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OCCURRENCE OF RACE 2 OF FUSARIUM WILT OF TOMATOES IN QUEENSLAND

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SUMMARY

A race of *Fusarium oxysporum* f. sp. *lycopersici* previously unrecorded in Queensland was isolated from tomatoes in the Bowen area in 1968. Pathogenicity tests indicated that this isolate was similar to race 2 described from Florida.

I. INTRODUCTION

In many parts of the world, losses from Fusarium wilt (*Fusarium oxysporum* Schlecht. ex. Fr. f. sp. *lycopersici* (Sacc.) Snyd. & Hans.) in tomatoes have been greatly reduced by the widespread use of cultivars possessing the resistance factor discovered by Bohn and Tucker (1939) in *Lycopersicon pimpinellifolium*. In recent years, however, there have been reports of losses in tomato cultivars with this type of resistance. Alexander and Tucker (1945) found an isolate of *F. oxysporum* f. sp. *lycopersici* able to attack such cultivars in Ohio. Gerdimann and Finley (1951) designated a similar strain as race 2, while the commonly occurring one was referred to as race 1. In 1961, Stall reported economic losses from race 2 in tomato crops in the Delray Beach area of Florida. It has since occurred in other parts of Florida (Jones and Littrell 1965), Arkansas (Goode 1966; Goode, McFerran and Fudge 1968), Brazil (Tokeshi and Galli 1966), New Jersey (Miller and Kananen 1968), Israel (Katan and Wahl 1969) and Morocco (Laterot and Pecaut 1969).

This paper presents the results of a survey made in the Bowen area and of studies comparing the pathogenicity of two isolates of *F. oxysporum* which were suspected to be similar to races 1 and 2.

II. RESULTS OF SURVEY

In the Bowen area on the Central Queensland coast, in September 1968, typical Fusarium wilt symptoms were recorded in the tomato cultivar Campbell 1402, which is resistant to race 1. *F. oxysporum* was consistently isolated from the stems of the diseased plants. A limited survey of this area was carried out in August 1969 to determine the distribution of the organism. Samples of the cultivar Campbell 1402 showing Fusarium wilt symptoms were collected and the isolates of *F. oxysporum* obtained from these samples were inoculated onto the cultivars Rouge de Marmande, Floradel and Walter. Isolates producing disease symptoms only in the cultivar Rouge de Marmande were regarded as race 1, and isolates producing symptoms in both Rouge de Marmande and Floradel as race 2.

