UNSATURATED PETROLEUM OILS AS INSECTICIDES[1]

SATURATED petroleum oils have shown an increasing use as insecticides for several years, owing to their generally satisfactory performance, to the absence of suitable substitutes and to the belief that saturation (*i.e.*, removal of most of the unsaturated hydrocarbons) was essential to the safe use of the oils on tender plants.

Recent studies by the writer have indicated that radical departures from the standard practise may be possible with the result that the use of an easily available and low-priced class of oils will become feasible.

Diesel fuel oils, at present used freely in the Hawaiian Islands as weed killers, have proved effective insecticides and their toxic effects on plants have been practically completely mitigated.

Briefly, the oils are emulsified on a colloidal clay carrier such as Bentonite. They are then diluted in the spray tank in such a manner that the hydration of the oil-charged Bentonite particles is greatly increased and, conversely, the toxic effects of the oils on plants eliminated. This process, which in practise is extremely simple, is essentially one of acidifying the spray water prior to adding the concentrated emulsion.

Field tests have shown that a 1 per cent. dilution of a concentrated emulsion containing 50 per cent. Diesel oil is adequate for control of the pineapple mealy bug (*Pseudococcus brevipes* Ckl.), on pineapple and repeated sprays of from 1 per cent. to 4 per cent. have shown no phytocidal action. Preliminary experiments on citrus have given excellent control of green scale (*Coccus viridis* Gn.) when a 3 per cent. dilution was used and no deleterious effects on the plants have been noted.

Details of these studies will be presented in full later.

WALTER CARTER

UNIVERSITY OF HAWAII

PLANT SPACING, A MAJOR FACTOR IN THE LOCAL ADAPTATION OF STRAWBERRY VARIETIES

STUDIES[1] of the responses of the strawberry plant to various factors have indicated that photoperiodism, temperature and duration of the rest period determine the general adaptation of varieties in the humid regions of the United States. The commercial varieties of the South grow vigorously during the short days of early spring and when planted in the North become over-vegetative and unfruitful. Northern varieties, on the other hand, require the long days of midsummer for full growth and when taken South grow weakly and gradually succumb. Howard 17, for example, finally died out when planted at Willard, N. C.

The rather sharply limited adaptation of strawberry varieties of northeastern United States, with the exception of Howard 17, as compared with varieties of the southern and Pacific coast states, is traceable in part to photoperiodic and temperature reactions and to the effect of environment on susceptibility to leaf spot, leaf scorch and root rot, but apparently even more to differences in the number of plants in a given area. The wide adaptability of Howard 17 is apparently related to its limited production of runner plants, which, in Maryland at least, are not generally initiated after August 15.

Careful observations during the current season of the new varieties, Dorsett and Fairfax, and the older variety, Blakemore, all introductions of the U. S. Department of Agriculture, support the explanation that spacing is the chief factor in the local adaptation of strawberry varieties. At Willard, N. C., the yields of Blakemore plants grown under various spacing systems, ranging from an average of over 30 plants to only two thirds of a single plant per square foot, were strikingly different. The yields with 30, 4.0, 1.8, and 2/3 of a plant per square foot were, respectively, 42, 119, 131 and 99 bushel crates of marketable fruit per acre. Observations in fields of Dorsett, Fairfax, and other varieties in other strawberry sections indicated that the number of plants per given area is the chief, though not the sole, factor in determining adaptation.

Apparently in varieties such as Blakemore and Dorsett, where vigor of plant may be expressed by the production of many runners, yields may be increased by restricting the number of runner plants to the optimum number per square foot. Runner restriction, conserving as it does the soil nutrients and moisture, tends toward more crowns, more fruit buds and more fruit per plant.

In conclusion, the author emphasizes that potentially valuable new seedlings may be discarded and that new varieties have been and are being rejected simply because the plants have been grown in too dense stands. In testing seedlings or varieties a stand of 1 to 4 plants per square foot by July seems near the optimum. All later runners should be removed at frequent intervals. Culture should, of course, be such as to maintain in the greatest degree the vigor of the remaining plants.

GEORGE M. DARROW

U. S. DEPARTMENT OF AGRICULTURE

[1] Published with the approval of the director as Miscellaneous Paper No. 13, of the Pineapple Experiment Station, University of Hawaii.

[1] Geo. M. Darrow and Geo. F. Waldo, "The Practical Significance of Increasing the Daily Light Period of Winter for Strawberry Breeding," SCIENCE 69: 496–497, 1929; "Fruit-bud Formation in the Strawberry in Spring in Southeastern States," SCIENCE 72: 349–350, 1930.