Identification of the Races of Fusarium oxysporum f. sp. melonis
Causing Wilt of Muskmelon in California

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We wish to thank Mme. Rissier of the Station d'Amélioration des Plantes Maraîchères in Avignon, France, for the
seed of cultivars with differential resistance.
Supported in part by California Melon Research Board Grant No. 8-74.

ABSTRACT

Fusarium oxysporum f. sp. melonis was identified as the
cause of wilt in two fields in Riverside County, California.
The isolates of the fungus were tested on muskmelon
cultivars differentially resistant to Races 1 to 4 of Fusarium

oxysporum f. sp. melonis. Results showed that these isolates
were of Races 2 and 3 that were previously unreported in the
U.S.

Phytopathology 66:15-16

Since 1930 Fusarium wilt of muskmelon (Cucumis
melo) has been a serious disease in the U.S. (2) where it
has been reported as the cause of severe crop losses in
several areas. The occurrence of the disease in California
has been recorded (6), but whether this was due to Fusarium
oxysporum f. sp. melonis (Leach and Currence,
Synder and Hansen) is unconfirmed.

Although the existence of physiological races of
Fusarium oxysporum f. sp. melonis has been confirmed
(5), only Race 1 was known to occur in the United States.

In 1972, Fusarium wilt was identified as the cause of the
loss of 100% of the crop in a field in Arlington, Riverside
County, California. Fusarium oxysporum f. sp. melonis
was isolated from the diseased plants. In 1973, another
report of the disease from Riverside County was received
and confirmed. The field was 15 miles from that field
where the original isolate was obtained. Preliminary tests
showed these isolates to be highly pathogenic to all the
cultivars of muskmelon tested. Of particular interest was
the fact that several muskmelon cultivars resistant to
Race 1 were susceptible. These isolates were tested against
melon cultivars used to differentiate among Races 1, 2,
3, and 4 (5). We report here the results of these tests which
indicate that one isolate is Race 2 and the other is probably
Race 3.

The original isolates of Fusarium oxysporum f. sp.
melonis were obtained from sections of diseased plant
 tissue. The sections were surface disinfected with 1.0%
sodium hypochlorite (10% chlorox) for 10 minutes and
transferred to PCNB peptone-agar (4). Resultant
colonies were transferred to potato-dextrose agar,
identified as Fusarium oxysporum by microscopic
examination, and transferred to glucose-peptone agar
(GPA).

Isolates were also recovered from soil collected from
fields in which the disease had been identified. A modified
Anderson Air Sampler (1) was used to distribute 0.1 g of
soil samples previously screened to pass a 38-μm screen
over 300 areas of petri dishes containing water agar.
Fungal colonies were identified as Fusarium oxysporum
and tested for pathogenicity.

Cantaloupe seeds were germinated in steamed UC-
planting mix (3). At the four- to six-leaf stage, the

seeding were inoculated by dipping the roots in a
suspension containing approximately 10⁷ conidia/ml.
Four inoculated seedlings were transplanted to a 15.2-cm
diameter pot for 12 plants per experiment. The cultivars
tested were Charentais, Doublon, and CM 17.187. The
differential resistance is shown in Table 1.

Inoculation of the varieties Charentais, Doublon, and
CM 17.187 with a known F. oxysporum melonis Race 1
isolate gave the predicted reaction (Tables 1 and 2). When
these same cultivars were inoculated with conidia of the
California isolates, the isolate designated X-22 gave the
reactions expected for Race 3, and the isolate designated
X-38 gave the reactions characteristic of Race 2 (Table 2).

TABLE 1. Differential resistance to Fusarium oxysporum
melonis as described by Rissier et al. (4)

<table>
<thead>
<tr>
<th>Melon cultivar</th>
<th>Race 1</th>
<th>Race 2</th>
<th>Race 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charentais</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Doublon</td>
<td>R</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>CM 17.187</td>
<td>R</td>
<td>R</td>
<td>S</td>
</tr>
</tbody>
</table>

R = resistant, S = susceptible.

TABLE 2. Differential resistance of melon cultivars to
Fusarium oxysporum melonis isolates from California

<table>
<thead>
<tr>
<th>Melon cultivar</th>
<th>I-498 from Israel (Race 1)</th>
<th>X-38 from Moreno, CA (Race 2)</th>
<th>X-22 from Arlington, CA (Race 3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charentais</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Doublon</td>
<td>R</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>CM 17.187</td>
<td>R</td>
<td>R</td>
<td>S</td>
</tr>
</tbody>
</table>

*R = resistant, S = susceptible.
*Supplied by Dr. David Netzer.
The cultivar responses were clearly different from those of the known Race 1 isolate and from each other. These results are in general agreement with those of Risser et al. (5). However, those authors describe the response of Dublon to Race 2 as yellowing and tissue decay. In our tests, several isolates of the fungus did produce such symptoms, whereas others, obtained from the same field produced wilting and death of Dublon plants.

These data indicate that the California isolates are not members of Race 1, the only race reported previously in the United States. The fact that two different races were isolated from such a limited geographical area is puzzling, especially since there has been no noticeable spread of the disease into other melon-growing areas of the state. We are continuing our surveys of the major melon-growing areas to assess the disease incidence outside Riverside County.

Studies are now under way to identify resistance to Race 2 and Race 3 of *Fusarium oxysporum melonis* in commercial American muskmelon cultivars.

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**LITERATURE CITED**


