STUDIES OF THE RESISTANCE OF SPECIES OF *PASSIFLORA* TO FUSARIUM WILT *(F. OXYSPORUM* F. *PASSIFLORAE).*

By G. S. PURSS, B.Sc. Agr., Pathologist, Division of Plant Industry.

SUMMARY.

It is possible to obtain a degree of resistance to Fusarium wilt in the purple passion fruit (Passiflora edulis) **but the resistance so far located has only been sufficient to delay infection. This would be of little value commercially, where a high level of resistance is required to suit a perennial plant.**

Some other species and varieties of Passiflora **possess good resistance to the disease and certain strains of the golden passion fruit** (P. edulis f. flavicarpa) **possess characters suited to their use as resistant rootstocks.**

I. INTRODUCTION.

A wilt disease of the purple passion vine (*Passiflora edulis* Sims) is of major importance in Queensland. This disease has been described as Fusarium wilt (McKnight 1951) and the causal agent identified as *Fusarium oxysporum* Schlecht. em Snyder and Hansen f. *passiflorae* (Purss. 1954). The disease has since been reported in New South Wales on *P. edulis* at Kulnura, Taree (New South Wales Department of Agriculture 1953).

The passion fruit is by nature a perennial which is expensive to establish on account of the trellising required. The effect of a disease of this nature which completely destroys affected plants and renders the field useless for replanting is disastrous. The disease was at first localised but with gradual spread it has now become so prevalent in south-eastern Queensland that it has to be considered one of the normal hazards to successful cultivation.

McKnight (1951), following resistance tests, suggested that control might be achieved either by selecting resistant individuals within *P. edulis* or by top-grafting *P. edulis* onto the root system of a suitable resistant species of *Passiflora.* Since then the reaction of many individuals of *P. edulis* and other species of *Passiflora* has been investigated with a view to determining their value as rootstocks. This paper records the results of these studies.

II. TECHNIQUES OF TESTING FOR RESISTANCE.

Three techniques of inoculating seedlings with *F. oxysporum* f. *passiflorae* were compared.

(1) *Fungus–slurry method.*—This technique was used by McKnight (1951). Inoculum is prepared by scraping the spores and mycelium from the

Fig. 1.

Passiflora edulis Vine on a *P. edulis* f. *flavicarpa* Rootstock.

surface of a potato dextrose agar (P.D.A.) culture of the test fungus and adding this to a small quantity of water. The seedlings, with 1-3 true leaves, are removed from the soil and their roots thoroughly washed in running water, then dipped into the inoculum. They are then replanted. Check plants are dipped in water free from inoculum. This technique is a laborious one when testing large numbers of seedlings.

(2) *Nutrient solution method.*—The nutrient solution described by Sherbakoff, Miller and Simpson (1944) was inoculated with small pieces of a P.D.A. culture of the fungus and left for two days with occasional agitation. This solution was then used for inoculating flats of moist sterilized soil at the rate of 500 ml. to approximately every square foot of soil. Into this soil either seedlings or seed of the species being tested were placed.

Typical results of both these methods of testing appear in Table 1.

Table 1.

RESULTS OF DIFFERENT INOCULATION TECHNIQUES WITH *F. oxysporum* f. *passiflorae* ON *P. edulis*.

Treatment.	Number of Plants.	Percentage Mortality After 1 Month.
Soil inoculated with nutrient solution. Seedlings planted immediately	14	65
Soil inoculated with nutrient solution. Seed sown immediately	66	71
Seedlings dipped in fungus-slurry, then planted immediately	17	100
Check. Seedlings dipped in water and replanted	17	0

(3) The third method of testing was simply to re-use the soil from flats in which seedlings inoculated by the fungus-slurry technique had died. Results here were very inconsistent, some seedlings taking a considerable time to show symptoms of the disease.

Because of its overall effectiveness the fungus-slurry technique was adopted. A possible objection to this method of testing is that it is too severe and not comparable with normal disease conditions in the field. However, as passion fruit is a perennial crop, subject to attack at all stages of maturity, resistance must be on an extremely high level to be worthwhile.

III. REACTION OF PASSIFLORA EDULIS.

Tests were carried out over a period of three years on seed collected from 10 different localities. Seedlings were inoculated in the 3-leaf stage with one isolate of *F. oxysporum* f. *passiflorae*. All survivors were inoculated with a mixture of a number of isolates obtained from different sources.

A total of 2,258 seedlings was treated in this way. Forty-eight seedlings survived the first inoculation but only six of these survived the second. These six surviving plants were planted out in the open, where five of them quickly wilted and died. All were found to be affected with Fusarium wilt.

The sixth plant survived for six months but eventually wilted and died from the same cause. Cuttings struck from this plant succumbed to the disease when planted out in infected soil. Scions of this "resistant" plant grafted on a resistant rootstock reached maturity and set seed. The reaction of its progeny was compared with that of an ordinary *P. edulis* line. The results appear in Table 2.

The resistance so far located in *P. edulis* is therefore of a very low order, tending only to delay symptoms of the disease. Such resistance would be of no value commercially.