was far more efficient as a catalytic material than ammonium-iron-citrate.

The tests on filter-paper were followed by tests on pure sucrose, used alone or with various other materials, and heated to high temperatures in porcelain dishes. It was found that when sugar, alone, was used, a large increase in volume was obtained, followed by a less rapid loss of water, and fair combustion was apparent until all the water was eliminated. On the other hand, when equal parts of potassium-iron-citrate were used, a less increase in volume was obtained, followed by a slow loss of water. In this instance, however, ready combustion was effected. If the flame was removed before combustion was complete, the mass was found to glow for a long period of time. On complete combustion, a coherent ash remained, containing iron oxides, uniformly distributed and in a very finely divided condition. A somewhat similar result could be obtained by using the ash of a good burning cigar, but not with ammonium-iron-citrate or similar compounds.

The iron remaining behind was found to possess magnetic properties, even when the temperature used exceeded that of a burning cigar. Tests on cigar ash yielded magnetic iron, but only where combustion was incomplete, no test being obtained where carbon was absent. It was thought that the force of attraction between the oxides and certain of the ash constituents was great enough to overcome the magnetic force, because magnetic iron added to an ash failed to respond to a magnetic field. On the other hand, where the iron was not well distributed, enough of the iron oxides became localized in quantities sufficient to overcome the attractive force of the ash particles.

It is suggested, therefore, that good combustion of cigar-leaf tobacco is associated with potassium compounds which give rise to potassium carbonate during combustion, and that the presence of such compounds may serve to intensify the catalytic effects of iron on this process.

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CARBON DISULFIDE EMULSION FOR THE CONTROL OF A NEMATODE

CARBON DISULFIDE in the un-emulsified state was one of the earlier materials tested in the search for suitable means of controlling the root-knot nematode *Heterodera radicicola* Greef. Several workers[1] reported that the chemical showed some merit for this purpose. Zimmerley and Spencer[2] found it ineffective under greenhouse conditions. Objections to the use of CS_2, such as inflammability, disagreeable and persistent odor, cost and doubtful value as a nemacide, appear to be sufficient explanation for investigators turning to other chemicals and control methods.

We have recently treated nematode-infested soil in a greenhouse with an emulsion of carbon disulfide[3] similar to that developed to control larvae of the Japanese beetle *Popillia japonica* Newman and Asiatic beetle *Anomala orientalis* Waterhouse in lawns. The results of these preliminary tests are encouraging. An emulsion containing approximately 0.7 per cent. *actual* CS_2 has freed infested soil of nematodes under conditions tested.

Applications were made at the rate of one gallon of the diluted emulsion to each cubic foot of soil (greatest depth dimension, eight inches). Soil in pots and in a standard greenhouse bench was included in the experiments, maintaining, of course, adequate check pots and plats. It remains for future investigation to determine: the minimum dosage for a given unit of soil for commercial control; the range of efficiency for such variables as type and condition of soil and the stage and location of the nematode; and finally, from the cost of the treatment, whether or not it has a field of usefulness.

In large commercial greenhouses the soil in the ground or bottom beds is commonly disinfested with steam. The smaller houses are usually not supplied with the necessary heating equipment for steam sterilization. Even in the larger houses it is difficult to treat the benches with steam. Hot water has also been successfully used to control nematodes, but the same factors limiting the use of steam apply to this method and in addition it is more laborious and expensive. It is not feasible for use on bench soil. Carbon disulfide emulsion, if it should eventually fulfil the qualifications of a nemacide, might prove useful in small greenhouses and in treating benches where steam and hot water disinfestation is impractical in large houses. Its cost will limit the use of the emulsion outdoors but it may be valuable for treating seed beds and small areas of ground intended for valuable plants.[4]

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VIRGINIA TRUCK EXPERIMENT STATION

[1] E. A. Bessey, Bureau of Plant Industry Bul. 217. 1911. J. A. McClintock, Michigan Tech. Bul. 201. 1915. J. R. Watson, Fla. Bul. 200: 201. 1919. And others.

[2] H. H. Zimmerley and H. Spencer, Virginia Truck Expt. Sta. Bul. 43: 272. 1923.

[3] Supplied by I. P. Thomas and Son Co., Philadelphia, Penna.

[4] The writers call attention to the appearance of a paper by Schaffnit and Weber (*Anz. für Schädlingskunde*, 5: 19) under date of February 15, 1929, in which similar experiments are reported. The present paper was accepted for publication in SCIENCE on February 4, 1929, and is based on work done in the fall of 1928.