Growth of a Phytophthora sp. on carrot agar

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The rate of growth of an unidentified species of Phytophthora, causing rubbery brown rot of stored carrots, was greatest on carrot agar medium prepared from frozen samples of carrots harvested at 14 weeks from seeding and from carrots frozen following 13 weeks storage at 1°C.

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Le taux de croissance d'une espèce non identifiee de Phytophthora provoquant une pourriture brune caoutchouteuse sur la carotte de conservation a atteint son intensite maximum sur gelose préparée a partir de carottes congelees récoltées a leur 14e semaine et de carottes congelees apres 13 semaines de conservation a la temperature de 1°C.

Introduction

A rubbery brown rot disease of carrots *(Daucus carota* L. var. sativa D.C.) caused by ***Phytophthora megasperma*** Drechs. was first reported as occurring in the field in Tasmania (1,8) and later elsewhere in storage (6,7). In Alberta, a similar rubbery brown rot of carrots, caused by an unidentified species of ***Phytophthora,*** was responsible for serious losses in 1969-70 (3) and recurred there in 1975-76 (7). It appears to be caused by an undescribed species of ***Phytophthora.*** This paper reports the results of a study to determine whether carrot roots taken from the field at different intervals after seeding or stored for different periods of time would vary in supporting growth of the causal fungus.

Materials and methods

Two isolates of the Alberta carrot ***Phytophthora*** (7) (980-1 and 1157) obtained in 1970 were used on the test media. These media included 7 field samples of irrigated Imperator 11 carrot roots harvested weekly at the 12 to 18 wk growth stages, and 6 samples of unwashed carrot roots Filacell-stored at 1°C taken at 3.0, 3.5, 4.5, 6.5, 10.0 and 13.0 wk during storage. "Filacell" storage involves the combining of refrigeration and humidification by forcing air through a heat and moisture exchanger wound on a frame attached to inside storage room walls. All carrots were frozen as quickly as possible after sampling and remained so, in 1.5 mil closed unperforated polyethylene bags until used in media preparation.

The effect of sampling date on radial growth of mycelium of the 2 fungal isolates was studied using 5 mm agar plugs of inoculum grown on standard carrot agar and placed on the centre of the test agar in petri plates. Standard agar for all tests was prepared using a single sample of unwashed, mature carrot roots Filacell-stored at 1°C for 18 wk and grown on the same field as the test carrots. For each test carrot agar was prepared by blending 200 g frozen carrot tissue with 250 ml distilled water. The juice was strained through a triple layer of cheesecloth, and distilled water was added to make up 1 litre to which 15 g of Difco agar was then added. The medium was sterilized in 2 litre flasks for 20 min at 121°C and 15 lb pressure. Radial growth of the mycelium (mm) was recorded at intervals during a 20 day period using 10 replicates of each isolate per date of carrot sampling. Radial growth measurements of the 2 isolates were averaged for recording purposes.

Results and discussion

Rate of growth of mycelium was greater on all fresh carrot test media than on the standard carrot medium (Fig. 1A). Radial growth was greater by 60%, after 10 days incubation, for carrots sampled after the 14 wk growth than on the standard carrot medium. This period of carrot root development coincides with the "biochemical maturity" phase referred to by Phan and Hsu (4) when sugar content has reached a plateau. Media from carrot roots sampled before and after the 13 and 14 wk from seeding produced 10-20% less radial growth. In Alberta the disease has so far not been found in the field, nor in unwashed carrot roots at harvest time.

The growth pattern of ***Phytophthora*** on stored carrots media was similar to that on fresh carrot media. The decreased growth on media prepared with carrots that had been stored for 3 to 4.5 wk may be a reflection of the heightened respiration demands on reducing sugars in stored carrots immediately after harvest (2,5).

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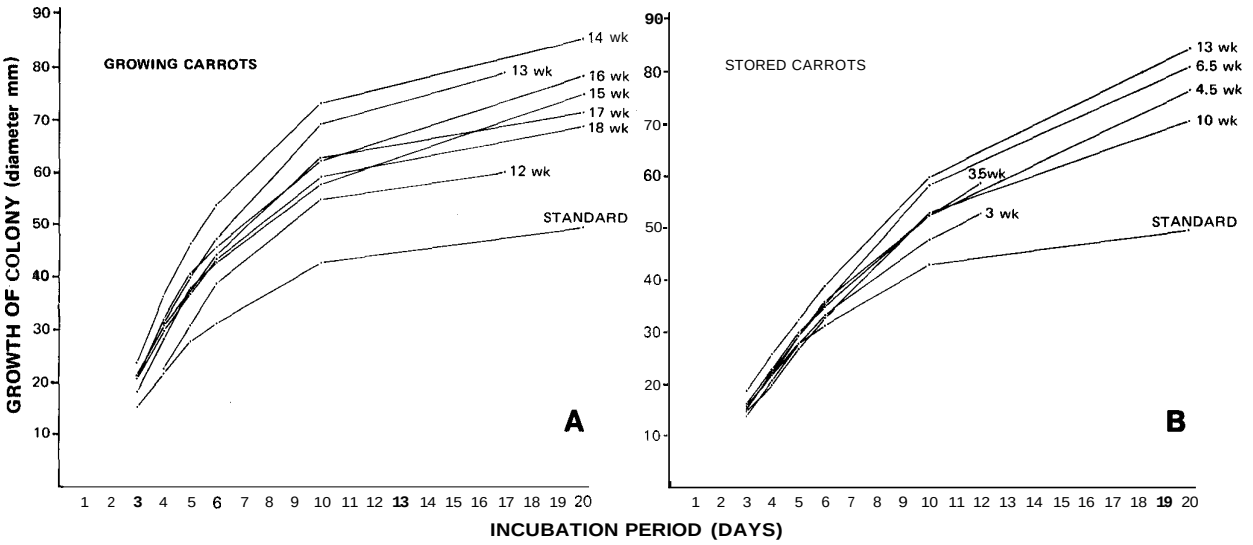

Figure 1. Radial growth of a *Phytophthora* sp. during 20 days incubation on media prepared from frozen samples of carrot roots, (A) taken at different intervals after seeding and, (B) at different intervals during storage.

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