

A chemical method to identify tuber rot in potato caused by *Phoma exigua* var. *foveata*

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The fungus *Phoma exigua* Desm. var. *foveata* (Foister) Boerema causes a noxious tuber rot in potato called 'gangrene' (Boyd, 1972). *Phoma exigua* Desm. var. *exigua* causes a symptomatologically indistinguishable disorder but is much less noxious. Also it is not always possible to distinguish gangrene from tuber rot caused by *Fusarium* spp. and other fungi. The Plant Protection Service as well as the General Netherlands Inspection Service for Field Seeds and Seed Potatoes apply the following method to test lots of seed potatoes for contamination with *P. exigua* var. *foveata*. From a sample, tubers are bruised one by one and subsequently stored at 5°C for 8–10 weeks. From the rotting spots which then develop isolations are made on an agar medium. Five to nine days later *P. exigua* var. *foveata* can be distinguished from other fungi by cultural characteristics (Boerema, 1967; Tichelaar, 1974). Our research was aimed at shortening the test period.

Because it is known that *P. exigua* var. *foveata* induces the formation of anthraquinone derivatives, as chrysophanol, on potato-dextrose-agar (Bick and Rhee, 1966), we tried to demonstrate the presence of these derivatives directly in decaying tissue. In an initial experiment pure cultures of the fungus were compared. Mycelium and a part of the medium were homogenized in a Waring blender and extracted with chloroform. After evaporation at 55°C the extract was spotted on silica gel sheets and chromatographed. As solvent a mixture of toluene and acetone (95:5 v/v) was used. Under light with a wave length of 366 nm various components were visible (Fig. 1). The most conspicuous component had an R_f value of 0.79. This value coincides with one of the major components of a commercial preparation of chrysophanol. The relevant spot turned red after spraying with 10% KOH in methanol, which was used as a dye by Shah et al. (1972) to demonstrate anthraquinone derivatives on thin layer chromatograms.

The R_f 0.79 component could also be demonstrated in rotted tissue from potato discs which had been inoculated with *P. exigua* var. *foveata*, but not in healthy tissue from non-inoculated discs or in rotted tissue from discs inoculated with *P. exigua* var. *exigua*. It was even possible to distinguish between rot caused by *P. exigua* var. *foveata* or by *P. exigua* var. *exigua* by pressing a freshly cut side of the rotting disc to a silica gel sheet and chromatographing as described above.

The specific component was not present in tissue decaying as a result of inoculation with *Fusarium solani* var. *coeruleum* (Sacc.) Booth, *F. sambucinum* f. *Fuckel*. b. Wollen-

Fig. 1. Chromatograms of extracts of tissue of potato tubers with rot caused by *P. exigua* var. *exigua* and by *P. exigua* var. *foveata* respectively, and of commercial preparations of emodin and of chrysophanol. The photograph was made using light with a wavelength of 366 nm.

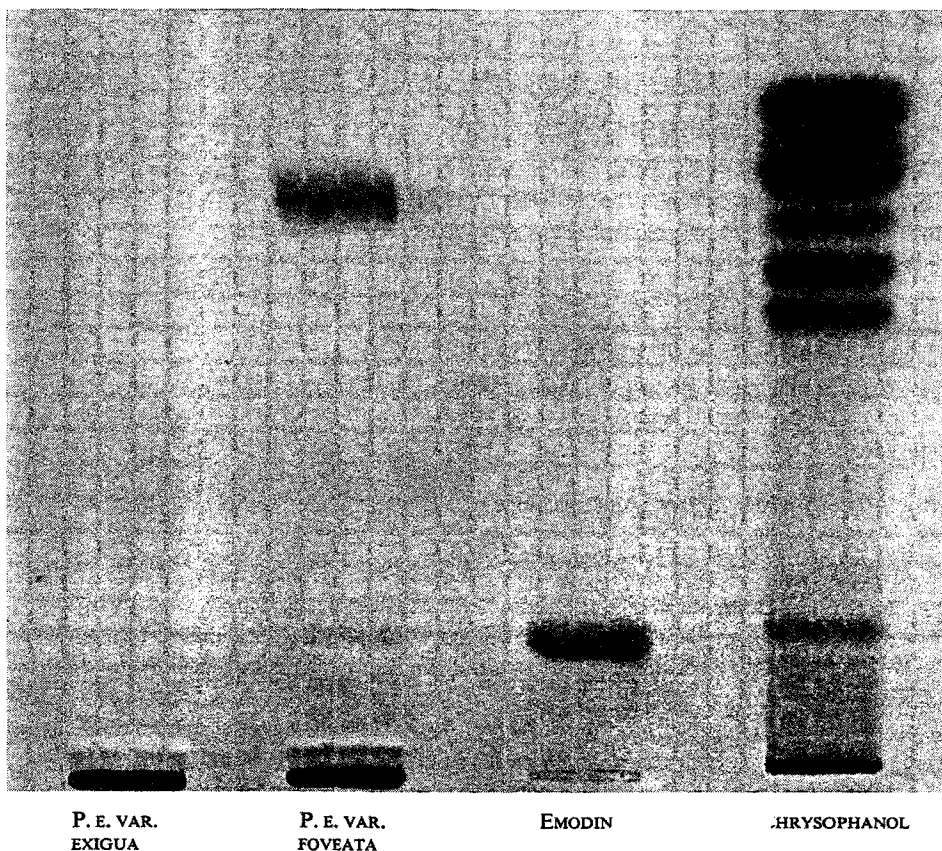


Fig. 1. Chromatogrammen van extracten van weefsel van aardappelknollen met rot veroorzaakt door *P. exigua* var. *exigua* en door *P. exigua* var. *foveata*, en van handelspreparaten van emodine en chrysophanol. De foto werd gemaakt met behulp van licht met een golflengte van 366 nm.

weber, *F. culmorum* (W.G.Sm.) Sacc. or *Phytophthora infestans* (Mont.) de Bary, respectively. In rot from potato discs which had been inoculated with *P. exigua* var. *foveata* together with one or more of the fungi mentioned above, the specific component could always be demonstrated, whereas the isolation of this fungus did not always succeed.

Up to now thirteen isolates of *P. exigua* var. *foveata* were investigated. With all of these it was possible to demonstrate the presence of the fungus by way of thin layer chromatography of extracts of rotted potato tissue.

Samenvatting

Een chemische methode ter identificatie van knolrot bij aardappel veroorzaakt door Phoma exigua var. foveata

Het is niet altijd mogelijk om rot veroorzaakt door *Phoma exigua* var. *foveata* op grond van symptomen met zekerheid te onderscheiden van rot veroorzaakt door andere schimmels. Het bleek mogelijk om *P. exigua* var. *foveata* door reactie op een specifiek anthrachinonderivaat snel en eenvoudig aan te tonen in zowel reïncultures op voedingsbodems als in rottend weefsel van aardappelknollen. Het materiaal werd daartoe met chloroform geëxtraheerd en het extract met behulp van dunne laagchromatografie geanalyseerd.

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Publications received

The publications marked with an asterisk will be reviewed in due time.

- * Annual Review of Phytopathology, vol. 12. 502 pp., Annual Reviews, Inc., Palo Alto, California, USA 1974. Price \$ 12.00 (USA), \$ 12.50 (foreign).
- * Bohlen, L.: Crop pests in Tanzania and their control. 142 pp., Verlag Paul Parey, Berlin and Hamburg 1973. Price DM 64.
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