

medium of soybean hay to the surface soil, were innocuous when the soil was covered by a plastic foil to reduce aeration. In greenhouse trials, soybean hay has been the most effective medium, with cotton and corn following in order. From the standpoint of disease control, methods of land preparation and weed control designed to keep organic material out of the upper level of soil are of much greater importance than the selection of crops in the rotation. In a limited number of field trials with cultural practices designed to apply this phenomenon, yields have been 3-4 times the average farm production.

Host relationship, morphology, and sporulation of Scolecotrichum graminis. BRAVERMAN, S. W. Timothy, tall oatgrass, and orchardgrass seedlings were inoculated with conidia collected from orchardgrass and timothy. Conidia from orchardgrass were pathogenic only to orchardgrass, and conidia from timothy infected only timothy. These data suggest the occurrence of physiological forms of *S. graminis* on orchardgrass and timothy. On the other hand, conidial measurements of isolates from the 3 hosts suggest no varietal distinction of the fungus. Isolates showed little variation in texture, color, and amount of mycelial growth. The optimum temperature for mycelial growth of the 3 forms was between 25° and 28° C. A method of inducing sporulation in culture by ultraviolet irradiation was developed. Conidia produced in the advancing mycelial zone 12 days after irradiation were morphologically similar to those found in nature.

Observations on secondary spread of Physoderma maydis on corn. BROYLES, JAMES W. Indications are that secondary spread of *Physoderma maydis* takes place by a spore form other than resting sporangia or zoospores liberated by them. Heretofore it was not thought to spread except by resting sporangia, although ephemeral sporangia have been reported. Liberation of resting sporangia begins 6 weeks after silking when plants are no longer susceptible; local secondary spread by this means seldom occurs. In sparsely infested fields, individual plants often are heavily infected (10,000-12,000 lesions), indicating spread on the plant. In a lightly infested field of 10,000 2-plant hills, each plant was classified as healthy or diseased and as in position 1 or position 2 in the hill. For each position, the ratio of diseased to healthy plants was calculated. These 2 numbers were multiplied together to obtain the probability of both plants being diseased. The difference between this figure and the actual proportion of such hills was used to calculate the percentage of diseased plants infected by spread within hills (10.3 per cent). Diseased plants also were counted in rows each of which was bordered by inoculated rows having different levels of infestation. Little infection occurred on plants adjoining disease-free rows, 70 per cent were infected adjoining moderately infested rows, and 100 per cent adjoining heavily infested rows. Noninoculated suckers in inoculated rows usually were infected.

Observations on time and location of penetration in relation to amount of damage and chemical control of Physoderma maydis. BROYLES, JAMES W. *Physoderma maydis* infects corn at any stage from seedling to silking. Location of lesions and amount of damage depend on the time of infection. Damage was greatest in plants inoculated when 35 to 45 days old. Single inoculations at 39 days resulted in 100 per cent lodging; at 32 and 53 days there was 50-80 per cent infection but little lodging. Infections at 25 days or earlier caused more leaf lesions but fewer infected plants and less damage. Most infection apparently takes place in meristematic tissue in the leaf whorl, which makes complete chemical control possible, although no effective control has been reported previously. In noninoculated plots containing many natural infections and in plots in which plants were inoculated 6-12 times, spraying in the leaf whorl twice a week for 4 weeks before silking gave almost complete control. Fewer applications also greatly reduced infection and lodging. Crag 341 (34 per cent glyodin),

Phygon-XL (50 per cent dichlone), and Tenn. Corp. Copper-Zinc (basic copper sulfate, zinc sulfate; 26 per cent Cu, 8 per cent Zn) were toxic to corn, whereas Orthocide 406 (50 per cent captan) and Fermate (76 per cent ferbam) were nontoxic. All gave good control, however. These controls are being used along with new inoculation techniques in basic studies on the disease to determine losses and to test for resistance. They may eventually be used to control brown spot in seed and field corn.

Resistance to anthracnose in cucumber. BUSCH, L. V., AND J. C. WALKER. Of some 130 foreign introductions of cucumber tested for resistance to *Colletotrichum lagenarium*, 8 were worthy of further consideration. Results obtained from F₂ and backcross progenies, when Accessions 163213, 163217, and 175111 were used as male parents and variety SMR12 as the female parent, suggested that resistance was of 2 distinct types, multiple and single factor. A histopathological investigation revealed that appressorial formation started approximately 10 hours after inoculation, followed by direct penetration some 58 hours later. Colonization was intracellular, and the mycelium had a definite affinity for the small veins in the leaf. The early stages of infection were identical in both the resistant and susceptible hosts. As infection progressed in the susceptible host, the mycelium spread rapidly throughout the leaf, followed by protoplasmic disintegration and tissue collapse. In the resistant host there was little cell collapse, and protoplasmic disintegration was never more than 1 or 2 cells in advance of the hyphae. An apparent thickening of the cell wall in definite areas and the deposition of globules of red staining gum-like material frequently accompanied the resistant reaction.

