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MATURE PLANT RESISTANCE OF COWPEA LINES TO COWPEA SEVERE MOSAIC VIRUS IN SURINAME

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SUMMARY

Local and imported cowpea lines have been tested for their susceptibilities to the cowpea severe mosaic virus (CSMV). Only 12 lines, obtained from the IITA in Ibadan (Nigeria), showed resistance to the virus. On the other hand some of the lines, which were resistant to the nigerian cowpea yellow mosaic virus (CYMV), revealed susceptibility to isolates of the surinamese cowpea severe mosaic virus; in various extents, however.

In order to find a way to let the crop escape infection, mature plant resistance experiments were carried out. These experiments showed that in the greater part of the susceptible lines mature plant resistance started at the age of 28 to 35 days.

INTRODUCTION

Cowpeas (*Vigna unguiculata* (L.) Walp.) are grown throughout the tropics and subtropics and are the most ancient vegetables of human food. In India cowpeas were known already in Sanskrit times and the old Romans grew it under the name '*Phaseolus*'. Nowadays they provide food for millions of people in India, Africa and the West — Indies.

In Suriname only four varieties of *Vigna sinensis* were known at the beginning of this century: capucijner, djaripesie, botropesie and black eye-pesie (Ter Horst, 1961). To improve and expand this small collection and to substitute the red kidney bean, experiments were conducted with local and imported lines. The first import took place in 1912 from the United States of America (Ter Horst, 1961).

At present cowpea lines are obtained from the IITA (International Institute for Tropical Agriculture) in Ibadan (Nigeria). They are to be tested for their growth, production and susceptibility to virus diseases under surinamese conditions.

In this paper attention was focused on screening of the different lines for their susceptibility to the cowpea severe mosaic virus (CSMV) and on mature plant resistance tests.

The objective the last-mentioned tests was to find a way for the susceptible lines (with good qualities to production, growth etc.) to escape CSMV-infection.

MATERIALS AND METHODS

The Cowpea (*Vigna unguiculata* (L.) Walp.) lines, TVu 3629, TVu 4557, TVu 1502, TVu 157, TVu 1267, TVu 1190-E, TVu 1977, TVu 2616 P, TVu 1987, TVu 201, TVx 1836 P, TVx 1836, TVx 30, TVx 2112, TVx 1630, TVx 876, VITA 4 and TVx 66-2 H have been used in the experiments. TVu 1267, a selection of the Agricultural Experiment Station in Paramaribo, served as a control.

The cowpea severe mosaic virus isolate was obtained from severely infected *Vigna sinensis* Cv. 'Sesquipedalis' plants which showed green blisters on the leaves, leaf malformation and reduction of leaf size.

From each line 80 plants were sown. Subsequently the carborundum-dusted primary leaves of each 10 plants of each line were inoculated at the ages of 3, 7, 14, 21, 28, 35, 42 and 56 days, respectively. Since at the ages of 42 and 56 days the primary leaves were mostly dropped already, trifoliate leaves were inoculated at these ages.

4 to 6 days after the inoculations the first reactions of the different lines were recorded. Three weeks later a second series of readings were made to make sure that the number symptoms did not vary any longer.

RESULTS AND DISCUSSION

All of the tested lines mentioned in the previous section have shown to be susceptible to the CSMV isolate. The most susceptible one was TVu 1977, from which the infected plants

Table 1. Susceptibility and mature plant resistance of cowpea lines.

