

Research on Stubborn Disease in Morocco

CALAVAN AND CHRISTIANSEN (1) have shown that a transmissible stunting factor is associated with stubborn disease. Their experiments have strengthened the hypothesis that this affection is of a virus nature. This paper describes part of an experiment, which was carried out in Morocco, that confirms results obtained by Calavan and Christiansen.

Method

SOURCES OF INOCULUM.—Six orange trees were chosen; all showed very severe symptoms of stubborn disease.

No. 1—A 20-year-old Washington Navel orange tree (Mechra Bel Ksiri district).

No. 2—A 27-year old Washington Navel tree (Sidi Slimane district).

No. 3—A 24-year-old Golden Buckeye orange tree (Marrakech district).

No. 4—An 8- to 10-year-old Hamlin orange tree (Marrakech district).

No. 5—A 12- to 15-year-old Grosse Sanguine orange tree (Sidi Slimane district).

No. 6—A 10-year-old Valencia Late orange tree (Mechra Bel Ksiri district).

Indexing of these trees is under way; the Grosse Sanguine orange tree has shown foliar symptoms of psorosis.

TEST PLANTS.—Seventy-two Hamlin orange seedlings, used as rootstocks, were grafted on April 24 and on May 16, 1962, with Eureka lemon buds taken from 2-year-old seedlings; 12 seedlings were grafted with each of the 6 sources. The budlings grafted on April 4 were inocu-

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lated on May 25 with inoculum from sources No. 1, 2, and 5; those grafted on May 6 received inoculum from sources No. 3, 4, and 6 on July 3. Twelve Hamlin orange seedlings were maintained as non-inoculated checks.

TYPE OF INOCULUM.—Three types of inocula were used for each source of inoculum: (a) woodless bud, (b) bud with wood, and (c) side-grafted twig.

All inocula were grafted onto the Hamlin orange rootstock of the test plants.

Results

Two weeks after inoculation, a number of plants showed reduced growth; the new shoots were weak and had very small leaves, almost without chlorophyll. Also, these plants had shorter internodes and their leaves were more erect than normal (Figure 1). The total number of

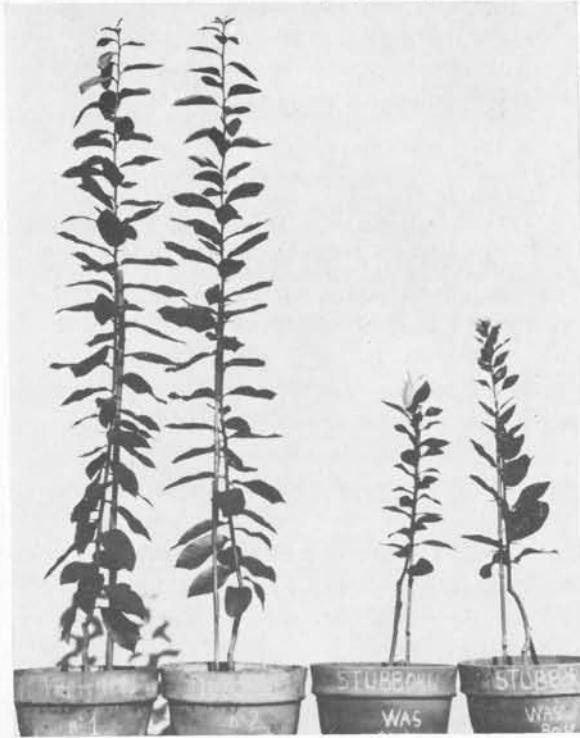


FIGURE 1. Left: 2 lemon trees on Hamlin orange. Right: 2 lemon trees on Hamlin orange, one inoculated with a woody bud (far right) and the other with a twig; both inocula came from a stubborn-affected Washington Navel tree.

PROCEEDINGS of the IOCV

such plants was 29 (40.3%); there were 14 dubious test plants (19.4%), and 29 plants (40.3%) that did not respond. The 12 non-inoculated check plants were normal.

At the end of 1962 and during 1963 the new growth produced by the inoculated test plants was normal.

Discussion and Conclusion

The results of this experiment confirm those obtained by Calavan and Christiansen; they show that a stunting factor has been transmitted. But whether this factor is the causal agent of stubborn remains a question; especially, since in the field we have never found stubborn on lemon trees.

The symptoms obtained in Morocco on the lemon test plants resemble those obtained in California. This identity seems to indicate that the same factor has been transmitted in both countries.

It seems as if the use of woody buds and twigs gives better results in transmitting this factor than the use of woodless buds.

Literature Cited

1. CALAVAN, E. C., and CHRISTIANSEN, D. W. 1961. Stunting and chlorosis induced in young-line citrus plants by inoculations from Navel orange trees having symptoms of stubborn disease, p. 69-76. In W. C. Price [ed.], Proc. 2nd Conf. Intern. Organization Citrus Virol. Univ. Florida Press, Gainesville.