STUDIES ON PLANT EXUDATES AND THE MODE OF PENETRATION BY THANATEPHORUS CUCURBITAE

by

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TABLE OF CONTENTS

SUMMARY

ACKNOWLEDGEMENTS

I. INTRODUCTION

II. LITERATURE REVIEW

III. GENERAL METHODS

1. Isolates of T. cucumeris

2. Media

   (1) Water
   (2) Agar media
      (a) Glucose-yeast agar
      (b) Seedling agar

3. Growth of radish seedlings

   (1) In sand
   (2) In test-tubes

4. Collection of radish exudate in water

   (1) Exudate from whole seedlings
   (2) Hypocotyl and cotyledon exudate

5. Concentration and sterilization of exudate

6. Biological assays

   (1) "Celophane"-agar-plate bioassay
   (2) Epidermal-strip bioassay
      (a) Removal of epidermal strips from radish hypocotyls
      (b) Testing intact seedlings covered with epidermal strips
      (c) Testing exudate and other materials using epidermal strips
(3) Bioassays with artificial membranes
   (a) Preparation of "Cellophane" and
       collodion membranes
   (b) Testing intact seedlings covered
       with membranes
   (c) Testing pieces of plant tissue and
       exudate covered with membrane

IV. EXPERIMENTAL

Part A. The process of infection cushion
   formation by T. cucumeris

Part B. The relation between host exudate and
   the formation of infection cushions
   by T. cucumeris

1. Investigations with seedling exudate and
   synthetic materials
   (1) The "Cellophane"-agar-plate bioassay
       (a) Materials obtained by ion-
           exchange chromatography
           of seedling exudate
       (b) Materials obtained by paper
           chromatography of seedling
           exudate
       (c) Synthesized nicotine derivatives

(2) The epidermal-strip bioassay
   (a) Synthesized nicotine derivatives
   (b) Fractions from seedling exudate
   (c) Unfiltered exudate and exudate
       filtered through "Visking"
       membrane
   (d) Material from "Visking" membrane

2. Investigations with hypocotyl and cotyledon
   exudate, using epidermal strips
   (1) Tests with epidermal strips placed
       on untreated and treated hypocotyls
   (2) Bioassay of exudate with epidermal
       strips
3. Investigations with hypocotyl and cotyledon tissue, using artificial membranes
   (1) "Celophane" membranes
      (a) "Celophane" covering hypocotyl of whole seedlings
      (b) "Celophane" covering pieces of hypocotyl and cotyledon tissue
   (2) Collodion membranes
      (a) Collodion covering hypocotyl of whole seedlings
         (i) Parent isolates
         (ii) Single-basidiospore isolates
      (b) Collodion covering pieces of hypocotyl tissue
      (c) Collodion covering pieces of cotyledon tissue
      (d) Comparison of reactions of single-basidiospore isolates on collodion covering hypocotyl and cotyledon tissue

4. Investigations with hypocotyl and cotyledon exudate, using collodion membranes
   (1) Exudate collected in water
   (2) Exudate collected in agar
      (a) The development of a method for collecting exudate in agar blocks
      (b) Effect of agar concentration on exudate collection
      (c) The problem of variation between individual agar blocks
      (d) The length of the collection period
      (e) The relation between exudate concentration and infection cushion formation
5. Investigations of properties of the biologically active material in radish exudate
   (1) Stability during storage 148
   (2) Heat stability 149
   (3) Extraction of active material from agar 150
   (4) Effect of pH of exudate on biological activity 152
   (5) Adsorption by ion-exchange resins and activated charcoal 158

V. DISCUSSION 161

VI. BIBLIOGRAPHY 164

VII. appendix 202

Publication: The mechanism of host penetration by Phanerochaete sordida
by N.T. Plentje, R.L. Dohman, and A. Kerr.
SUMMARY

Crucifer-attacking isolates of T. cucumeris form dome-shaped infection cushions on radish hypocotyls by the proliferation and aggregation of hyphal branches which are short, swollen and often curled. The various stages of development of infection cushions are similar to those described in the literature by other workers.

Evidence is presented that exudate from radish seedlings induces the development of infection cushions by crucifer-attacking isolates of T. cucumeris. It is also shown that the material which stimulates infection cushion formation is a natural constituent of the host plant and is not produced by an interaction between host and pathogen.

Infection cushions form on radish epidermal strips placed on the hypocotyl of whole seedlings; they also form on artificial membranes placed on hypocotyls of whole seedlings and on pieces of hypocotyl and cotyledon tissue. Exudate from whole seedlings filtered through "Visking" membrane stimulates the formation of infection cushions on radish epidermal strips and on "Cellophane" induces the development of structures which show some of the characteristics of cushions. Unfiltered exudate does not induce these reactions. Although material extracted from "Visking" membrane by water causes curling and clumping on "Cellophane", it fails to induce typical cushion formation on epidermal strips. Fractions obtained from exudate by
ion-exchange and paper chromatography and also some derivatives of nicotinic acid cause either a stimulation of fungal growth or some hyphal curling and clumping, but not typical infection cushions.

Not all batches of exudate from whole seedlings induce infection cushion formation on epidermal strips or curling and clumping on "Cellophane". Similarly, very few batches of exudate, collected by immersing hypocotyl and cotyledons in water, stimulate infection cushion formation on collodion. Consistent recovery of active material only occurs when exudate is collected in agar.

A quantitative relationship between exudate concentration and number of infection cushions formed is demonstrated. The pH of exudate influences infection cushion formation. The active material in exudate is stable for long periods at 2°C and -15°C and is not destroyed by heating at 100°C for 30 min. Although active material may be extracted from agar containing exudate by centrifugation, some of the material is apparently adsorbed by the agar, suggesting that the active factor is positively charged. Tests with ion-exchange resins also support this suggestion.

These results are discussed in relation to the literature concerning the influence of plant exudates on fungal growth up to and including penetration and also in relation to susceptibility and resistance.