Seed perpetuation of lignocortosis (wood pocket) of semidense Lisbon lemon. CALAVAN, E. C. All known symptoms of lignocortosis, except fruit striping, appeared in seedlings from diseased semidense Lisbon lemons. Variegation developed early in 0 to 22.5 per cent of the seedlings from 36 diseased sources. Slightly diseased parents gave 3 per cent and severely diseased ones 17 per cent variegated seedlings. Dark splotches occurred on shoots of some seedlings within 3 years. Cankers associated with V-shaped necrotic sectors in the branches and stems of seedlings 4-6 years old caused dieback and killed seedlings. No lignocortosis symptoms developed in 9331 citrus seedlings, including lemons other than semidense Lisbon, from 3 parent groups: those topworked on diseased interstocks for 4 years, those that carried buds from diseased trees for 7 years, and those grown as controls. Lignocortosis symptoms occurred in the roots of diseased semidense Lisbon seedlings but not in other rootstocks or interstocks under diseased lemon or seedless lime tops. The erratic occurrence of leaf, root, and shoot patterns and of necrotic streaks and sectors in the bark, wood, and fruit peel of diseased trees, together with the failure of diseased tissue grafts to produce symptoms in healthy trees or in seedlings therefrom, suggests the probable unstable chimeral nature of lignocortosis.

Wetting and penetrating agents combined with fungicides as protectants and eradicants for wheat stem rust. CAMPOS, ALFREDO, AND N. E. BORLAUG. Sulphur dust (10 micron) was suspended in solutions of chemicals used in the textile industry as wetting and penetrating agents and carriers of dyes. Wheat seedlings were sprayed before and after inoculation with urediospores of *Puccinia graminis* var. *tritici*. Sprays applied 24 hours prior to inoculation were washed off the foliage with tap water (5 lb. pressure spray) immediately before inoculation. Twenty days later, only 3 to 5 uredia had developed on 40 plants treated with wettable sulphur suspended in solutions of wetting and penetrating agents of the sulfonated or sulfated types such as Mono-sulph, Penequick, or Soromine; 500 uredia had developed on 40 nontreated plants. Protection apparently was due to penetration and retention of the chemicals in the fine interstices of the leaf surface. Sprays applied to seedlings 3 days after inoculation did not reduce infection.

Since acid solutions are better penetrants than neutral or basic solutions, certain acids were used in combination with Victawet 12 as wheat foliage sprays 6 days after inoculation. Sulfamic acid inhibited further sporulation for 10 days, but within 30 days the mycelium was again sporulating normally. Sulfanilic acid strongly inhibited further rust development and uredia were observed only occasionally after 30 days.

Effect of a by-product of Cephalosporium gregatum on water flow in soybean stems. CHAMBERLAIN, DONALD W. Experiments were made to determine whether the reduction in water flow in the vessels of soybean stems infected with *Cephalosporium gregatum* can be attributed to a by-product of the fungus. The brown pith and some of the vascular elements were scraped from the stems of infected plants. Twenty-five g of the scrapings were blended in 250 ml distilled water in a Waring blender, and the resulting mixture was centrifuged. The tests were made on 7-cm sections of healthy soybean stems. The normal rate of water flow was determined by measuring the amount of distilled water forced through a stem section in 4 minutes under pressure (15 lb./sq. in.). The extract was then forced through the stem section in like manner, after which the rate of flow was again determined with distilled water. Water conduction was reduced 65-80 per cent after the extract had passed through the vessels. The principle involved in reducing water flow in the vessels was not removed by passage through a Seitz filter, nor was it inactivated by autoclaving for 20 minutes at 15 lb. pressure. Diluting the extract 1-10 had no appreciable effect. Extracts made from agar cultures of the fungus had an effect similar to that of extract from diseased stems. The extract caused internal browning, but not wilting, in seedling plants.

Incidence of tristeza virus in Florida in trees not yet showing field symptoms. COHEN, MORTIMER. A survey has been made throughout the citrus growing areas of Florida to determine the incidence of tristeza virus in trees on sour orange rootstock that appear healthy. At each of the 25 locations chosen, 8 trees were sampled near a tree known to be in decline with tristeza disease. Both histological and transmission tests were used to determine the presence of the virus. The highest proportion of infected symptomless trees was found in the Orange-Lake county area, which is considered to be the area of most rapid spread of this disease. This pattern of distribution of tristeza virus is confirmed by another study in which citrus trees on various rootstocks and located throughout Florida were indexed on key lime seedlings. Some trees on sour orange rootstock show neither field nor histological symptoms, although it has been more than a year since they were found to be infected with tristeza virus. This study will help provide precise information on the interval between initial infection of mature citrus trees and their eventual decline. Continued studies of this nature may prove of value in predicting future extensive outbreaks of tristeza.

