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Effect of Cyhexatin (Plictran) on Growth, Conidial Germination And Sporulation of *Cercospora arachidicola*[1]

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ABSTRACT

Growth of *Cercospora arachidicola* Hori, the causal agent of early leaf spot disease on peanuts, was completely inhibited on Czapek-Dox broth medium amended with the acaricide cyhexatin (Plictran) at ≥ 73.5 μg/ml; however, at 14.7 μg/ml traces of growth occurred after 6 weeks of incubation at 27±2C and continuous fluorescent light (800 lux). Aqueous preparations of cyhexation at ≥ 147.0 μg/ml completely inhibited the germination of conidia of *C. arachidicola*. At a concentration of cyhexatin ≥ 73.5 and 14.7 μg/ml, less than two percent of the conidia germinated as compared wtih more than 95 percent germination in distilled water. Misting of aqueous preparations of cyhexatin at ≥ 147.0 μg/ml on the adaxial or both surfaces of peanut leaflets with mature leafspot lesions was very effective in reducing the sporulating potential of *C. arachidicola*.

Key Words: *Arachis hypogaea*, anti-sporulants, chemical control, tricyclohexyl hydroxystannane, tricyclohexyltin hydroxide.

Cercospora arachidicola Hori causes early leafspot on peanut (*Arachis hypogaea* L.). Cultures of *C. arachidicola* are routinely maintained for production of conidia on a peanut oatmeal agar (POA) medium (7) containing 100 μg/ml streptomycin sulfate. Occasionally, cultures of *C. arachidicola* became contaminated with the two-spotted spidermite, *Tetranycus urticae* Koch. Cyhexatin (tricyclohexyl hydroxystannane), an acaricide, was incorporated in the POA medium at 1.470 and 0.735 g per liter to control mite contamination in the cultures of *C. arachidicola*. At both cyhexatin concentrations in the POA medium, the growth of *C. arachidicola* was completely inhibited. Triphenyltin hydroxide (Fentin hydroxide), a compound chemically related to cyhexatin, has been reported to inhibit the sporulation of *C. arachidicola* on peanut leaves (4). It is one of the recommended fungicides for control of leafspot diseases on peanuts (8, 9). Cyhexatin (Plictran) is a registered miticide on several crops (2).

This study was conducted to provide basic information on: 1) the effect of cyhexatin on the growth of *C. arachidicola* in culture, 2) the effect of cyhexatin on the germination of conidia of *C. arachidicola*, and 3) the effect of cyhexatin on the sporulation potential of *C. arachidicola* on peanut leaves. A part of this research has been reported (5).

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This is a report on the current status of research concerning use of a chemical that requires registration under the Federal Insecticide, Fungicide, and Rodenticide Act, as amended by the Federal Environmental Pesticide Control Act. Cyhexatin is not presently registered on peanuts with the Environmental Protection Agency. No recommendations for use of this chemical are implied in this report.

Materials and Methods

All experiments described in this paper were performed at 27 ± 2C in the presence of continuous fluorescent light (800 lux), unless otherwise noted. Cultures of *C. arachidicola* used in these tests were maintained on POA medium (7), containing 100 μg/ml streptomycin sulfate.

Czapek-Dox broth (Difco) was used as the basal medium in studying the effect of cyhexatin on the growth of *C. arachidicola*. Fifty ml quantities of medium was autoclaved (121 C for 20 min.), in glass prescription bottles (250 ml capacity) with screw caps. After cooling to room temperature, the medium was amended with cyhexatin at 0.0, 14.7, 73.5, 147.00, 735.0 and 1470.0 μg/ml. Medium in each bottle was inoculated with two 5 mm discs of POA medium on which *C. arachidicola* had been grown for 2 weeks. The bottles were placed horizontally on a shelf and incubated for six weeks under the stated conditions. Mycelia and spores of *C. arachidicola* in liquid medium were harvested by filtration on fiberglass pads, then dried (93 C) in a microwave oven for 7 minutes.

Germination of conidia of *C. arachidicola* was tested in various concentrations of cyhexatin using the depression slide technique (6). Conidia of *C. arachidicola* were produced by incubating leaflets of cv. Tamnut 74 peanuts, with mature lesions, in continuous light at 100% relative humidity for 2-3 days. Conidia were washed from the surface of leaflets with minimal volumes of distilled water. Concentration of conidia in the suspension was determined with a hemacytometer and then adjusted to 200,000 conidia/ml.

