

## DEPARTMENT OF PLANT PATHOLOGY

### The Dissemination of Peach Yellows and Little Peach:

The budding of the root stock of plum, when using peach buds carrying either yellows or little peach, shows that the wild plum (*Prunus myrobalan*) which is used as budding stock for many American plum varieties may carry both yellows and little peach without showing very marked symptoms; however, when this wild-plum stock, which has been budded with yellows or little peach, is budded back into peach seedlings, these seedlings readily show both diseases in due time. We have shown also that certain Japanese plums (*P. salicina*) may mask the symptoms of both yellows and little peach.

Wild peach (*P. persicae*) which is used as foundation stock for peach and sometimes for Japanese flowering plum, will show marked symptoms of both yellows and little peach, when budded with peach carrying these diseases. By budding the many varieties of plums with yellows and little peach we have shown certain varieties manifest definite symptoms of these diseases while others mask these diseases. On the other hand we have not succeeded in having Mahaleb cherry (*Prunus mahaleb* L.) or Mazzard cherry (*Prunus avium* L.), which are the foundation stock for most cherry varieties, take yellows or little peach when budded with peach buds carrying these diseases. This is the first year in three that peach buds have taken on the Mazzard cherry. We have not succeeded in making them take on Mahaleb.

### Many Plums Carry the Viruses of Yellows and Little Peach—

We have called attention through the Transactions of the Peninsula Horticultural Society 1933, p. 17, (meeting of December 19 at Berlin, Md.) that "our work the past two years in budding yellows and little peach into various plums, shows that the Japanese variety known as Abundance (*P. salicina*) and others may carry the viruses of both of these diseases without showing very marked symptoms of either disease".

From data since gathered we have evidence that other varieties of plums may show certain symptoms of these diseases and live many years, and at the same time breed many thousands of the plum-leaf hopper (*Macropsis trimaculata*) which disseminates both of these diseases. One Japanese plum of the Red June variety, 22 years old, carried over 10,000 plum hoppers and we have shown by budding that this tree carried the virus of yellows. In the Annual Report for 1933 (p. 37) we have shown the Oriental varieties of plums (*P. salicina* and *P. simonii*) have lived longer at our Experimental Plum Orchard than the European or American Plums. Data gathered this season show that the wild plum (*P. munsoniana*) may breed the hopper (*M. trimaculata*) abundantly and also carry the virus of yellows.

### Survey of Hemipterous Insects Breeding on Peach, Plum, Cherry, and Apricot—

In our studies of virus carriers, in order to gather definite data on what insects are breeding on the various *Prunus* species, several

hundred sources of peach, plum, cherry, and apricot were brought into the greenhouse from January to April, placed in water (branches only) covered with cheese cloth, and forced from five to six weeks, that is through the blossoming period and later, to see what insects hatch from eggs deposited on or in the bark. This proved a very valuable preliminary survey, for it showed us sources where large numbers of the plum hopper (*Macropsis trimaculata*), which carries yellows and little peach, were to be found for later experimental work. This preliminary survey included plums from ten states, including four each from North Dakota, Minnesota, Iowa, and Nebraska. These states are beyond the peach districts. The object of including these states was to learn whether *Macropsis trimaculata* is common on our wild plum, and hence probably a native American species. Our limited survey did not show it present on the sources sent in from beyond the peach district. Our plum survey from Illinois to Delaware, including Indiana, Ohio, Pennsylvania, and Maryland showed the plum hopper very prevalent in these states. Table 8 shows several other insects are breeding on the peach and plum, which we had not formerly tested for virus carrying. (See plate I)

Where plum hoppers (*M. trimaculata*) or other Hemipterous insects were present on any of the above sources in number sufficient for experimental purposes, they were placed directly on peach seedlings, to learn if they were carrying any virus to which peach is subject. Also these insects, when present in numbers, or could be obtained easily in numbers, were fed on peach trees carrying yellows and little peach. Later these insects were bagged on healthy peach seedlings to learn whether the insects were possible virus carriers.

The plum hopper (*M. trimaculata*) was the one insect found breeding throughout the peach district on unsprayed plum trees. In the Ohio Experiment Station Variety Plum Orchard at Wooster, which was well sprayed, we found no plum hoppers, whereas many thousands of hoppers were collected from the sprayed Variety Plum Orchard at the Delaware Experiment Station at Newark, Delaware. Age of trees may have had much to do with this difference. The trees at the Ohio Station were about nine years old, while those at the Delaware Station were twenty-seven years old. Well-sprayed peach orchards in Pennsylvania and Delaware showed no plum hoppers (See Table 8) while some of the neglected peach orchards, particularly in the home orchards, showed many hoppers present.