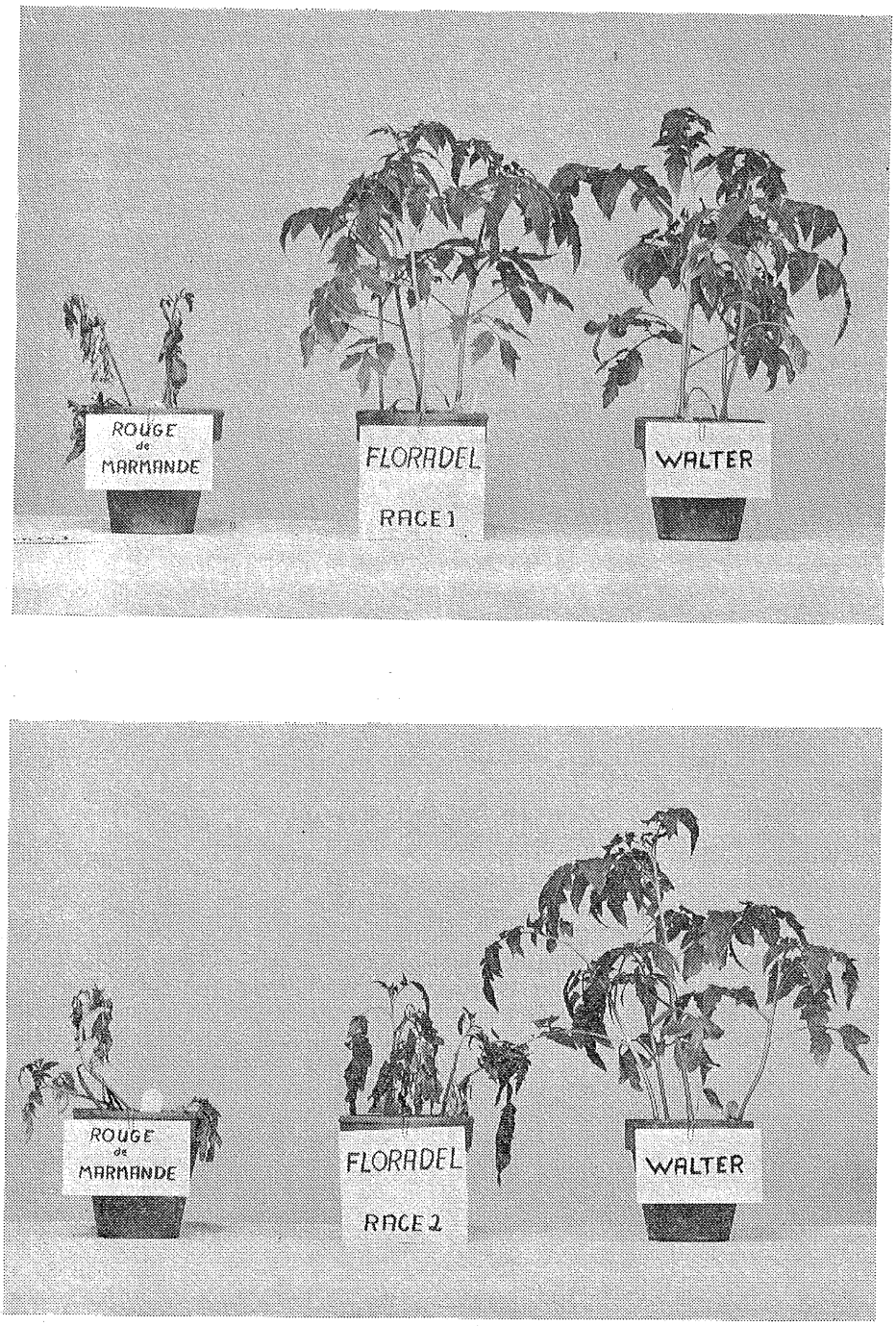

Fig. 1.—Disease development in the tomato cultivars Rouge de Marmande, Floradel and Walter following inoculations with isolates of *F. oxysporum* f. sp. *lycopersici* from Sunnybank (race 1) above and Bowen (race 2) below.

The cultivar Campbell 1402 showed Fusarium wilt symptoms on 14 of 16 farms visited. In each case the cultures isolated were race 2 of *F. oxysporum* f. sp. *lycopersici* (Figure 1), indicating that its occurrence had become widespread in the area in 12 months. There have been no reports from other areas of Queensland of Fusarium wilt symptoms in tomato cultivars resistant to race 1.

III. METHODS AND MATERIALS FOR PATHOGENICITY TESTS

The cultivars used in the pathogenicity tests are listed in Table 1. Seedlings were grown to a height of 3-4 in. in steam-sterilized U.C. soil mix and the roots were washed clean prior to inoculation.

TABLE 1

PERCENTAGE OF PLANTS IN A NUMBER OF TOMATO CULTIVARS SHOWING VASCULAR DISCOLORATION AFTER 21 DAYS FOLLOWING INOCULATIONS WITH ISOLATES OF F. *oxysporum* f. sp. *lycopersici* FROM SUNNYBANK AND BOWEN

Cultivar	Sunnybank Isolate		Bowen Isolate	
	No. of Plants Inoculated	Percentage Diseased Plants	No. of Plants Inoculated	Percentage Diseased Plants
Susceptible				
Rouge de Marmande	70	100	60	100
Red Cloud	—	—	30	100
Q3	30	87	40	95
Q2	30	100	40	100
Grosse Lisse	40	100	110	95
Resistant to race 1				
Burnley Gem	30	66	35	100
Manapal	40	22	75	87
Indian River	40	8	30	100
Floralou	40	12	40	98
Step 305	30	3	30	97
Marian	30	10	30	97
Campbell 1402	30	7	50	98
C2	—	—	40	95
Tropic	30	7	30	100
Floradel	100	1	300	100
Resistant to races 1 and 2				
Walter	30	3	114	4

Two isolates of the Fusarium wilt organism were used. The first was cultured from the cultivar Salad, collected at Sunnybank near Brisbane, and the second was from a Campbell 1402 plant from the Bowen area. Cultures of the isolates were maintained on potato dextrose agar and all subculturing necessary was done by the single spore method. Immediately prior to use 7-day-old cultures were macerated for 1 min in a blender with 25 ml of distilled water for each petri dish of culture. The seedlings were inoculated by dipping the roots in this suspension, and then being replanted into pots of steam-sterilized U.C. mix. The plants were incubated in a naturally lit glass cabinet at 22–26°C and after 21 days the presence or absence of vascular discoloration in the tap root was recorded for each plant.

IV. RESULTS AND DISCUSSION

The pathogenicity of the isolates on 16 cultivars is shown in Table 1. Results from the Sunnybank isolate were typical of race 1 of *F. oxysporum* f. sp. *lycopersici,* causing a high incidence of disease only in cultivars without the

resistance factor. The Bowen isolate, however, was also pathogenic to the cultivars with appreciable resistance to race 1. The cultivar Walter was highly resistant to both isolates. The results indicated that the Bowen isolate was similar to race 2 of *F. oxysporum* f. sp. *lycopersici* as described by Stall and Miller (1965) and Strobel *et al.* (1969).

V. ACKNOWLEDGEMENTS

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