

wide and complex. It is evident that different strains of a virus or of several viruses are present on the infected plants. It is possible also that most part of the symptoms described may belong to the 'line pattern' group of virus symptoms. This can be more accurately ascertained using indicator plants. In any case, at present, we are allowed to presume that almond trees have actually, in Italy, the highest percentage of virus infection of all stone fruit trees.

Generally, all symptoms described may disappear with the rise of temperature, so that in August the affected trees are symptomless.

May be also we can reach a classification of almond varieties according to the relative severity of their different symptoms.

Not yet investigated are the relations between leaf symptoms and the variability in leaf shape and size and leaf malformations, among which is also a certain number of bifid leaves that may be directly connected with virus infection.

From a practical point of view, there is a good possibility to reach the solution of the problem by selecting resistant varieties or only distributing the ones already cultivated in our almond growing regions that appear to have a remarkable resistance to virus infection.

DISCUSSION

POSNETTE: Have all those symptoms been transmitted?

Answer: Only some of them, as I emphasized in my lecture. Till now it was most important to know what symptoms and how many of them are present in Italy.

POSNETTE: Has the variegation been transmitted by grafting?

Answer: No, that variegation could not be transmitted up til now.

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THE PRESENT ASPECT OF FRUIT TREE VIRUS DISEASES IN SWITZERLAND

BY

S. BLUMER

Versuchsanstalt für Obst-, Wein- und Gartenbau, Wädenswil, Switzerland

At the moment we know in Switzerland about a dozen virus diseases of fruit trees. Some of them are of considerable economic importance especially some virus diseases of apples.

Flat limb is very frequent in the varieties Gravenstein and Schneiderapfel. Besides, this disease occurs occasionally in the varieties Ontario, Glockenapfel and Tobiäsler. The yield of diseased trees may be very satisfactory at least during the first years. It is assumed that this fact is due to some difficulties in the downward movement of organic compounds.

The proliferation disease seems to be very frequent in nurseries but occurs also on fullgrown trees. The identification of this disease in the nursery is very difficult, because the prior growth of axillary buds may be caused by other factors

than by virus alone. There exist some varieties which show frequently a vigorous and acute-angled ramification and even the enlarged stipules are present. Nevertheless, the viruslike appearance of this trouble must be attributed to genetic factors in these varieties. In other cases the proliferation disease may appear the first year after budding and disappear completely in the second year. Finally, similar viruslike symptoms are caused by powdery mildew, aphids or by non parasitic troubles if the terminal bud is killed.

With these restrictions we must admit as true that the proliferation virus occurs very frequently in our nurseries and in the orchards. The variety Schneiderapfel used in Switzerland mainly as an intermediate is very susceptible to this virus and it will be the first aim to eliminate from this valuable variety both the flat limb and the proliferation disease.

Rough skin. This disease seems to be very wide-spread in Switzerland and causes serious loss of quality on several varieties, e.g. Boskoop, Reinette de Champagne, Ontario, Glockenapfel and possibly on Golden Delicious, Gravenstein and Staefner Rosen (Baldwin). Transmission experiments carried out by H. FISCHER will give definitive proof whether all these troubles are related to virus.

Further trials on the transmission of the *Pfeffinger disease* of sweet cherries showed that young trees planted close to diseased trees are infected after 2-3 years. On the other hand, we did not observe any transmission of the disease during 11 years, if potted trees were grown closely together. We can conclude from these trials and from different observations in orchards that transmission by root contact occurs very frequently, but there is little evidence for a transmission by insect vectors.

Prune dwarf on Italian Prune (Fellenberg) seems to be the most serious danger in this variety. A number of other varieties grafted on diseased Italian Prune showed no symptoms. Some others revealed different types of mosaic.

The typical symptoms of prune dwarf appeared only on the variety Ebersweier Frühzwetschge. The work with viruses on prunes and plums offers many difficulties because of the variability of symptoms on different varieties. Latent infections occur very frequently and therefore we have no proof that the rootstocks and varieties used in our experiments are really free from virus.

DISCUSSION

BERKELEY: Do the line pattern symptoms persist in prune dwarf infected trees showing line pattern?

Answer: On Italian Prune line pattern symptoms appear one year after infection, but they fade away in the second or third year if the trees are infected with prune dwarf at the same time. I never could find symptoms of line pattern on leaves which show the typical prune dwarf deformations. It is possible that the line pattern comes from the rootstocks.

TEN HOUTEN: Why does Dr BLUMER believe that Pfeffinger disease is not transmitted by an insect?

Answer: During eleven years two healthy trees among sixty diseased potted trees that were artificially infected stayed healthy although there is a number of cicadellids and other insects present in this plot.

TEN HOUTEN: It may be possible that the vector does not occur in Zürich,

whereas it may be present in the Basel area. In the Netherlands the same is the case with *Macropsis fuscus* on raspberries. This vector does not occur in the Wageningen plantations.

Answer: The Pfeffinger disease spreads in orchards at a distance of 3–4 km from our trials at Wädenswil. If for transmission an insect vector would be indispensable, it also should occur in Wädenswil. Besides it was tried in 1944 to introduce the vector from Pfeffingen, but without any success.

MULDER: Has Dr BLUMER indeed no proof of the virus nature of witches' broom disease? How long ago did he carry out his transmission experiments?

Answer: The experiments were carried out already four years ago; during this time I could not find any symptoms on rootstocks grafted with diseased scions. This is in contradiction with the Dutch result.

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RECENT PROGRESS IN FRUIT TREE VIRUS RESEARCH IN ITALY

BY

RAFFAELE CIFERRI

Laboratorio Crittogamico, Pavia, Italy

Fruit culture in Italy is of the greatest economic importance. The area of specialized cultures of unmixed crops, was in the year 1953 of about 400.000 hectares for citrus, pomaceous and drupaceous plants, walnut, hazel-nut, carob and fig. The area of the olive trees (mixed and unmixed crops) is about 1.300.000 ha and that of grapevines, at all, about 4.000.000 ha.

In spite of the extensive culture of fruit trees, virus diseases are comparatively not very important, or at least their economic importance has not been ascertained, with a few exceptions. For instance, the virus diseases of cherry trees of almost universal distribution are not known in Italy. Nutrient deficiency diseases are apparently more important at least for some species (peach, cherry, citrus, olive, persimmon, and others), chiefly on the widely diffused cultures established on calcareous soils.

This is the reason why the studies of both groups of diseases are generally made by the same research workers, at least in the first phase of survey.

The objects of the most intensive research are actually:

- a. Apple and pear ('witches' broom'; B-deficiency);
- b. peach (K and P-deficiency);
- c. cherry (K and P-deficiency);
- d. almond (the complex of virus diseases);
- e. olive (B-deficiency and several virus or virus-like diseases);
- f. citrus (crinkly leaf psoriasis; Zn and Mn-deficiency).

We report only about the most frequently occurring or important or peculiar virus diseases in Italy.