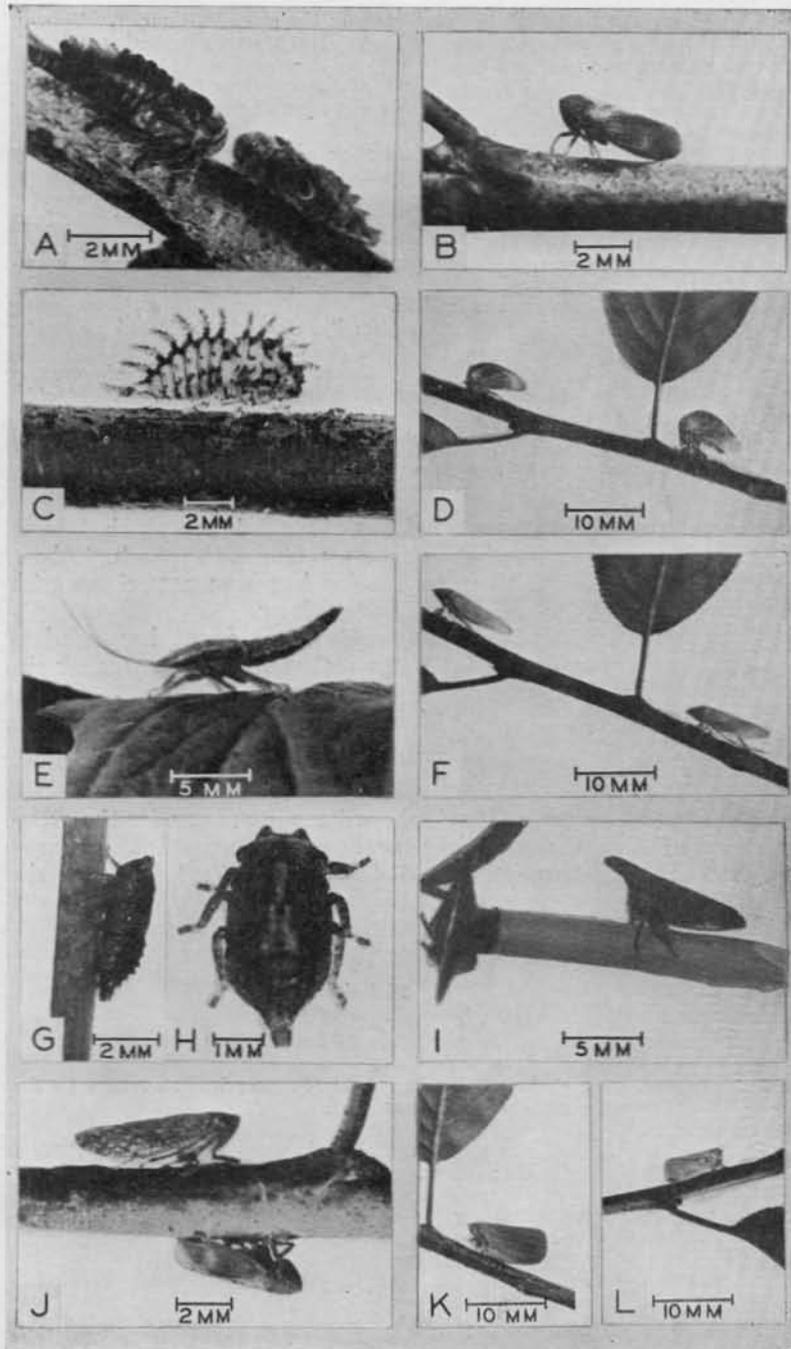
#### **Feeding Plum Hoppers on Virus of Yellows and Little Peach—**

Feeding experiments included many thousand plum hoppers (*M. trimaculata*) fed on both little peach and yellows. Three thousand peach seedlings were used in the budding and feeding experiments. We have found that *M. trimaculata* carries both these viruses to peach. This has been shown not only in seedlings but in old trees eight years old and nineteen years old. Three, eight-year old peach trees, out of seven, fed yellows through *M. trimaculata* came down with the disease.

