I. DISEASES OF CEREAL CROPS

WHEAT

ERGOT (*Claviceps purpurea*). A trace was found in the winter wheat plots at Lacombe, Alta. (M.W.C.). A heavy infection was reported in a field of Thatcher at Bredenbury, Sask., by Mr. Chisholm, United Grain Growers Co.; it was particularly heavy in the headland bordering the road allowance (A.M. Brown). It was also present in a seed sample from Carlyle (H.W.M.).

POWDERY MILDEW (*Erysiphe graminis*). Infection was light to moderate in the plots at Lethbridge, Alta., and a trace at Lacombe. A moderate infection was seen in one field and a trace in two others in seedling stands of winter wheat in southern Alta. in late October (W.C. Broadfoot). Infection was also severe on winter wheat about Guelph, Ont. (J.D. MacLachlan). The disease was slight to very heavy in spots on Rideau and Dawson's Golden Chaff winter wheat in the Cereal Division plots, C.E.F., Ottawa (R.G. Atkinson). Powdery mildew occurred sporadically across Canada; infection was heavy at Smithers, B.C., and Lethbridge, Alta., and moderate at Ottawa (T. Johnson, B. Peturson and W.J. Cherewick).

HEAD BLIGHT (chiefly *Fusarium* spp.). At Gretna, Man., 10% of the heads were reported to have been affected in 3 fields of wheat (Regent and Thatcher) by W.G. Sallans. The odd head was also infected in 3 of the Laboratory plots at Winnipeg. *Fusarium graminearum* was isolated from heads from both places. A trace was present in a Regent sample from Guelph, Ont. - *F. avenaceum* isolated; scattered heads in Regent from Lower South River, N.S. - *F. Poae* and *Helminthosporium sativum* isolated (W.L. Gordon). Up to 10% of the heads were affected in fields in Essex Co., Ont.; *F. graminearum* was isolated (J.J. Miller). Head blight was slight in the O.A.C. fields, Guelph (J.D. MacLachlan). Head blight caused an average infection of 10% of the heads in the plots at Ste. Anne de la Pocatiere, Que., and varied from 0 to 35%. Part of the blighting appeared to be due to root rot rather than direct infection of the heads (A. Payette). A few affected heads were brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

SPOT BLOTCH (*Helminthosporium sativum*), resembling that found on barley, was a trace to moderate in the plots at Olds, Alta., and a trace in a field at Okotoks (W.C. Broadfoot).

COMMON ROOT ROT (*Helminthosporium sativum* and *Fusarium* spp.) caused slight damage in 16 fields and a trace in 11 out of 44 examined in Alta. In seedling stands of winter wheat in southern Alta. in late October, root rot damage was a trace in 3 fields, slight in 3 and moderate in 4 (W.C. Broadfoot).

Common root rot was recorded for 187 fields of wheat examined after Aug. 3 in Sask. Disease ratings varied from 2 to 26 on a scale where 40 is maximum. The mean rating of 9.3 with a standard deviation of 4.3 was about equal to the ratings in 1943 and 1941 and somewhat higher than those in 1944 and 1942 (P.D.S. 23:2 and 24:2). In general, the disease was more prevalent in crop districts where the rainfall was light and the crops poor. The first

provincial estimates of yields in bu. per acre for crop districts 1 to 9 were respectively: 22.1, 14.5, 6.1, 3.8, 23.1, 11.8, 7.8, 24.8, and 13.3; while the corresponding common root rot ratings were: 5.66, 6.79, 11.17, 13.36, 6.60, 9.95, 9.59, 8.60, and 10.46.

Traces of prematurity blight were present in 3 fields and a patch was found in one field at Delisle, Sask. (B.J. Sallans).

A basal stem rot (Fusarium culmorum) was severe on Carleton durum wheat in a zone about saline spots in the University plots, Saskatoon, Sask. The pH of the saline spots, where no wheat grew was 8+, but the pH of the root rot infected areas and the normal areas was the same, viz. pH 6.6. Possibly the salt balance in the root rot areas favoured the disease. When seed from this field was surface sterilized and plated on P.D.A., 9% of the seed yielded Fusarium (T.C. Vanterpool).

Much of the wheat was subjected in the seedling stage to strong winds in May and early June in Sask. The winds with drifting sand particles caused damage in some areas. The presence of common root rot caused additional complications and caused the seedlings to have a noticeably unthrifty appearance (T.C. Vanterpool).

Common root rot was found attacking the adult plants in most parts of Man. in 1945, but it was not serious except in a few individual fields of wheat and barley in the southwestern part. Durum wheat was severely attacked in certain experimental plots at Winnipeg, Morden, and Brandon. In these plots from 5 to 10% of the plants produced little grain. Seedling blight, the early phase of common root rot, was very severe in several fields in the lower Red River Valley. In individual fields at Dominion City and Steinbach, more than 25% of the seedlings were blighted, and as a result, the stand was very thin in the spring and the fields suffered from excessive growth of weeds later in the season (F.J. Greaney).

