The Effect of Waste Products from the Guayule Rubber Mill on the Growth of Various Crops

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PROCESSING guayule shrub to obtain rubber yields large quantities of waste materials consisting of leaves, liquid effluent, and bagasse. Disposal of these waste products presents a problem and it was desired to know whether they could be safely applied to farm land. Beneficial effects of organic matter on certain soils are well known and guayule leaves and bagasse offer a considerable supply of organic material. On the other hand, it has been shown, (2,3)³ that actively growing guayule produces substances toxic to itself but not as far as is known to other plants. This paper presents results of experiments conducted to determine what effect the addition of leaves and bagasse to the soil or the liquid effluent to irrigation water would have on the growth of other crops.

MATERIALS

As the leaves contain little rubber and interfere with milling, their removal is the first step in the shrub processing. Two methods of removal have been employed resulting in two types of waste leaves. In one method the shrub is dried and the leaves shaken off, resulting in dry leaves, and in the second the shrub is placed in boiling water for 12 minutes and then the leaves shaken off resulting in parboiled leaves. From 15 to 25% of the dry matter of the shrub consists of leaf material and an average factory with a daily capacity of 40 tons of shrub will accumulate about 8 tons of oven-dry leaves per day.

In the milling process the defoliated shrub is ground to a pulp with water and further dispersed in tanks of water where the rubber floats and is skimmed off while the woody tissue sinks. This liquid portion or effluent contains all the readily soluble constituents of the roots and stems. The output of this liquid waste is about 5,000 gallons per long ton of dry shrub milled. If this could be used for irrigation the disposal problem would be solved and the irrigation supply for nearby fields increased.

The residue of ground material from which the rubber has been extracted and practically all the water-soluble constituents have been leached is known as the bagasse. About one-half the weight of shrub fed into the mill is recovered in this form. Some mills burn the bagasse for fuel, but even then there is an excess which requires disposal.

No chemicals are added to the shrub in the commercial rubber extraction method, it being purely a mechanical process. Thus any effects by these materials on the growth of other crops will result solely from compounds present in the guayule shrub.

METHODS

The various test crops were grown in soil in boxes 1 foot×1 foot×½ foot, in 3-gallon glazed crocks or in 5-inch flower pots. The leaf material or bagasse when used was uniformly distributed throughout the soil. Four types of soil were used, Chualar loam, Greenfield loam, Hanford coarse sandy loam referred to later simply as Hanford loam, and a very fine unclassified sand from the bed of the

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³Numbers in parenthesis refer to “Literature Cited”, p. 1015.