

and were highly toxic to alfalfa when not subjected to incubation of residues; if autoclaved, these extracts were only slightly toxic. Moisture is a factor, e.g., at 40 and 60% of water holding capacity (mhc) (oven-dry-weight basis) is present and decomposing quackgrass residue is not toxic, but at 80% mhc decomposition was toxic, and extracts were toxic. Toxicity at high soil moisture increased with the amount of residues added to seedlings growing axenically and anaerobically. Amended quackgrass extracts were not chlorotic, but the cortex was discolored and secondary roots were marbled, with little tertiary branching; however, no stamnation occurred, chlorosis and stunting

Effects of a soil bacterium on conidia and hyphae of *Helminthosporium sativum*. KENNETH M. OLD. (Univ. St. Paul.) Conidia and hyphal fragments of *H. sativum* suspended in a culture filtrate of an antagonistic bacterium failed to grow. When plated out on diseased agar, however, the conidia germinated readily, but hyphae were still inhibited. This effect could be to some extent by washing the hyphae in distilled water 15 min before plating out. A suspension of conidia and hyphae was placed on the surface of sterilized agar amended with the bacterium. Conidia and hyphae then incubated for 5 hr and recovered using cellophane tape. The tape was examined for germination of conidia and growth of hyphae. Both were inhibited, but in the case of the conidia were more markedly affected. Inoculated was placed into glass vials, in contact with a cellophane membrane. Spores and hyphae, placed to the reverse side of the membrane, showed no inhibition. This suggested that actual contact between infested soil and the fungus was needed for inhibition, bacterial metabolites being adsorbed on soil surfaces. When a culture filtrate of the bacterium was added to the vials, the addition of activated animal charcoal to the filtrate greatly reduced its inhibition of conidia and hyphae.

Composition of soluble ribonucleic acid from *Pseudomonas infestans*. O. T. PAGE AND M. C. CLARK. (N.C. Dept. Agr. Research Sta., Fredericton, N.B.) Previous studies of host-parasite interaction, the potato late blight fungus, *P. infestans*, released soluble ribonucleic acid (sRNA) which contained hypoxanthine, in addition to the normal bases, guanine, adenine, cytosine, and uracil. To determine the ratio of hypoxanthine to the other bases, and thereby the possible base-pair relationships and base substitution, extrahyphal sRNA was obtained by breaking mycelium of *P. infestans* in a cellulose membrane and collecting the aqueous RNA diffusate. The sRNA was hydrolyzed with perchloric acid, the neutralized hydrolysate was chromatographed, and the moles % of each base eluted in 2-dimension chromatograms was calculated by ultraviolet extinction coefficients. In view of at least a partial helical configuration in extrahyphal sRNA molecules, as shown by hyperchromic effect, the observed deviation from complementary base pairing suggests that hypoxanthine is a component of the nonhelical portion of the extrahyphal sRNA which diffuses from the late blight fungus. Differences in composition of sRNA from several isolates of *P. infestans* were found.

Effects of oat straw and supplemental nitrogen on rhizobial antagonism in bean rhizosphere. G. C. PAPAVIZAS. (S.D.A., ARS, CRD, Beltsville, Md.) Numbers of bean rhizosphere microorganisms antagonistic to *Fusarium solani* f. *phaseoli*, *Rhizoctonia solani*, *Thielaviopsis basicola*, and *Aspergillus albo-atrum* were increased by adding to soils with mature oat straw (C/N ratio of 83) or oat straw amended with NH_4NO_3 to produce N/C ratios of 30 or 40. Numbers of rhizosphere antagonists were substantially

decreased by high-N applications (200 ppm N) alone or with oat straw (to produce a C/N ratio of 10). Antagonists were suppressed by both nitrate N and ammonium N, but with few exceptions, the suppression was more pronounced by the former than by the latter N ion. Suppression by N was greater at soil pH 4.7 than at 6.1 or 7.1. Soil reaction could not account for suppression of rhizosphere antagonists. The majority of antagonists from rhizosphere of beans grown in strongly acid soils were true bacteria, whereas the majority of those from beans grown in slightly acid and neutral soils were *Streptomyces* spp. Most lysis of mycelium of the 4 fungi was caused by soil amended with oat straw (with or without N) and the least by autoclaved soil or by soil with NH_4NO_3 only.

Some characteristics of dwarf mistletoe populations on red fir. J. R. PARMETER, JR. AND R. F. SCHARPF. (Univ. Calif., Berkeley; and Pacific Southwest For. and Range Expt. Sta.) Critical appraisal of dwarf mistletoe damage and of rate of spread and intensification may depend on knowledge of mistletoe population characteristics. Studies of dwarf mistletoe (*Arceuthobium campylopodum*) on red fir (*Abies magnifica*) were made by cutting and examining 14 trees 24-86 years old (avg 58). Bole infections, tallied separately, were found on all but 1 tree and averaged 2.2/tree. Of the 1,299 branch infections examined, 23% were dead. Of the remaining live infections, 51% bore shoots, 18% bore fruit, and only 5% bore large fruiting clumps. These observations indicate that only a small percentage of infections contribute significantly to spread and intensification at any one time. Differences in fruiting and in mortality among infections on trees from different areas were noted, suggesting that different populations may vary in these respects.

Free amino acid and amide content of tobacco and oats infected by wildfire and halo blight bacteria. P. N. PATEL AND J. C. WALKER. (Univ. Wis., Madison.) Free amino acids and amides in the chlorotic halo and green tissue encircling the halo in tobacco leaves inoculated with *Pseudomonas tabaci* (Wolf & Foster) Stevens were compared using a Beckman amino acid analyzer. Eight days after inoculation, chlorotic tissue was lower in aspartic acid, γ -aminobutyric acid, alanine, and glutamic acid; had similar amounts of ornithine and β -alanine; but was higher in 28 other amino compounds than green tissue. An unidentified amino compound eluting at the same position as methionine sulfoxides was present only in chlorotic tissue. Free methionine concentration in green and chlorotic tissue was 0.233 and 0.683 $\mu\text{moles/g}$ of dry tissue, respectively. Chlorotic tissue from oat leaves, 10 days after inoculation with *P. coronafaciens* (Elliott) Stevens, was higher in phenylalanine, ethanolamine, ammonia, and glutamic acid; had similar amounts of leucine, tyrosine, proline, β -alanine, lysine, histidine, ornithine, and arginine; but was lower in aspartic acid, threonine, serine, asparagine-glutamine, glycine, alanine, and γ -aminobutyric acid than tissue from uninoculated plants.

A soil-borne virus disease of pepper in California. A. O. PAULUS, I. J. THOMASON, AND L. G. WEATHERS. (Univ. Calif., Riverside.) A soil-borne virus of pepper (*Capsicum annuum*), causing stunting, severe stem necrosis, irregular yellow-green mottle with ringspots on the leaves, and enations and sunken necrotic spots on the fruit, has been found occurring naturally in San Luis Obispo County, Calif. Chlorotic local lesions occurred on the cotyledons of inoculated cucumber (var. National Pickling) and pinpoint necrotic local lesions occurred on leaves of Pinto bean. Young pepper plants may be killed. The virus was recovered from *Urtica urens* and *Solanum nigrum* growing in naturally infested soil. Field soil was brought into the greenhouse, mixed, and half of the soil was steamed. Peppers planted in the nonsteamed (but not the steamed) soil showed the first virus symptoms after 21 days and