among those of minor importance. It is widespread in its occurrence every year and its effect is to induce premature maturity. Downy Mildew (Peronospora manshurica) showed its usual specificity this year by attacking highly susceptible varieties like Blackhawk and Harley but only lightly infecting Lincoln, Chippewa, and Monroe. Mosaic (Soja virus 1); Bud Blight (virus of tobacco ringspot group); Brown Spot Septoria glycines; Bacterial Blight (Pseudomonas glycinea); and Leaf Spot (Phyllosticta soyaecola) were of sporadic occurrence.

Corn-seed Maggot Injury, although of more or less common occurrence in the district in past years, was noted for the first time this year in the laboratory plots. The injury is mentioned here because of the possibility of mistaking it for a root rot. The maggots penetrate the lower hypocotyl and feed on the internal tissues of the young plants. While the maggots are in situ, the trouble can be accurately diagnosed; but after they leave the plant, diagnosis is more difficult. The injured hypocotyl tissues collapse and die, and the root soon dies also. This is the stage at which an incorrect diagnosis may easily be made for the symptoms resemble those of a root rot.

SUNFLOWER

Sunflower Diseases in Manitoba in 1958

W.E. Sackston and J.W. Martens

Sunflowers were sown on 45,000 acres in Manitoba in 1958. Drought, wind-erosion, and severe frosts in June caused growers to abandon 19,000 acres. Adverse conditions early in the season delayed maturity markedly, but favorable weather in the fall allowed even late fields to mature and produce good seed yields. Average yields on the 26,000 acres harvested were estimated to be 650 pounds or more per acre, for both the oilseed varieties (on 13,000 acres) and large-seeded varieties for confectionery use (13,000 acres).

Sixty-seven fields were examined in the main survey, made 8-11 September in both the central and outlying areas. Mr. John Hildebrand, Co-operative Vegetable Oils, Altona, assisted in locating fields in the central area and took part for two days of the survey, and Dr. E.D. Putt, Morden Experimental Farm, assisted for two days in the outlying areas.

Frost Damage. Sunflower seedlings damaged by frosts in late June were submitted by growers and others in late June and early July. Damage was severe and widespread. The lower leaves were not affected in most cases. Leaves higher along the stem showed scattered necrotic spots. Upper leaves were rugose, chlorotic, distorted, in some samples, and in others with the apical portion killed. The growing point was killed in many plants, which later in the season could be recognized by having from two or three up to five or more stems, arising from basal adventitious buds. The central pith near the growing point was necrotic or collapsed in many plants,

and some stem cracking was present. Most of the affected seedlings submitted were about 10 to 12 inches tall. In some fields scattered plants were affected, in others a significant proportion was frozen, but the plants were left to mature. Many fields were so severely affected that the sunflowers were turned under. Traces of frost damage were seen in 21 fields in the survey; 1 field was moderately affected, and in 2 fields all the plants showed frost injury.

Rust (Puccinia helianthi). Rust was present in 49 of the 67 fields. Traces were found in 27 fields, on the resistant variety Beacon, as well as on Advance and on Mennonite, the large seeded variety grown for confectionery use. From 1 to 10% of the surface of the middle leaves was rusted in 11 fields, from 11 to 25% in 7, from 26 to 50% in 2, and from 50 to 80% in 2 fields. Most of the fields with more than traces of rust were in the central area. The source of inoculum for one isolated field in an outlying area where sunflowers had not previously been grown might have been wild Helianthus annuus plants with rust on them, in an adjacent field.

Actual losses caused by rust were not significant in most fields. It is significant, however, that rust is again increasing the prevalence, and that in a few fields infection was extremely heavy. The situation is particularly serious because of the increasing popularity of the rust-susceptible, large-seeded Mennonite variety. Inoculum will be plentiful in 1959, and if weather conditions are favorable for rust development, an extremely serious outbreak might develop. The breeding program was directed entirely at producing rust resistant sunflowers for edible oil production. A start has now been made at incorporating rust resistance into large-seeded varieties grown for the confectionery trade.

Leaf Mottle (Verticillium albo-atrum). Leaf mottle was present in trace amounts in 27 fields. Up to 10% of the plants were affected in 14 fields, from 11 to 25% in 7, 26 to 50% in 3, and 51 to 75% in 3 fields. The disease was found only in the central area. It was destructive only in a few fields, and in plot areas selected because of heavy infestation of the soil by the pathogen.

Stalk Rot and Premature Ripening (Various causes). Conditions varying from light brown to black discoloration of the stems, in the latter case associated with an internal "black jelly rot", were found in 22 fields. Traces were seen in 12 fields, from 1 to 5% in 8 fields, and 6 to 10% in 2 fields. Microscopic examination of the cortical tissues and pith of some of the darkest stems showed a profusion of microsclerotia of V. albo-atrum, which was also isolated from light brown as well as dark brown stems. Although other causes induce both stalk discoloration and premature ripening, for years a close association has been observed between leaf mottle and later stalk and pith discolorations.

In a few fields, an unfamiliar type of stalk discoloration was observed. Elongate, pale brown stem lesions spread from 2 to 4 inches up and down from the base of dead petioles, and extended from 3/4 to 1 inch around the stem. The lesions appeared to be superficial. Plants of the inbred S37-388 were affected

in a crossing block; the lesions were scarce on Sunrise plants. Fungi isolated from lesioned tissues have not yet been tested for pathogenicity.

Wilt and Root Rot (Sclerotinia sclerotiorum). Traces of Sclerotinia wilt, root rot, and basal stem rot were found in 33 fields. From 1 to 5% of the plants were affected in 4 fields, 6 to 10% in 2 fields, and 25% in 1 field. The disease is not confined to the main sunflower areas.

Head Rot (Rhizopus sp.) Traces of Rhizopus head rot were found in the plots at the Melita Reclamation Station; up to 50% of the plants were affected in patches.

Aster Yellows (Callistephus virus 1) Traces of aster yellows infection were seen in 15 fields. Between 5 and 10% of the plants were affected in 1 field near Carberry. Incidence of aster yellows was so low and erratic that no results were obtained from plot experiments on the disease.

Downy Mildew (Plasmopara halstedii). Downy mildew was light in 1958. Traces of the disease were found in 10 fields. From 1 to 2% of the plants were affected in 4 fields. Affected plants were often in patches in low parts of the fields.

Head Drop (Cause unknown; possibly some due to snout beetle attack). Head drop was more conspicuous than in previous years. Traces of the condition were observed in 22 fields, 1% of the plants were affected in 3 fields, and between 5 and 10% of the plants were affected in 1 field. Field infections of this severity have not been observed previously in Manitoba, although as many as 12% of the plants of one selection were affected in Dr. Putt's breeding nurseries some years ago.

Miscellaneous. Symptoms very similar to those of leaf mottle were seen in 3 fields in the outlying areas, and were very conspicuous in plots at Melita. No vascular discoloration was associated with the condition, and no pathogen was isolated from affected tissues. It was presumably caused by drought. Terminal Distortion and Head Sterility affected a few plants in 1 field. It appeared to be an extreme symptom of frost injury. Powdery Mildew (Erysiphe cichoracearum) was present in trace amounts in 1 field.

Other Observations

ROOT ROT (Rhizoctonia solani) in s. Alta. was rated 2-tr. 1-sl./10 fields examined (J.S. Horricks).

LEAF MOTTLE (Verticillium albo-atrum) was present in 4/10 s. Alta. fields in trace amounts (J.S.H.).