not limited to the dry state.

The water repelling soil surfaces undoubtedly develop from the presence of certain organic materials. Difficult-to-wet soils have also been found under citrus and pine trees and under grassy vegetation. Perhaps it should not be surprising that this condition would develop in greenhouse soils from the prolonged use of organic matter.

How serious the problem of non-wettability of greenhouse soils may become cannot be estimated, but it is clear that the development of this condition will present water management difficulties. Irrigation of greenhouse soils is usually dependent upon the capillary flow of water from one soil particle to another. This in turn is related to attractive forces between the water and the soil particles. When this flow rate becomes slow, thorough wetting of the soil particles becomes difficult, and much water may be wasted in trying to irrigate the soil.

No prevention

At the present time there is no practical method for preventing the development of non-wettability in soils. But the following management practices may be helpful in coping with this problem:

(1) The use of commercial wetting agents may improve water penetration into difficult soils. Studies have shown that sometimes a marked response may be obtained from a single application of a wetting agent, but usually repeated applications are needed. The grower should experiment with the use of these materials to determine how they may best be used for his conditions.

(2) Watering the soil in two stages—partial watering one day followed by another irrigation the second day—has been found by some growers to aid in wetting all the soil.

(3) Mulching to break up crusts that form on the soil surface may aid in the movement of water into the soil. Sterilizing does not improve the wettability of the soil.

(4) Replacing the old soil with new soil is better than using the same soil for long periods. A program of replacing one fourth of the soil periodically may help to prevent non-wettabilty from becoming a serious problem in the entire greenhouse.

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