TAKE ALL (Ophiobolus graminis) caused slight damage in 4 fields and a trace in 3 out of 44 examined in Alta. (M.W.C.). Scattered plants were found affected in widely separate points in Sask. viz. Fox Valley and Melville. The disease was reported to be common and in some fields severe in northeastern Sask.; typical take all specimens accompanied the reports (R.C. Russell). Take all appeared to be causing slight damage in a field at Smeaton (T.C. Vanterpool). A severe outbreak of take all occurred in a field of wheat on newly broken land near Gilbert Plains, Man. In many large patches in the field, at least 50% of the plants were destroyed by the disease. This is probably the most destructive outbreak of take all on record for Man. (F.J. Greaney).

Take all was observed in localized areas in several fields of winter wheat in the Guelph district, Ont. In one field near Paris, the disease was severe throughout the field. From the number of samples received for examination, it would appear that the disease was increasing (J.D. MacLachlan). Take all was observed in the variety plots at the Station, Ste. Anne de la Pocatiere, Que. It was later found in 2 fields

at the Station, one of Coronation and another, half in Coronation and half in Regent. In the plots up to 5% of the plants were affected (A. Payette). The identification of the causal organism was verified (I.L. Conners).

STRIPE RUST (Puccinia glumarum) was general and heavy and caused slight to moderate damage at Creston, B.C. Kharkov seemed the worst affected (W.R. Foster). Infection was moderate on fall-sown Fairfield and Dawson's Golden Chaff, and a trace to nil on other named varieties at Agassiz, B.C.; a slight infection was present at the University, Vancouver (W. Jones). Infection was a trace in 5 fields, slight in 3, and heavy in 1 on seedling stands of winter wheat in southern Alta. (W.C. Broadfoot).

STEM RUST (Puccinia graminis) did not appear until late in the season in Alta. and was very scarce. A trace of infection was found at Lacombe on Aug. 24 and at Lethbridge on Sept. 10 (M.W.C.). Traces were recorded in only 4 out of 196 fields examined in Sask.; the virtual absence was due to the very dry conditions prevailing in the western half of Sask. in 1945 and the predominance of resistant varieties elsewhere (H.W.M.).

Stem rust infections averaging upwards of 50% developed on Marquis and Red Bobs in experimental plots at Morden, Winnipeg, Portage la Prairie, Brandon and Gilbert Plains, Man., in 1945. At these Statibns the commonly grown stem rust resistant varieties Regent, Renown and Thatcher remained almost stem-rust free throughout the season. Virtually no stem rust occurred in commercial fields of these varieties and, since nearly all the wheat acreage in Man. was sown to stem rust resistant varieties, this rust caused no reduction in wheat yields. A very light infection of stem rust was present on barley varieties throughout Man. In most fields examined this infection averaged only 1 or 2% or less and had only a very minor effect on yields (B. Peturson). Stem rust only slightly affected winter wheat in the Guelph area, Ont., because it did not appear until the grain was nearing maturity (J.D. MacLachlan). Stem rust was almost absent from the plots at Fredericton, N.B., 10% being recorded on Huron (S.F. Clarkson). Infection varied from 5 to 40% in 10 fields examined in Queens and Prince Counties, P.E.I., in late August (R.R. Hurst). A 10% infection was recorded on Garnet in a field in Kings Co. (E.B. McLaren).

An examination of rust nursery material (q.v.) grown at 30 separate points in Canada revealed an infection of 20% or more on the more susceptible varieties at Indian Head, Sask., Brandon and Morden, Man., Fort William and Guelph, Ont., and Normandin, Que. (T. Johnson et al.).

LEAF RUST (Puccinia triticina) infection was moderate on fall sown Garnet and Thatcher, slight on Rideau, Cornell 595, Nured, Dawson's Golden Chaff and Marquis and a trace on Fairfield at Agassiz, B.C., in June; it was severe on spring sown Garnet and Red Bobs, moderate on Thatcher and a trace to slight on Marquis and Coronation in August. A slight infection was also recorded on all varieties at Saanichton (W. Jones).

Leaf rust did not appear until late August in Alta., when a trace to slight infection was observed at Lethbridge, Olds, Lacombe and Edmonton. A moderate to severe infection developed in September in a few late-maturing stands at Edmonton and in the soft wheat varieties at Lethbridge (M.W.C.). Leaf rust was widespread in Sask.; it was severe in many fields in the eastern part, where rainfall was normal, but was scarce or absent in the dry western section (H.W.M.).

