TRANSMISSION STUDIES WITH THE NEW PSYLLID-YELLOWS DISEASE OF SOLANACEOUS PLANTS

DURING the years of 1926, 1927 and 1928 a peculiarly destructive disease of potatoes was found on the western slope of Colorado in the potato fields, and it was thought to be associated with the common tomato psyllid (*Paratrioza Cockerelli Sulc.*). The exact nature of the injury is not well understood, and it was thought either to be caused by a toxic material secreted by the nymph while feeding on the leaves of the plants or that the insect transmitted a so-called virus. The disease is apparently different from any of the so far described diseases of either the potato or the tomato. The outstanding characteristic symptom is the upward cupping of the leaves and a marked dwarfing of the plant. The disease was most severe during the 1927 growing season, when the early potato crop was reduced from a six hundred to a two carload crop. Since 1927 it has been found on other solanaceous plants and the most damage has been observed on the potato and tomato crops.

The investigations carried on to date indicate that the injury is not produced by the feeding of the psyllid nymph alone.[1] Eggs laid by viruliferous tomato psyllids on diseased plants, grown under caged conditions, were hatched artificially under sterile conditions. The nymphs so secured were placed on healthy tomato plants and permitted to feed for the first time on the growing portions of the plants. The nymphs were permitted to feed until reaching the adult stage and in each case no injury was observed on the plants. Duplicate checks produced the same effect. The results indicate that the so-called virus is not transmitted through the egg and then to the nymph stage, and further that the feeding of the nymphs alone does not severely injure the growth of the tomato plants.

In the observations made, with viruliferous nymphs under caged conditions, the disease was transmitted from affected to healthy plants in a short time. Viruliferous nymphs were transferred from diseased to healthy potato plants and the characteristic symptoms produced within seven to ten days. The insects apparently bear an important relationship to the disease, and are important in spreading and transmitting the disease. The disease has been transmitted from diseased tomato to healthy potato plants and also from potato to tomato plants. It has also been transmitted to the common garden pepper, to eggplant and to the ornamental Jerusalem cherry. The evidence to date indicates that the disease is of a virus nature.

Artificial inoculation, of extracted and filtered juice secured from a diseased plant, by means of a needle injection, did not prove to be a satisfactory method of transmission.

The scale-like nature of the nymph, its habit of feeding on the under-side of the leaves, and the further protection afforded by the cupping or upward rolling of the leaves make control by spraying and dusting a very difficult problem. The strong spray mixtures necessary to kill the insect injure the foliage of tender solanaceous plants. The destructive nature of the disease and the difficulties encountered in control indicate that it may become one of the most serious diseases affecting solanaceous plants in the inter-mountain region.

A. M. BINKLEY

COLORADO AGRICULTURAL COLLEGE

THE NATIONAL ACADEMY OF SCIENCES. III

Polarized fluorescence in liquids: ERNEST MERRITT and DONALD ROGER MOREY. While the light emitted by fluorescent liquids ordinarily shows no polarization, it has been found that solutions of fluorescent materials in highly viscous solvents emit light which is partially polarized. In its dependence on the direction of emission and on the state of polarization of the exciting light the fluorescence of such solutions is qualitatively similar to the light scattered by small suspended particles in the Tyndall effect. The polarization is, however, never complete. The polarized fluorescence of viscous solutions, first noticed by Weigert, has been studied by numerous observers, and has been satisfactorily explained as the result of the relatively slow Brownian rotations of the active molecules, for if the viscosity is sufficiently great the excited molecules will return to the normal state before the random distribution has been reached which is necessary for unpolarized emission. The percentage of polarization will therefore depend upon two factors: *viz.*, (1) the extent to which viscosity slows up the Brownian movements of rotation, and (2) the duration of the excited state. Since the fluorescence spectrum consists of a band extending over a range of several hundred Ångström units, it seems not unlikely that the duration of the excited state is different for the excited molecules corresponding to different parts of the band. And in this case we should expect the amount of polarization to vary, probably progressively, throughout the spectrum. Unfortunately, the only two attempts that have previously been made to determine a possible variation of polarization with wave-length have led to contradictory results. The question seems therefore to call for further experiment. Using glycerin solutions of rhodamin B and of uranin we have compared the intensity of the fluorescent light

[1] The psyllids used in the cage experiments were kindly identified by E. O. Essig, entomologist of the University of California.