

TULIP BULBS GROWN ON RATTLE VIRUS INFECTED SOIL

Arne Thomsen
National Research Centre for Plant Protection
Institute for Plant Pathology
DK-2800 Lyngby
Denmark

Abstract

In field experiments carried out on a rattle infected sandy soil, tulip bulbs were planted at depths of 7,5 cm and 15 cm respectively.

After the growing season and harvesting, the bulbs were planted in a healthy field for further investigation. The results here showed that the spreading of tobacco rattle virus was most widely spread in the bulbs grown at a greater depth.

The experiments were carried out without artificial watering.

Due to the virus vector (*Trichodorus* spp.) depending on the moisture in the soil, the virus spread in general was most severe in years with heavy rainfall.

Introduction

In Denmark tobacco rattle virus (TRV) occurs all over the country especially in light soils. TRV has a very great host range and spontaneous infection is common in numerous plant species including many wild plants, among which *Stellaria media* is particularly susceptible. Among the cultivated plants, rattle virus is of importance for potato growers as spraing develops in the tubers of susceptible and sensitive varieties. Also in flower bulbs TRV occurs. Certain cultivars of tulip are susceptible to TRV infection. The rate of infection is high when planted early on an infected soil, and low when planted later in the season.

Trichodorus spp. is vector for the virus and several investigations have proved this nematodes to be present in many Danish soils.

In an early investigation more than 1,100 Danish soil samples have been tested for possible content of soil borne viruses by means of the bait plant method and TRV was hereby found in more than 30 % of the samples.

The distribution varied a lot from one part of the country to another. In light soils TRV was found in twice as many samples as it was in heavier soils.

From fields with flower bulbs TRV was found in 21 % of 114 investigated soil samples.

Comparison of rainfall with spraing incidence in potato tubers has shown the latter increasing with increasing rainfall in the period of tuber formation (3).

Investigations on potatoes has shown that attack from spraying in the progeny increases with the depth (4) due to normally better conditions from the nematodes spreading the disease, as shown by van Slogteren (1) increasing attack from TRV the deeper the bulbs are planted.

Materials and methods

Experiment_1

In field experiments carried out on a TRV infected light soil 1000 tulip bulbs of 'Brilliant Star' and 1000 tulip bulbs of 'Kornefor s' were planted in October.

500 bulbs of each cultivar were planted respectively 7,5 cm and 15 cm deep.

After one growing season the plants were inspected, the bulbs harvested and after drying planted in a field proved to be free of *T r i c h o d o r u s* s p p. and TRV. The following spring the plants were inspected for TRV symptoms. The experiment was carried out without artificial watering.

Experiment_2

Over a three year period - each year - 200 TRV free bulbs of the cultivar 'Apeldoorn' were planted in a TRV infected light soil in the depth of 10 cm. Symptoms was recorded and the results obtained were compared to the rainfall in the autumn the year of planting.

Results

Table_1

In general 'Brilliant Star' (35 %) was more susceptible to TRV infection than 'Korneforos' was (6 %). After one growing season in the TRV infected soil no flowers showed TRV symptoms.

After further one growing season the same plants transferred to a healthy soil had several flowers showing TRV symptoms.

In the original deep grown bulbs 44 % of 'Brilliant Star' and 8 % of 'Korneforos' showed symptoms compared to only 25 % and 3 % respectively from the bulbs grown at lesser depth.

Table_2

The 'Apeldoorn' planted in 1971 (heavy rainfall showed a total of 28 % TRV infected plants in 1973.

The same cultivar planted the following two years (one normal and one dry) showed TRV infection in only 8 and 12 % of the plants, respectively.

Discussion

The investigation confirms the finding of Van Slogteren, that TRV is most widely spread in the deep grown bulbs.

There seems to be a connection between the moisture in the TRV infected soil and the spread of TRV.

In the actual experimental field most nematodes are found in the soil 25 cm depth and the upper surface only very few was found.

Soil samples was taken to a depth of 1,6 m.

Trichodorus spp. and TRV was proved to a depth of 1.3 m.

References

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Table 1 - Infection of TRV in tulips grown in infested soil one season

Cultivar	% plants with symptoms after replanting in healthy soil	
	15 cm deep	7.5 cm deep
'Brill. Star'	44	25
'Korneforos'	8	3

Table 2 - Infection of TRV in 'Apeldoorn' on TRV infested soil

Planting year	Precipitation	% TRV infected after two growing seasons
	oct. - dec. mm	
1971	261	28 (1973)
1972	181	9 (1974)
1973	144	12 (1975)

Normal precipitation oct. - dec. = 185 mm