Leaf rust of wheat was very late in getting established in Man. in 1945. It was not until the first week in July, three weeks later than normal, that the first leaf rust infections were observed. However, owing to a cold late spring, crops were also late, generally a good two weeks later than normal. Although the initial infections were late, they were quite heavy and widespread. They evidently were due to heavy leaf rust spore-showers that occurred over Man. during the week centering on June 20. Leaf rust infections spread and developed rather quickly and by the end of the first week in August (shortly before harvest) infections on Thatcher wheat averaged well over 70% in most fields and in some fields they averaged as high as 90%. Regent and Renown also became heavily infected with leaf rust. Although not quite as severely rusted as Thatcher, Regent and Renown in most localities in Man. carried infections averaging over 60%. In general, Regent and Renown became much more heavily infected this year than formerly. Recent greenhouse studies indicate that the heavier infections which developed in these varieties this year were due to an increase in the prevalence of races of leaf rust to which they are susceptible (B. Peturson). A moderate infection occurred at Guelph, Ont. (J.D. MacLachlan). A trace of leaf rust was first noticed on Dawson's Golden Chaff in the Cereal Division plots, C.E.F., Ottawa, on June 13. Infection was up to 65% on the same variety and 25-40% on Rideau on July 20. Next day leaf rust infection was up to 40% in a 2-acre block of Thatcher, 5-10% on a similar block of Coronation and 25-40% on 2 small blocks of Garnet. In the rust nursery, Kapuskasing, infection was virtually 100% on Little Club, 65% on Regent and generally heavy on all varieties (R.G. Atkinson). Leaf rust infection varied from a trace to 80% in the plots at Ste. Anne de la Pocatiere, Que.; it was again fairly heavy on Coronation and Regent which were said to have been relatively free from rust when the varieties were first introduced (A. Payette). Leaf rust infection varied from 20-85% on the more susceptible varieties at Fredericton, N.B. (S.F. Clarkson). Infection varied from 5 to 65% in Queens Co., P.E.I., on Aug. 30 (R.R. Hurst).

Leaf rust of wheat was generally severe except in Alta., western Sask., and some parts of the Maritime Provinces. In Man. and Sask. and in certain areas in eastern Canada, wheats such as Regent that had been resistant in previous years, showed considerable susceptibility. The reason appears to lie chiefly in the prevalence, in 1945, of physiologic races, such as race 128, that may attack these varieties heavily (T. Johnson et al.).

BROWNING ROOT ROT (Pythium spp.) was not conspicuous this year in Sask. probably due to the prolonged cool weather of early summer and perhaps to some extent to the increased use of phosphate fertilizer.

Isolations were made from only one sample from which Pythium tardicrescens was obtained. This species has previously been reported (P.D.S. 18:8) to be more commonly associated with browning root rot in cool years than P. arrhenomanes and P. aristosporum, the other virulent species. P. aristosporum was associated with wireworm damage of crested wheat grass in July. During the June survey, fields showing moderate damage were observed around Prince and Revenue, and slight damage at Humboldt. On the University Seed Farm the most of one field and one corner of another were severely attacked, both leaf yellowing and root lesioning being conspicuous. Some barley fields showed typical leaf symptoms, but root lesioning was inconspicuous on this crop.

During the war years the amount of phosphate fertilizer available in Sask. was on a quota basis. The amount was almost the same during the years 1940 to 1943 inclusive, with a slight increase in 1944, and about four times as much in 1945. The following results are based on the amount of phosphate fertilizer sold in Pythium root rot areas, the average rate of application, and the average increase in yields as obtained from field experiments in Pythium root rot areas.

Savings in the control of Pythium root rot through the use of phosphate fertilizer were as follows:

1940 to 1943	$4,000,000
1944	1,250,000
1945	3,500,000

On the Regina plains where the annual saving during the first five years under review was less than a quarter of a million dollars, it is estimated that at least 1½ million dollars could have been gained annually if an adequate supply of phosphate had been available.

The fact that $3,500,000 is estimated to have been saved in 1945, a year in which Pythium root rot was less severe than usual but one in which phosphate was more widely used, gives some idea of the losses incurred in previous years when the root rot was more severe and insufficient amounts of phosphate were available.

In trials concluded June 16, 1945, to determine the parasitic action of Pythium tardicrescens and P. ultimum to wheat, P. tardicrescens was found to be moderately parasitic, causing root browning and necrosis, whereas P. ultimum was mildly parasitic, causing root stunting with browning confined to the extreme tip (T. C. Vanterpool).

Browning root rot was found in a few fields in the Gilbert Plains district, Man. It was associated with soil deficient in phosphate (F.J. Greaney).

GLUME BLOTCH (Septoria nodorum). A slight infection was recorded in 2 fields and a trace in another out of 44 examined in Alta. (M.W.C.). A light infection was found in Sask. in 3 fields out of 196 examined; they were located in areas where moisture was ample (H.W.M.). A few affected heads were observed in one field near Hunter River, P.E.I. (R.R. Hurst).

