

## RESEARCH NOTES

### SUGAR: AN EFFECTIVE BUT EXPENSIVE NEMATOCIDE

It is well known that nematodes are very much affected by variations in osmotic pressure. Abbott and Richards<sup>1</sup> in 1911, Stoklasa<sup>2</sup> in 1933, and Stephenson<sup>3, 4</sup> in 1942 and in 1944<sup>5</sup>, tested the reactions of some free-living nematodes to changes in osmotic pressure. Schopfer<sup>6</sup> in 1932, and Panikkar and Sproston<sup>7</sup> in 1941, conducted a similar work, but using parasitic nematodes. All of these investigators worked with inorganic compounds in their experiments.

Apparently, it was not until 1961 that Feder<sup>8</sup> proved that sugar, an organic compound, kills nematodes when added to the soil. He mixed soil of a known moisture content with different concentrations of sugar to control such nematodes as: *Radopholus*, *Tylenchulus*, *Pratylenchus*, *Dolichodorus*, *Belonolaimus*, *Meloidogyne*, and some free-living forms. These nematodes, according to him, are killed by dehydration. In other words, a liquid moves by osmosis from a less concentrated to a highly concentrated solution, hence the body fluid moves out of the nematode resulting in dehydration.

Feder planted the sugar-treated soil to okra, corn, Duncan grapefruit, and sour orange. He noticed that the growth of citrus and corn was apparently retarded, however, the plants recovered when the sugar was flushed out of the soil with water 24 hours after treatment.

Recently several trials have been conducted at this Station with the purpose of discovering whether sugar can control two of the most important parasitic nematodes on tomato (*Meloidogyne incognita* and *Rotylenchulus reniformis*). Ordinary cane sugar was mixed thoroughly with soil, having a

<sup>1</sup> Abbott, J. F., and Richards, E. L., The lethal effect of pure distilled water on the vinegar eelworm (*Anguillula aceti*), *Biol. Bul. Woods Hole* 21 122-6, 1911.

<sup>2</sup> Stoklasa, J. J., La résistance de l'anguillule du vinaigre aux différences de la pression osmotique, *Spisy lék. Fak. Masar. Univ. Brno* 12 127-30, 1933.

<sup>3</sup> Stephenson, W., Resistance of a soil nematode to changes in osmotic pressure, *Nature* 149 500, 1942.

<sup>4</sup> —, The effects of variations in osmotic pressure upon a free-living soil nematode, *Parasitology* 34 253-65, 1942.

<sup>5</sup> —, The effect of certain inorganic chloride solutions upon the movements of a soil nematode (*Rhabditis terrestris* Stephenson), and upon its bodily size, *Parasitology* 35 167-72, 1944.

<sup>6</sup> Schopfer, W. H., Recherches physicochimiques sur le milieu intérieur de quelques parasites, Première Partie, *Rev. suisse Zool.* 39 59-114, 1932.

<sup>7</sup> Panikkar, N. K., and Sproston, N. G., Osmotic relations of some metazoan parasites, *Parasitology* 33 214-23, 1941.

<sup>8</sup> Anonymous, Sugar Kills Nematodes, *Agr. Res.* 9 (9) 3-5, 1961.

6-percent moisture content and infected with these two nematodes, at the rates of 1 pound of sugar to every 10, 50, 100, and 200 pounds of soil.

Average nematode control 20 days after treatment was 99.3, 98.1, 84.7, and 30.3 percent, respectively. The untreated pots had an average nematode increase of 198.3 percent. Tomato seedlings which were planted at this same date, revealed that the highest level of sugar (1:10) was toxic to the plants which did not recover even after flushing the sugar out with water.

Three months after, the plants were taken out and observations made. It was found that all tomato plants in the treated soil (except those of the 1:10, which were killed) were better than the controls in height, number of leaves, flowers, and fruits, as well as weight of fruits and green top. The 1:200 treatment was the best, having slight differences over the others. A study of the roots demonstrated that all plants of the 1:50 treatment were free of galls. Root-knot was also controlled to a great extent in the 1:100 and 1:200 treatments. In turn, all control plants had a very high rate of infection by this parasite.

Sugar, of course, can be used for controlling nematodes. It has the advantages of being readily available, having a relatively low price, and no mammalian toxicity. However, sugar has limited uses as a nematocide. It can be used in laboratory and greenhouse work as well as in home gardens. But it cannot be recommended for fieldwork since such treatments would require thousands of pounds per acre, making the costs of nematode control prohibitive by this means.

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