

## Mechanical transmission of virus from grapevines attacked by „Dégénérescence infectieuse” to *Chenopodium quinoa*

by

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### Introduction

Measures for preventing the extension of “Dégénérescence infectieuse” (D. I.) of vines are recommended. Accordingly, grapevine cuttings should be selected only from virus-free vines in vineyards. The selection is based upon visual inspection as regards the symptoms of virus disease or other growth abnormalities, and sometimes it may be supplemented by microscopical examination for the presence of *trabeculae* (cordons).

Recently sap transmission of fanleaf and yellow mosaic viruses from grapevines to herbaceous plants was reported (CADMAN *et al.*, 1960). Several workers from other grape producing countries have obtained similar results (CIFERRI, 1962, HEWITT *et al.*, 1962).

At present the transmission of the above mentioned viruses<sup>1)</sup> by sap inoculation from infected grapevines to herbaceous plants is recommended to be a rapid method of diagnosis, especially in cases in which symptoms of infected vines are masked (VUITTENEZ, 1967, BOVEY *et al.*, 1967).

In Greece, to our knowledge, this is the first report of sap transmission of D. I. virus complex from grapevines to the herbaceous species *Chenopodium quinoa*.

Results of tests carried out in the laboratory early spring 1965 to 1967, under temperature conditions between 18° and 22° C are presented in this paper.

### Material and Methods

#### Source of virus

Plant material was obtained from infected vines of several *Vitis vinifera* varieties from vineyards of the Institute at Lykovrissi. These cultivars, grafted in 1956, were chosen in accordance with the general presumption that infected vines of different varieties of *V. vinifera* show differential degree of loss of vigor and productivity. Thus, some varieties like Savatiano seem to withstand a virus infection for a rather long time, while others, such as Black Corinth, Roditis and Sultanina, loose vigor and fruitfulness very rapidly. In two of our tests sap inoculations were prepared from Sultanina cuttings, rooted in water under laboratory conditions. The infected plants were used either fresh or after freezing at approximately -2° C for 20 days.

As a good source of virus concentration<sup>2)</sup> young shoots of a length of about 5 cm (VUITTENEZ, 1963) were used.

<sup>1)</sup> Identified among others in vines showing symptoms of Reisigkrankheit, a synonym for D. I. (BERCKS and STELLMACH, 1966).

<sup>2)</sup> A method for estimating the virus-concentration in grapevines is described by STELLMACH, 1966.

### Test plants

Sap inoculations were carried out on one or two opposite seated leaves (the third and fourth from the base) of the young seedlings of *Ch. quinoa*, which had developed between 6–7 leaves at the time of inoculation. The inoculation was accomplished by rubbing the leaf surface with “Celite” as abrasive. A few days after the inoculation the test plants as well as the controls were transplanted in larger pots.

### Results

The plan of our tests and the results obtained in each series of inoculations is demonstrated in Table 1.

The symptoms produced by *Ch. quinoa* plants are:

1. 4–5 days after inoculation local chlorotic lesions in the sap inoculated leaves occurred which became later necrotic.
2. A number of *Ch. quinoa* plants, especially those that had shown the above mentioned local symptoms in sap inoculated leaves, presented 8 to 23 days after inoculation a chlorotic (light green) narrow band along both sides of the large veins in a few of their younger leaves above the point of inoculation. Later, and especially in the most seriously infected test plants a general weakening of growth was noticed, accompanied by formation of small leaves in varying degrees.
3. Inflorescences of severely infected *Ch. quinoa* plants were reduced in size and number of flowers to various degrees.
4. The symptoms mentioned under 2 and 3, once appeared, remained throughout the growth period of the test plant (*Ch. quinoa*).