SPECKLED LEAF BLOTCH (Septoria spp.). Infection was a trace in 8 fields, slight in 18 and moderate in 1 out of 44 examined in Alta. Infection was slight to moderate in the plots at Lethbridge, slight at Lacombe, and a trace to slight at Olds (M.W.C.). Speckled leaf blotch was present in 4 fields in the northeastern and eastern areas in Sask., where moisture was abundant. Leaf spots of undetermined origin were reported in 20 fields (H.W.M.).

The strain of Septoria with spores larger than S. nodorum Berk. and closely resembling S. Avenae Frank, which was first reported in 1942, was generally prevalent on wheat in Man. in 1945. Lesions were first found on July 12 and infection was widely distributed through the province before the end of the month. After the first week in August lesions bearing pycnidia were common in all wheat fields examined, particularly on older leaves. The abundance of pycnidia on fading leaves suggested that the death of the leaves was hastened by the infection. Trace infections by the same organism were found on spring rye at Winnipeg and on barley and oats in a few localities. Infection tests in the greenhouse indicated that the organism on rye, oats, and barley was pathogenically (as well as morphologically) identical with that on wheat. Slight to moderate infections were noted on wheat from some of the rust nurseries (q.v.) in Ont. and Que. (T. Johnson).

Speckled leaf blotch (Septoria Tritici) was slight to moderate on Rideau, Garnet, Marquis, Dawson's Golden Chaff, and Jones' Fife at Agassiz and the University, Vancouver, B.C. (W. Jones).

BUNT (Tilletia caries and T. foetida). A summary of car inspections for the first quarter of the grain year 1945-46 was prepared by W. Popp from the records of the Western Inspection Division. The results are given in Table 1.

Table 1. Wheat Bunt in Western Canada

Summary of Inspections from August 1 to October 31, 1945

Class of Wheat	Cars Inspected	Cars Graded Smutty	Percentage Graded Smutty
Hard Red Spring	65,829	162	0.25
Amber Durum	1,183	33	2.79
White Spring	19	0	0.00
Alberta Red Winter	249	6	2.41
Garnet	367	0	0.00
Mixed Wheat	37	0	0.00
All Classes	67,684	201	0.29

There appears to be very little change in the bunt situation in wheat in Western Canada in 1945 as a comparison with the figures for the same quarter in 1944, or earlier, will show.

In the field, a trace of bunt was seen in 2 fields out of 44 examined in Alta. (M.W.C.). The field survey revealed considerable bunt in certain districts in the southwestern part of Sask., infection varying from a trace to 13% of the heads, but very little bunt was seen elsewhere. Out of 30 samples of wheat examined in the laboratory 22 were clean and 4 others carried such a light spore load that treatment was not recommended.

In field plot tests conducted by the Laboratory with a large number of naturally smutted samples of wheat, oats and barley, less bunt developed in 1945 than in the previous year, but considerably more covered smut appeared in the oats and barley. There was a good correlation between the spore load on the seed and the amount of smut in the subsequent crop (R.C. Russell). A single head of Dawson's Golden Chaff sent by S.A. Bowman from a farm at Perth, Ont., was affected by T. caries (I.L. Conners).

LOOSE SMUT (Ustilago Tritici) affected 3% of the heads in a field of durum wheat at Findlay, Man. (J.E. Machacek). From enquiries regarding the control of loose smut, it would appear that the disease was unusually prevalent in winter wheat in 1945 in southwestern Ont.; and some fields were "rather badly infected". Its increased prevalence is thought to be due to the rainy weather at flowering time in 1944 (P.D.S. 24ixii) (I.L. Conners). Loose smut infection was moderate to severe on winter wheat about Guelph, Ont.; more prevalent than in 1944 (J.D. MacLachlan). A trace was present in Coronation and Huron in the plots at Ste. Anne de la Pocatiere, Que. (A. Payette). A trace was recorded in one field near Charlottetown, P.E.I. (R.R. Hurst).

BLACK CHAFF (Xanthomonas translucens var.) caused slight damage in the University plots, Saskatoon, Sask., on Carleton durum wheat; dried bacterial ooze was showing on the stems (T.C. Vanterpool). Bacterial black chaff (X. translucens f. sp. undulosa) infection ranged from a trace to 45% in 7 out of 20 fields examined in Man. (W.A.T. Hagborg).

BROWN NECROSIS (cause unknown) was prevalent on many of the new varieties at Brandon, Man. It was confined to the outer glumes; no neck or stem browning was present (F.J. Greaney).

HEAT INJURY. The green leaves of wheat at Dauphin, Man., showed 2 yellow bands each on June 30, as a result of the extreme heat at the soil level during June 19 and 20 respectively (J.E. Machacek).