Cowpea lines	Susceptibility to CSMV		Mature plant resistance								
	Reaction to CSMV inoculation	Sequence of symptoms		Age of plants (in days)							
		prim.	trif.	3	7	14	21	28	35	42	56
		leaves		Numbers of infected plants							
TVu 3629	HS	I (chl)	vy→mo→lm	8	3	5	3	1	0	0	0
TVu 4557	S	I (chl)	vy→mo→lm	7	—	8	5	4	0	0	0
TVu 1502	S	I (chl)	vy→mo→lm	6	9	8	8	3	6	2	0
TVu 157	S	I (chl)	vy→mo→lm	3	9	7	7	6	2	0	0
TVu 1267	S	I (chl)	vy→tn+lm	2	8	8	5	4	1	0	0
TVu 1190E	S	I (chl)	vy→mo	10	7	6	5	7	3	1	0
TVu 1977	HS	I (chl)	vy→mo→tn	10	3	2	3	2	1	1	0
TVu 2616P	S	I (chl)	vy→mo→lm	10	3	10	5	7	0	1	0
TVu 201	S	I (chl)	vy→mo→lm	10	7	3	8	0	5	2	0
TVu 1987	S	I (chl)	vy→mo→lm	10	10	3	2	10	2	0	0
TVx 1836	S	I (chl)	vy→byf	2	4	8	4	3	1	3	0
TVx 1836P	S	I (chl)	vy→mo	10	9	2	3	4	4	1	0
TVx 30	S	I (chl)	vy→mo+lm	10	1	5	4	1	0	1	0
TVx 2112	S	I (chl)	vy→mo+lm	10	5	7	3	4	1	1	0
TVx 1630	S	I (chl)	vy→lm	10	4	10	10	10	2	1	0
TVx 876	S	I (chl)	vy→mo+lm	9	—	6	5	3	1	1	0
VITA-4	HS	I (chl)	mm→ld+tn	10	10	10	10	9	8	6	0
TVx-66-2H	S	I (chl)	vy→mo→lm	10	10	5	10	10	4	0	0

S: Susceptible

HS: Highly Susceptible

I (chl): local chlorotic lesions

vy : vein yellowing

mo : mosaic

mm : mild mottling

byf : bright yellow flecks

lm : leaf malformation

ld : leaf drop

tn : top necrosis

Mature plant resistance of Cowpea lines to Cowpea severe mosaic virus in Suriname

showed severe mosaic, dwarfing, malformed leaves and top necrosis. However, when virus was introduced in 7-days old plants and older the amount of infected plants reduced drastically; as is to be seen in table 1.

Line TVu 3629 was also highly susceptible; top necrosis, was absent, however. With all of the lines symptom expression started with local lesions on the primary leaves, followed by a systemic vein yellowing, which most frequently turned into mosaic and sometimes into leaf malformation (TVu 1630), top necrosis (TVu 1267) or bright yellow flecks (TVx 1836).

From table 1 it can be concluded that the amount of infected plants is decreasing the older the plants were when inoculated. Although each line has to be viewed separately for the occurrence of mature plant resistance, there exist a general tendency that with most of the lines the resistance started at the age of 28 to 35 days.

The term of mature plant resistance was first used by Bercks (1951, 1952), when studied this phenomenon in detail for potato virus x.

Since it is known now to what extent mature plant resistance occurs in the cowpea lines mentioned in this paper, advantage can be taken of it to protect the crop from infection with this virus.

From the experiments of Van Hoof (1962) it became clear that the virus can be transmitted by the beetles *Cerotoma variegata* F., *Diabrotica* sp. (probably *laeta* F.) and *Diphaulaca* sp. (probably *meridae* Barber). It is no use to spray against these beetles since they do not transmit the virus circulative. Covering the crop with gauze for the first 35 days would be better. By doing so infestation and, as a consequence, infection is prevented.

However, cross pollination by insects will be prevented too. Fortunately we are dealing here with a self-pollinating crop. What the yield and the quality will be, still needs investigation.

Another solution of the problem would be breeding or selection of resistant lines. In the course of the experiments 12 lines have been found resistant to the virus: TVu 4554, TVu 2480, TVu 3901, TVu 3900, TVu 113, TVu 408-2, TVu 410, TVu 274, TVu 1948, TVu 612, TVu 2331, TVu 6666. They will open new perspectives for the future.

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