Table 8—Showing Sources of Peach and Plum Breeding Hemipterous Insects

State	Fruit Variety	Number of Sources	Sources with plum hopper, <i>Macropsis trimaculata</i> , Fitch	Sources with common buffalo hopper, <i>Ceresa bubalus</i> , Fab.	Sources with <i>Gypona octolineata</i> var. <i>striata</i> , Burm.	Sources with a black hopper <i>Thekia uhleri</i> Stal.	Sources with <i>Phlepsius irroratus</i> , Say	Sources with <i>Acanalonia conica</i> , Say	Sources with <i>Ormenis pruinososa</i> , Say
North Dakota	Plum	7	0	0	0	1	0	0	0
North Dakota	Peach	0	0	0	0	0	0	0	0
Minnesota	Plum	5	0	0	0	0	0	0	0
Minnesota	Peach	0	0	0	0	0	0	0	0
Iowa	Plum	4	0	0	1	1	0	0	0
Iowa	Peach	0	0	0	0	0	0	0	0
Nebraska	Plum	4	0	0	0	0	0	0	0
Nebraska	Peach	0	0	0	0	0	0	0	0
Illinois	Plum	3	0	0	0	0	0	0	0
Illinois	Peach	0	0	0	0	0	0	0	0
Indiana	Plum	3	0	0	0	0	0	0	0
Indiana	Peach	0	0	0	0	0	0	0	0
Ohio	Plum	8	4	0	0	0	0	0	0
Ohio	Peach	1	1	0	0	0	0	0	0
Pennsylvania	Plum	0	0	0	0	0	0	0	0
Pennsylvania	Peach	13*	0	0	0	0	0	0	0
Maryland	Plum	6	6	0	1	0	0	0	0
Maryland	Peach	2*	0	0	0	0	0	0	0
Delaware	Plum	112	68	0	15	0	18	0	17
Delaware	Peach	32*	8	4	3	0	1	2	0

\*All of the sources of peach examined in Pennsylvania were well-sprayed orchards; the two peach orchards examined in Maryland were well sprayed; 12 of the peach orchards examined in Delaware were well sprayed and we found no *M. trimaculata*.  
None of the well-sprayed peach orchards examined in the states of Pennsylvania, Maryland, and Delaware showed plum hoppers, *M. trimaculata*, Fitch.



**Plate I**  
Showing Some Hemipterous Insects Which Breed on the Peach and Plums That are Under Test for Virus Carrying Properties.

A, The nymph stage and B, the adult stage of the plum leaf hopper, (*Macropsis trimaculata* Fitch) the insect which we have shown, transmits both peach yellows and little peach.

C, the nymph stage and D, the adult of the common Buffalo tree hopper (*Ceresa bubalus* Fab.) which in our survey was found breeding abundantly only on the peach.

E, the nymph stage and F, the adult stage of *Gypona octolineata*, variety *striata* Burm., commonly found breeding on the plum.

G, and H, the nymphs and I, the adults of a black tree hopper of the order Membracidae, probably *Thelia uhleri* Stal., very plentiful on a plum sent in from Iowa State College by Dr. Melhus.

J (upper), comparing an adult specimen of the leaf hopper, *Phlepsius irroratus* Say, found breeding rather sparingly on plum but abundant on apricot, with the adult (lower) of *Macropsis trimaculata*.

K, a green insect of the Lantern Fly Family, Fulgoridae, *Acanalonia conica* Say, very common on both the peach and the plum.

L, a gray to bluish gray insect of the Lantern Fly Family, *Ormenis pruinosa* Say, very common on both the peach and the plum. The nymph stage is white from the cottony-like covering.

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Three peach trees nineteen years old, out of ten fed little peach through *M. trimaculata* showed foliage symptoms like little peach. About 1,000 seedlings, upon which insect feeding has been carried out with yellows and little peach will be reported on later.

The Periodical Cicada (*Cicada septendecim* Linn) has failed to show any virus carrying properties for little peach or yellows for the third season after feeding.

T. F. Manns and M. M. Manns.

#### Bacterial Spot of Stone Fruits:

Infection of foliage and fruit showed some increase for the growing season of 1933 compared with the three previous years. A heavy carry-over of twig infection for 1934 was established following the

Table 9—Materials Used for 250 Gallons of Diluted Spray

Block Number	Materials
1	Zinc sulphate 25 lbs., hydrated lime 25 lbs.
2	Zinc sulphate 10 lbs., flotation sulphur 10 lbs., hydrated lime 10 lbs. (15 lbs. when using lead arsenate).
3	Dry mix 20 lbs., zinc sulphate 10 lbs., hydrated lime 10 lbs. (20 lbs. when using lead arsenate).
4	Magnetic wetttable sulphur 6 lbs., zinc sulphate 10 lbs., hydrated lime 10 lbs. (20 lbs. when using lead arsenate).
5	Sulfospray 3 qts.