OATS

ANTHRACNOSE (Colletotrichum graminicola). Injury from anthracnose was conspicuous on the lower leaves in an area from Saskatoon, Sask., west for about 20 miles on Aug. 22. Slight damage was also noted on barley at Nipawin on Sept. 15. The disease appears to be on the increase in Sask. (T.C. Vanterpool).

POWDERY MILDEW (Erysiphe graminis) was slight on all varieties at Saanichton, B.C. (W. Jones). In the rust nurseries (q.v.). a trace was present at Saanichton and Smithers, B.C. (T. Johnson et al.).

COMMON ROOT ROT (Fusarium spp.) moderately affected all of the 14 fields examined in Sask. (B.J. Sallans).

LEAF BLOTCH (Helminthosporium Avenae) infection was slight on a few varieties at Agassiz, B.C. (W. Jones). Infection was a trace in 3 fields, slight in 13, moderate in 1 out of 21 examined in Alta.; it was a trace to moderate on the varieties at Lethbridge and slight at Lacombe (M.W.C.). The disease was moderate about Guelph, Ont. (J.D. MacLachlan). Leaf blotch was most conspicuous in the Montreal district, Que., in July when infection was recorded as slight in 38 fields and moderate in 19 out of 62 examined; an extended tour embracing Sherbrooke, Riviere du Loup and Lake St. John revealed infection slight in 10 fields, moderate in 16 and severe in 2 out of 47 examined (T. Simard). Infection varied from a trace to 35% on varieties in the various tests at the Station, Fredericton, N.B. (S.F. Clarkson). Leaf blotch was general in the East Baltic area of Kings Co., P.E.I.; damage was slight to severe (R.R. Hurst).

HALO BLIGHT (Pseudomonas coronafaciens). Infection was a trace to slight on a few varieties at Edmonton and Olds, Alta. (W.C. Broadfoot). A heavy infection was noted on the lower leaves in a field at Aberdeen, Sask. (T.C. Vanterpool). A light infection was found in 9 fields out of 23 examined in Man. (W.A.F. Hagborg). Halo blight was heavy on some volunteer oats in a strawberry planting in Queens Co., P.E.I.; it was noted on several other occasions in 1945 (R.R. Hurst).

CROWN RUST (Puccinia coronata) was again prevalent throughout Sask., but it developed very little in the western areas due to the dry weather (H.W.M.). Crown rust of oats was prevalent throughout Man. in 1945. Late sown susceptible varieties became very heavily infected. In the earliest sown crops only light infections occurred, but in crops that did not ripen until late August (and owing to a late spring there was a considerable percentage of these late fields) infections averaged well above 75% on such varieties as Victory, Banner, Gopher, Vanguard, and Exeter. These heavily infected crops suffered severe damage. The variety Ajax, which has considerable mature plant resistance to certain races of crown rust, was much less severely affected. This variety, even in late fields, rarely carried infections in excess of 25% and in most the infection was considerably less (B. Peturson). Infection was moderate to severe around Guelph, Ont. (J.D. MacLachlan).

Crown rust was again epidemic in eastern Ont. in 1945, after an interval of 8 years. Although the season opened early, fine weather was followed by a long cold rainy period. A few fields were thus sown earlier than in most seasons, but the bulk of the crop was sown unusually late. On July 31 a survey was made between Ottawa and Pakenham, some 30 miles up the Ottawa Valley. Only 10-20% infection was present in a few early-sown fields, but it varied from 40 to 80% in the later fields. The trip in part was through a well known buckthorn area. The percentage of rust on the crop appeared in general to be correlated with the proximity of the alternate host, maturity of crop, site, and variety. While the level of infection in individual fields might be very uniform, it was evident that the nearer the bushes were to the crop, the greater the depressing effect on height of straw and size of panicle. While crown rust was severe locally in the Ottawa Valley, it was reported to have caused equally severe losses in the counties fronting on the St. Lawrence. In these counties, where Erban had gained favour on account of its resistance to the prevailing races, it was as severely rusted as any of the susceptible varieties. Of the varieties extensively tested in 1945, only 601 was lightly attacked by crown rust. Beaver, from a cross between Erban and Vanguard, was heavily rusted. The poor showing of Erban, or of varieties possessing Erban resistance, in 1945 in contrast to 1937, is almost certainly due to predominance of races of Puccinia coronata, to which these varieties are highly susceptible. Some preliminary work has already been done in eastern Ont. by the District Weed Inspector of the Crops, Seeds and Weeds Branch, Ont. Department of Agriculture, on the eradication of buckthorn in a campaign against the alternate host (I.L. Conners). On July 21, infection varied from 5 to 25% in a block of Ajax in the Cereal Division fields, Ottawa, while no rust was observed in a 3-acre block of Beaver (R.G. Atkinson). Crown rust was light on oats about Quebec, Que. (O. Caron). A slight infection was observed in the Montreal district in June in 2 fields out of 109 examined; in one field the rust was spreading from a nearby buckthorn hedge. Rust increased in severity, the infection in August being severe in 19 fields, moderate in 31 and slight in 2 out of 53 examined. In the other areas visited infection was severe in 14, moderate in 19 and slight in 11 out of 47 examined (T. Simard). Crown rust infection varied from a trace (Roxton) to 75% (Cartier) in the Quebec Seed Board tests at Ste. Anne de la Pocatiere, Que.; similar percentages occurred in the other oat plots (A. Payette).