### Discussion

Figure 1 shows in graph the percentage of positive results (test plants with symptoms of a virus disease) on 7 series of test plants which were sap inoculated from 5 different varieties of infected grape plants (*V. vinifera*) or their cuttings

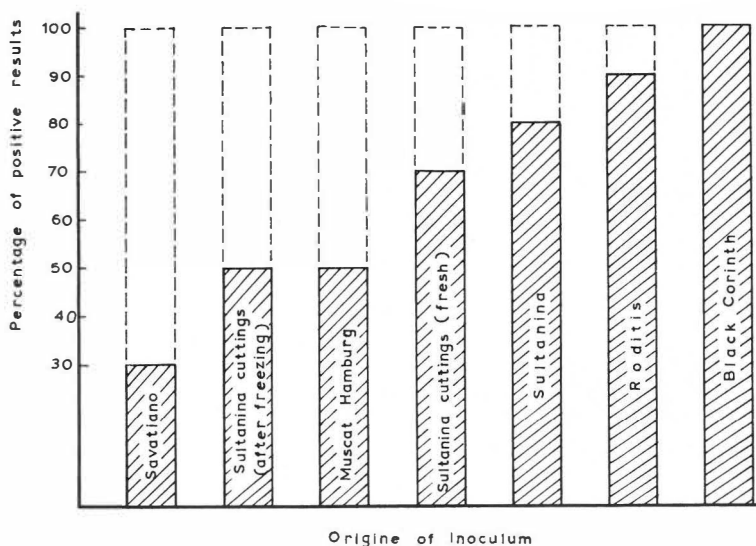


Fig. 1: Percentage of successful inoculations from various inocula.

Table 1  
The effects of sap inoculations of infected grapevine on *Ch. quinoa*

Date	Variety	Inoculated plants		Positive transmission %	Date of observation	Number of test plants with symptoms				
		n	n			Chlorot. lesions in inoculated leaves	Chlorot. bands along veins	Formation of little leaves	Delayed growth	
4. 4.	Sultanina cuttings (fresh)	10	4	70	9. 4. 19. 4. 2. 5.	10 10 10	— 3 3	— 3 3	— — —	— 7 7
10. 4.	Sultanina cuttings (after freezing)	10	4	50	15. 4. 19. 4. 2. 5.	10 10 10	— — —	— 5 5	— — —	— — 5
10. 4.	Muscat Hamburg <sup>1)</sup>	10	4	50	15. 4. 19. 4.	10 10	— —	— —	— —	— 5
19. 4.	Sultanina <sup>2)</sup>	10	4	80	23. 4. 27. 4.	10 10	— —	— —	— —	— 8
20. 4.	Savatiano <sup>1)</sup>	10	4	30	24. 4. 4. 5.	3 3	— —	— —	— —	— 3
3. 5.	Roditis <sup>3)</sup>	10	4	90	8. 5. 15. — 25. 5.	10 10	— —	— 9	— —	— 9
3. 5.	Black Corinth <sup>3)</sup>	10	4	100	8. 5. 15. — 25. 5.	10 10	— —	— 10	— —	— 10

<sup>1)</sup> Variety with slight virus symptoms.

<sup>2)</sup> Variety with yellow mosaic symptoms.

<sup>3)</sup> Variety with pronounced symptoms, characterized by an inhibited shoot growth.

(Table 1). The varieties Black Corinth, Roditis and Sultanina, listed among the more susceptible varieties to the virus complex causing D. I., have shown a more severe infection by sap inoculation (represented by a higher percentage of positive transmission) than the less susceptible ones as Muscat Hamburg and Savatiano. This observation may be of value as it might indicate a higher virus concentration in the sap of susceptible varieties.

Furthermore a varying intensity of the infectious strength of sap inoculations of Sultanina has been obtained. Thus a higher percentage of successful inoculations resulted from vegetative material (source of virus), taken directly from infected vines than from forced cuttings. A higher percentage of successful inoculations was obtained when using fresh material from cuttings in comparison with inocula of freeze-dried plant material. The variety Savatiano, empirically considered to be less susceptible to the virus complex of D. I. brought a lower percentage of positive results from sap inoculation.

### Summary

Sap transmission of virus was obtained from grapevines attacked by D. I. to herbaceous species of *Ch. quinoa*. The percentages of positive results obtained showed a differential degree of infectious strength of the inoculum from different *V. vinifera* varieties, related to their susceptibility to this virus disease.

We have also noticed a differential degree of the infectious strength of the sap taken from an infected vine and from cuttings. The material taken from cuttings was either used directly or after having endured a low temperature treatment and was then used for the inoculations.

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