Abstracts of the 1969 Annual Meeting of the Northcentral Division of The American Phytopathological Society

Inhibition of stomatal opening in bean by Uromyces phaseoli. J. M. DUNIWAY & R. D. DURBIN (Univ. Wis., USDA, Madison). When leaf discs were floated under conditions favoring stomatal opening (1,200 ft-c of light for 90 min at 28 C) and a rust infection of 75 colonies/cm^2 was in the fleck stage, the average stomatal aperture was reduced from 5 μ to 1 μ. Stomatal apertures were first reduced on primary leaves when fleck symptoms developed, 4 days after inoculation. Although the data here were taken when reductions were greatest, 5 days after inoculation, an effect of lesser magnitude persisted throughout the remainder of the disease cycle. As infection densities were increased up to 75 colonies/cm^2, there was a linear decrease in average stomatal aperture; at higher infection densities, additional decreases did not occur. A measurable reduction in stomatal aperture occurred up to 0.5 mm from the margin of isolated fungal colonies. Varying the light intensity between 600 and 2,400 ft-c, or using CO_2-free air did not significantly alter the disease effects on stomatal aperture. With an infection density of 100 colonies/cm^2, the average stomatal aperture of attached primary leaves decreased from 1.4 μ to 0.6 μ, and transpiration declined 35%.

The time sequence for phytoalexin production in Harosoy and Harosoy 63 soybeans. J. A. FRANK & J. D. PAXTON (Univ. Ill., Urbana). Examination of soybean hypocotyls inoculated with *Phytophthora megasperma* var. *sojae* indicated that both Harosoy (susceptible) and Harosoy 63 (resistant) soybean plants produced a phytoalexin in response to infection. Within 4 hr after inoculation, phytoalexin production and fungal development is similar in both varieties. Differences in the host-parasite interactions of the two varieties occur between 4 and 8 hr after inoculation. Phytoalexin is no longer detectable in Harosoy after 8 hr and the disease develops, resulting in the collapse of the hypocotyls within 48 hr after inoculation. Phytoalexin production continues in the resistant variety, and after 24 hr the plant cells surrounding the fungus become discolored and fungal invasion is halted. After 72 hr, the pathogen is killed, phytoalexin production ceases, and the existing phytoalexin begins to decompose. Therefore, since plant reactions to the pathogen are identical in the first 4 hr after invasion, the reactions responsible for resistance or susceptibility appear to occur between 4-8 hr, when phytoalexin production either increases or declines.

Electron microscope observations of Ceratocystis ulmi-infected elm. W. L. MACDONALD (Iowa State Univ., Ames). Three field-grown elm selections differentially susceptible to *Ceratocystis ulmi* were compared at the ultrastructural level to establish the host-pathogen relationships which existed during the first 2 weeks after inoculation. The initial reaction of the three elms to *C. ulmi* appeared to be similar and synchronous. Development of tyloses occurred in all selections, but was limited to the current year's growth. Formation of tyloses involved the elongation of the protective layer and pit membrane. Cell-wall alteration was not observed; however, large accumulations of tannin were noted in the cell vacuoles of ray and vasicentric parenchyma and within developing tyloses. Numerous spores small enough to pass through vessel pits were present in vessel elements. Hyphal penetration through the pit membrane and into parenchyma bordering vessel elements was seen 6 days after inoculation. Variations in internal symptom expression among the three elms appeared not to be related to differences in initial host responses.

Comparison of amino acid exudates from leaves of two bean varieties. L. NEWBY & B. G. TWEEDY (Univ. Mo., Columbia). Pinto and Top Crop varieties of *Phaseolus vulgaris,* susceptible and resistant, respectively, to *Uromyces phaseoli,* were grown under identical conditions in a growth chamber, and leaf exudates were collected. The exudates were separated into cationic, anionic, and neutral fractions by ion-exchange chromatography. The ninhydrin-positive materials were analyzed by the automated method of Moore & Stein. The quantity of amino acids exuded by the Pinto variety was 0.32 μg/cm^2, and for Top Crop was 0.15 μg/cm^2 of leaf surface. The greater quantity from Pinto was reflected in the 20 essential amino acids, except for threonine, which was about equal in the two varieties. Gas-liquid chromatography and the automated amino-acid analysis revealed 13 unidentified amino acidlike compounds. Treatment of the susceptible variety with 2,3-dihydro-5-carboxyanilido-6-methyl-1,4-oxathiin-4,4-dioxide (Plantvax) caused a tenfold increase in the amount of arginine exuded, while little effect was observed in the quantities of the other amino acids. However, total quantity of amino acids was slightly reduced with treatment. When the susceptible variety was treated with ^{14}C-labeled Plantvax, a compound cochromatographing with aniline was found in the exudate.

The expression of gene-for-gene interactions during primary infection of wheat by Erysiphe graminis f. sp. tritici. R. S. SLESINSKI & A. H. ELLINGBOE. (Mich. State Univ., East Lansing). Primary infection by *Erysiphe graminis* f. sp. *tritici* was studied with 13 near-isogenic wheat lines containing single *Pm* genes conditioning reaction to mildew development. Production of elongating secondary hyphae (ESH) was used as the criterion of a functional relationship between the host and parasite, and to determine the relative times of gene interactions. Chancellor, which contains no known *Pm* genes for incompatibility, was used as a standard suscept to which mildew development on the 13 isogenic lines was compared. With the *P1/Pm1* and *P4/Pm4* parasite/host genotypes, incompatibility was expressed at or near the time of penetration. The lowest percentages of ESH were produced with these combinations. The *P3/Pm3* genotypes (except *P3c/Pm3c*) inhibited only 60-70% of the parasite units from forming ESH. The remaining 30-40% of the parasite population developed as in compatible combinations. The *P2/Pm2* genotype did not alter the kinetics of ESH formation. Incompatibility in this combination was expressed as a chlorosis and necrosis of host cells 3-4 days after inoculation. Development of ESH with the four possible parasite/host genotypes involving the *Pm1* locus (*P1/Pm1, P1/pm1, p1/Pm1,* and *p1/pm1*) was altered only in the incompatible (*P1/Pm1*) combination.

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