Crown rust was heavy on 3 varieties sown adjacent to buckthorn bushes at Fredericton, N.B., on June 13; infections recorded on Aug. 17 were 90% on Erban, 98% on Victory and 35% on Mabel. In another test the same varieties were sown at Springhill in ¼ acre plots on July 1; Erban and Victory failed to head due to severe crown rust infection, while Mabel headed out and set seed. In the variety plots at Fredericton infection was not over 30% except on some late varieties (S.F. Clarkson).

Crown rust of oats occurred sparingly in eastern Sask., was very prevalent in Man., and appeared in epidemic form in many localities in Ont., Que., and the Maritime Provinces. In Eastern Canada there was a decrease in the proportionate prevalence of races 2 and 3 and an increase in prevalence of races 4 and 5. The extensive damage caused in Eastern Canada to Erban and other oat varieties possessing a similar type of resistance was, no doubt, due to increased prevalence of races 4 and 5, both of which attack these varieties heavily at all stages of growth (T. Johnson et al.).

STEM RUST (Puccinia graminis). A slight infection was observed on July 20 in several fields at Ladner, B.C. (W. Jones). Stem rust was first observed in Alta. on Aug. 24 as a heavy primary infection in the plots at Lacombe. Infection was slight to moderate in late maturing stands at Edmonton (M.W.C.). Stem rust caused slight to moderate damage in 4 fields out of 34 examined in Sask.; it was mostly confined to the eastern part of the province, but it was present in late crops around Saskatoon (H.W.M.). A heavy infection was noted at Vonda and Prince Albert on Sept. 14-15 (T.C. Vanterpool).

Stem rust of oats was first observed in Man. in 1945 as trace infections on oat crops in the southern part of the province during the third week in July. The infection increased rapidly and by mid-August susceptible varieties in some fields carried infections averaging 60% or more. Some of the new stem rust resistant varieties became quite heavily infected and in late fields, which matured toward the end of August, were severely damaged. Of the resistant varieties, Vanguard and Exeter were the least affected and infections on them rarely averaged over 10%, even in late fields. Ajax generally became more heavily infected and, although early sown fields of this variety carried only trace infections, many later ones carried infections averaging upward of 50%. The variety Tama, a stem-rust resistant variety of American origin, although not grown in Man. on a commercial scale, was included in experimental tests in several localities in the province. The late sown plots of this variety became heavily infected with stem rust. As in the previous two years the field infections of these resistant varieties were caused by physiologic races 8, 10, and 11 of Puccinia graminis var. Avenae. A marked further increase in these formerly rare races occurred this year and they have become so prevalent and widespread in Canada that they now constitute a threat to all the new resistant varieties which have been distributed to growers in recent years. A number of new strains of oats, which are resistant to races 8, 10 and 11, remained practically rust free throughout the season in test plots located at several different Stations (B. Peturson).

Stem rust was severe at scattered points in eastern Ont. in 1945. Observations made this year only confirm those made previously that when stem rust is present in epidemic proportions it is due to local outbreaks initiated by aeciospore inoculum from barberries nearly always occurring as escapes. From samples received from Pakenham and Appleton and fields examined at Vankleek Hill, it was evident that Vanguard or varieties possessing the same factors for resistance were being heavily rusted in 1945. A 50% infection was recorded in 2 fields of Beaver at Vankleek Hill on Aug. 7. From samples received from Pakenham, Ajax appeared to be somewhat more severely affected than Beaver. It should be noted that although 601 was remarkably resistant to the prevailing races of crown rust, it apparently possesses only the resistance of Vanguard to stem rust, and, in fact, a block of this variety was moderately rusted in the Cereal Division plots at Ottawa, according to R.A. Derick of that Division. Vanguard proved highly resistant to the races of stem rust prevailing in eastern Ont. and its introduction by the Cereal Division into areas where rust damage had been severe has in the meantime been of great practical benefit.

However, with the appearance of races of stem rust to which Vanguard is susceptible in 1943 in eastern Ont., the occurrence of rust in damaging amounts on Ajax, etc., during the past season is not surprising.