Correlation of antimicrobial activity and chemical structure of certain aromatic ketones. COHEN, SYLVAN I., and MARTIN S. FRANT. During the course of a screening program, the biological activities of approximately 35 related aromatic ketones were determined by 1) agar-plate assay against *Aspergillus niger*; 2) bactericidal concentration counts with *Aerobacter aerogenes*; and 3) spore-inhibition tests with *Sclerotinia fructicola* and *Stemphylium scarinaeforme*. Derivatives of acetophenone were prepared and tested for biological activity. Introduction of a hydroxyl group in the para position markedly increased activity. Further hydroxylation of the ring decreased activity, as did substitution of a *p*-amino group. Major enhancement resulted from the replacement of the methyl group by C=C to form alpha and beta unsaturated ketones. Adding cyclic structures (benzal, furfural) to the terminal CH₃ of these ketones reduced activity. Adding COOH to the terminal CH₃ group to form β -benzoylacrylates produced additional increases in activity. Further enhancement

resulted from the formation of lower alkyl esters. For the most effective structure, methyl benzoylacrylate, the decreasing order of effectiveness for para-substituents was Cl > none > CH₃ > Br > OH. The bactericidal order was slightly different, indicating specificity of these compounds.

The production and germination of conidia of Cladosporium effusum in the laboratory. CONVERSE, RICHARD H. Single spore cultures of *C. effusum* grew well but sporulated poorly or not at all on agar media made from potatoes, lima beans, corn, prunes, carrots, V-8 juice, or pecan-leaf pieces. No sporulation occurred on media composed of agar, ammonium nitrate, salts, and 1 of a number of carbon sources. The addition of B vitamins did not improve sporulation. Oatmeal and particularly Chinese chestnut agar allowed abundant conidial production. Of 45 isolates grown on oatmeal agar, only 8 sporulated abundantly, whereas 12 were sterile. The cardinal temperatures for spore germination were as follows: maximum, 40°; optimum, 25°; and minimum, <0°C. Germination was rapid in distilled water at 24°C, 34 per cent of maximum germination occurring in 4 hours and 77 per cent in 6 hours. Conidia held at 24°C in 100 per cent relative humidity (R.H.) had a germination level that was 14 per cent of that of distilled water controls after 4 hours and 69 per cent after 24 hours. The comparable figures were 4 per cent and 51 per cent at 99.8 per cent R.H. Germination was zero at and below 90.1 per cent R.H. Conidial germination in the absence of free water may explain the increase in scab lesions observed on pecans after rainless periods. Night temperatures and R.H. values measured before such increases were suitable for germination of conidia.

Further evidence of the value of eradicant fungicides for control of pecan scab. CONVERSE, RICHARD H. Phenyl mercury compounds, sodium pentachlorophenate (PCP), and monocalcium meta arsenite (MMA) were effective in 1 or both of the following small-scale trials: 1) a laboratory test of toxicity to pure cultures of *Cladosporium effusum* (Wint.) Demaree grown on agar, and 2) a field test in which scabbed overwintered pecan nut shucks were sprayed and suspended in containers above nonemerged pecan shoots. In the latter test, incidence of lesions on young foliage was used to assess eradicant action. Phenylmercuri-triethanol ammonium lactate (PML), PCP, and MMA were then used in field tests in 1955. Conidial production on overwintered lesions following 2 eradicant sprays in March of trees and of the ground beneath them was reduced by May to 0-3 per cent of the levels in the unsprayed controls. By August, unsprayed nuts averaged 88.7 lesions per shuck. Trees given 2 MMA sprays averaged 5.9 lesions per shuck, and trees given 4 ziram protectant sprays averaged 2.5. Nuts from trees sprayed with ziram and PML averaged 0.9 lesions; those with ziram and MMA, 0.6; those with ziram and PCP, 0.3; and those with ziram and MMA (where, in addition, the surrounding ground was sprayed with MMA), 0.01. No phytotoxicity was observed on the trees after use of any eradicant.

Chemical control of Sclerotium rolfsii in peanuts. COOPER, W. E. Peanut losses due to Southern stem rot (caused by *Sclerotium rolfsii* Sacc.) have been reduced by modified cultural practices, yet sporadic destructive outbreaks of the disease still occur. Thus, an effective fungicidal treatment applied when the epiphytotic first becomes evident would prevent these disastrous losses. To test this possibility, chemicals were applied as drenches at 900 gal./acre to previously inoculated peanuts. Three chemicals, pentachloronitrobenzene (PCNB), captan, and thiram, gave promising results at 6 and 12 lb./acre. At 12 lb./acre, they reduced the number of dead stems 53, 36, and 47 per cent, respectively, and increased the yield of pods 73, 21, and 14 per cent, respectively. In a more extensive test, the 3 materials at 12 lb./acre reduced the dead stems by 71, 55, and 51 per cent, respectively. The following 6 chemicals were ineffective: zincb at 10.4 and 20.8 lb./acre, dichlone