Soxhlet-Type Automatic Sand Cultures

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The automatic sand-culture apparatus illustrated in figure 1 has been in use for about two years and has required little attention other than for replenishing and replacing the culture solutions. The culture solutions from the reservoirs are applied to the sand five times per day with air-lift pumps that are activated by a time clock and solenoid air valve in much the same manner as in the earlier cultures devised by Chapman and Liebig (1).

The distinctive feature of the present equipment rests in the fact that the sand is alternately flooded and drained several times during each 15-minute "on" period of the time clock. Drainage is accomplished by an internal siphon which functions as in Soxhlet extraction equipment. With No. 16 sand, each culture retains about four liters of solution against gravity. The earlier cultures (1) were drained through a T-tube with a screened horizontal arm and an upright arm extended above the surface of the sand as an overflow. Because of clogging and variations in air pressure, frequent cleaning and balancing of discharge rates against drainage rates were required to prevent overflowing, on the one hand, or failure to flood the surface of the sand, on the other.

The essential features of the present Soxhlet-type equipment are outlined in the legend of figure 1. Because of self shading, only one or two of the three cultures on each reservoir are planted at any one time unless small plants are grown.

The advantage of an automatic and self-flushing system of this type over soil or so-called slop cultures lies in the fact that changes in the composition of the substrate solution are minimized by the repeated flushing of the rootzone and further by frequent replenishments and changes of the solution in the large-volume reservoirs.

Literature Cited


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1 Manuscript received Dec. 7, 1961.
2 California Water Resources Center Contribution Number 10, Reprint Series.