The severity of stem rust in 1945 focused attention on the importance of the barberry in initiating localized epidemics. At Appleton, near Carleton Place, a determined effort to eradicate the common barberry by spraying the bushes with sodium chlorate or Stephens Weed Killer was started on July 31. The original planting was thought to have been a few bushes set out in the village of Appleton some 30 years ago or more. Losses from stem rust are said to have become serious in the vicinity, and in 1930 as many of the escaped bushes as could be located were pulled up or cut down. The growers experienced relief from damage for two years, after which losses again began to increase. This area was located independently in 1932 (P.D.S. 12:2), when the bushes, which had been cut down two years previously were rapidly growing up again. The efforts to uproot the bushes were also not entirely successful. According to E.G. Anderson of this Division, the bushes sprayed in July 1945 appeared in most instances to be dead when he examined them on Oct. 6. Several other concentrations of bushes in this area still remain to be sprayed and a systematic survey for outlying bushes has yet to be undertaken. As mentioned under crown rust, a campaign to eradicate the alternate hosts in eastern Ont. is being organized (I.L. Conners).

Stem rust was not observed until July in the Montreal district, Que.; in August infection was slight in 9 fields, moderate in 1 and severe in 1 out of 53 examined. In the other areas visited infection was slight in 7 fields and moderate in 7 out of 47 examined (T. Simard). A trace of stem rust was observed on a few varieties in the plots at Ste. Anne de la Pocatiere (A. Payette). No stem rust was recorded on oats at Fredericton, N.B. (S.F. Clarkson). A moderate infection, mostly in the telial stage, was present on Erban at Briley's Brook, N.S., on Aug. 20 (J.F. Hockey).

Stem rust was rather severe in Man. and eastern Sask. and locally in certain other parts of the country. The previously resistant variety, Ajax, was heavily rusted in most of Man. and Sask., and the variety Vanguard bore more rust than in past years. The reason is to be found in the unusual prevalence of races 8, 10 and 11 in many parts of the country (T. Johnson et al.).

SPECKLED LEAF BLOTCH (Septoria Avenae). Infection was slight to moderate on a few varieties at Lethbridge, Alta. (M.W.C.). Infection was severe in a 20-acre field of Ajax at the Experimental Station, Kapuskasing, Ont. (R.G. Atkinson). Infection was slight in 18 fields and moderate in 3 out of 62 examined in July, in the Montreal district, Que.; in other districts, it was slight in 11 fields and moderate in 4 out of 47 examined in August (T. Simard). Speckled leaf blotch caused a 10-35% infection in the Quebec Seed Board plots at Ste. Anne de la Pocatiere; even a heavier infection occurred in the other oat plots. In contrast, only traces of Helminthosporium leaf blotch occurred in the same plots (A. Payette). Infection varied from a trace to 50% in the plots at Fredericton, N.B. (S.F. Clarkson). Traces of the disease were present in the rust nursery material (q.v.); the pathogen was not always S. Avenae (T. Johnson).

SMUTS (Loose Smut, Ustilago Avenae and Covered Smut, U. Kolleri). Loose smut was moderate on Lee and a trace to slight on several others at Saanichton, B.C. (W. Jones). A trace of smut was recorded in 10 fields and a slight infection in 5 others in Sask. Covered smut (highest infection 5%) affected 13 fields and traces of loose smut occurred in 2. All 5 seed samples examined were smutty (R.C. Russell). In 10 fields examined for smut in Man., loose smut (trace to 6%) occurred in 3 and covered smut (trace to 5%) in 5 (W.L. Gordon, W. Popp). Loose smut was slight to moderate about Guelph, Ont. (J.D. MacLachlan). Smut lightly affected oats about Quebec, Que. (O. Caron). Out of the 100 fields examined in Que. in August, infection by loose smut was slight in 6 fields, moderate in 7 and severe in 3; the corresponding figures for covered smut were: slight in 20 fields, moderate in 12 and severe in 6 (T. Simard). Infection ranged from a trace to 4% in fields examined in a survey of Kings, Annapolis and Lunenburg counties, N.S. (J.F. Hockey). A trace to 15% was present in 11 fields examined in the eastern part of Kings Co., P.E.I., on Aug. 9. (R.R. Hurst).

A specimen of the dock-leaved persicary, Polygonum lapathifolium, affected by smut (Ustilago utriculosa), was received from Mr. Adhemar Belzile, Superintendent at the Station, Normandin, Que., with this comment: "Persicary is a common weed in this district but this is the first time that it has been noticeably affected by smut". Smutted smartweed was noted on several occasions in oat fields during my cereal disease surveys in the Maritime Provinces in 1937 (P.D.S. 17:9) and in Quebec in 1939 (I.L. Conners).