Sporulating potential was used as the criterion for evaluating the effectiveness of cyhexatin sprays on *C. arachidicola* on peanut leaves. Sporulating potential of *C. arachidicola* was defined as the number of conidia produced per cm^2 of necrotic area under continuous light. Leaflets of cv. Tamnut 74 that had obvious necrotic lesions were collected from greenhouse - or - field grown plants and misted with an aqueous preparation (12 ml covered one surface of 100 leaflets) of cyhexatin on the adaxial, on the abaxial and on both surfaces using a DeVilbiss No. 15 atomizer (The DeVilbiss Company, Somerset, PA 15501). Leaflets were then incubated in continuous light at 27 ±2C for 3 days. Conidia were washed from the surface of the leaflets with distilled water containing Amway (Amway Corporation, Ada, Michigan 49301) surfactant (1 ml/1). Conidia in the suspension were counted using a hemacytometer. Necrotic lesions on the leaflets were excised and surface area determined with a Lambda area meter.

Reduction (%) in the sporulating potential of *C. arachidicola* was determined by the following formula: Reduction (%) in sporulating potential =

$$\frac{\text{1-Sporulating potential in treatment X 100}}{\text{Sporulating potential in control}}$$

Results and Discussion

Growth of *C. arachidicola* on Czapek-Dox broth was relatively slow; an average of 30.5 mg (dry wt.) of mycelia and spores per bottle of culture was recovered after 6 weeks of incubation in nonamended broth. This was not surprising since it has been reported that *C. arachidicola* grows slowly and sporulated poorly in culture (1, 3, 10). Growth of *C. arachidicola* was completely inhibited on Czapek-Dox broth amended with cyhexatin at 1470.0,

735.0, 147.0, and 73.5 μg/ml; however, traces of growth occurred at 14.7 μg/ml. On a peanut-oatmeal broth (7), a nondefined nutrient-rich medium amended with cyhexatin at 147.0 μg/ml, a trace of growth of *C. arachidicola* had occurred. Presence of cyhexatin at concentrations equal or greater than 147.0 μg/ml completely inhibited the germination of conidia of *C. arachidicola* at the stated conditions. At cyhexatin concentrations of 73.5 and 14.7 μg/ml less than two percent of the conidia germinated as compared with more than 95% germination in distilled water. This indicates that cyhexatin would have a value as a protectant chemical on peanut against infection with *C. arachidicola.*

Aqueous preparations of cyhexatin at 147.0, 735.0 and 1470.0 μg/ml, applied on the adaxial or both surfaces of peanut leaflets were most effective in reducing the sporulating potential of *C. arachidicola* (Fig. 1). However, cyhexatin applied at the same concentrations on the abaxial surface only of peanut leaflets was less effective in reducing the sporulating potential of *C. arachidicola* (Fig. 1). The highest concentration (1,470 μg/ml) of cyhexatin used in these tests represents an active ingredient of 0.57 kg/ha applied in 151 liters of water. This is less than one-half of the rate recommended on other crops (1). These data showed that cyhexatin could effectively minimize the production of spores (inoculum) of *C. arachidicola* that under favorable conditions contributes to infection and spread of early leaf spot in peanuts.

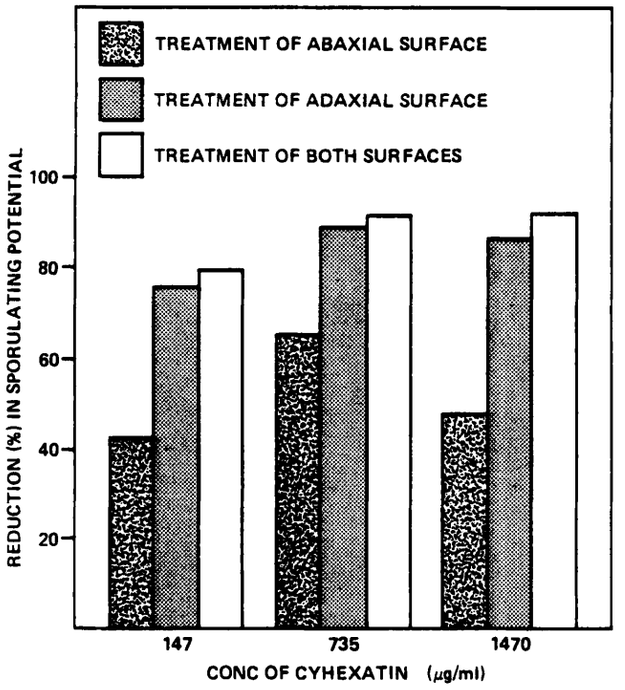

Fig. 1. Reduction (%) in the sporulating potential of *Cercospora arachidicola* on peanut leaves treated with aqueous preparations of Cyhexatin.

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