BLAST (non-parasitic) was recorded as follows: moderate on Wintock, trace to slight on other varieties at the Station, Saanichton, B.C.; slight on Victory and Eagle in the University plots, Vancouver (W. Jones); trace in 10 fields, 5% in 5, 10% in 2 and 15-20% in 4 in the 21 fields examined in Alta.; 5-20% in the plots at Olds, trace-10% at Lethbridge and trace-5% at Lacombe (M.W.C.); present in most fields in Sask. causing slight damage (H.W.M.); 25% of plants severely affected in a field at Neelin, Man., blasted spikelets extending from the base to the tip of the panicles and many plants completely sterile (F.J. Greaney); out of 100 fields in Que. slight in 70, moderate in 19 and severe in 7 (T. Simard). Appreciable percentage of blast occurred in the oat variety plots at Ste. Anne de la Pocatiere (A. Payette); varied from 5 to 30% in the variety plots, Fredericton, N.B. (S.F. Clarkson); heavy in a field at Kensington, P.E.I., and traces in several other fields examined (R.R. Hurst).

Both frost and soil drifting caused severe damage to oats in the seedling stage during late April and early May in Sask. (H.W.M.).

GREY SPECK (deficiency of available manganese) was observed again in the Winnipeg and Gilbert Plains districts, from which it had been previously reported, but also from farmers' fields in the 4 new districts of Swan River, Ethelbert, Erickson, and Oak Bank in Man. (W.A.F. Hagborg).

BARLEY

HEAD BLIGHT and DISCOLORATION (Alternaria, etc.). In field at Brandon, Man., 10% of the heads showed discoloured spikelets. Alternaria (most common) and Fusarium Equiseti were isolated (F.J. Greaney, W.L. Gordon). Head blight was slight in 24 fields, moderate in 9 and severe in 5 out of 48 examined in the Montreal district, Que. (T. Simard).

ERGOT (Claviceps purpurea). A trace was recorded in 2 fields and slight infection in one out of 32 examined in Alta.; a trace occurred in the plots at Lacombe and Lethbridge (M.W.C.). A trace of ergot was observed in a field at Kinistino, Sask., and in the plots at Saskatoon. Many sclerotia were present in a sample of seed from Carrot River (H.W.M.). Ergot occurred occasionally about Guelph, Ont. (J.D. MacLachlan). Ergot caused considerable damage in fields chiefly of smooth-awned barley in York Co., Ont. (J.E. Howitt). A trace was found in one field in the Montreal district, Que. (T. Simard), and in one variety in the plots at Fredericton, N.B. (S.F. Clarkson). A sample of ergot in barley was brought to the Laboratory, Charlottetown, P.E.I. (R.R. Hurst).

POWDERY MILDEW (Erysiphe graminis) was causing slight damage to Cape, Morocco and Chilian Brewing on March 29 in fall-sown test rows at Saanichton, B.C.; it was moderate on Newal and a trace to slight on others in spring barley at Agassiz (W. Jones). Powdery mildew was severe about Guelph, Ont.; it is still the most important barley disease in the district (J.D. MacLachlan). Infection was moderate to heavy in the Cereal Division plots on Galore at Manotick and heavy on Montcalm at Ottawa (R.G. Atkinson). Powdery mildew infection was slight in 7 fields, moderate in 4 and severe in 1 out of 27 examined in the Montreal district, Que., in August (T. Simard). The disease was moderate to severe in B.C., Ont. and southwestern Que. (T. Johnson et al.).

STRIPE (Helminthosporium graminsum) infected 1% of the plants in a plot at Brandon, Man. (B. Peturson).

SPOT BLOTCH (Helminthosporium sativum). Infection was slight in 2 fields, and a trace in 5 out of 32 examined in Alta.; it ranged from a trace to moderate on most varieties at Lethbridge and Olds, and was slight at Lacombe (M.W.C.). A slight infection was noted in a field at Jordan, Man. (J.E. Machacek). Spot blotch slightly affected barley about Guelph, Ont.; infection was chiefly on the basal leaves. In one field of Galore the disease was moderate to severe (J.D. MacLachlan). Spot blotch was slight in 12 fields out of 27 examined in the Montreal district, Que., in August (T. Simard).

COMMON ROOT ROT (Helminthosporium sativum and Fusarium spp.). Damage was a trace in 3 fields and slight in 2 in Alta. (M.W.C.). Out of 16 fields examined in Sask., the disease was moderate in 14 and severe in 2 (B.J. Sallans). Infection was moderate to severe in a barley field on barley stubble at Nipawin on Sept. 14 (T.C. Vanterpool).

NET BLOTCH (Helminthosporium teres). Infection was slight in one field in Alta., and a trace to slight on some varieties at Lacombe (M.W.C.).

Infection was a trace to slight in 5 fields in widely scattered areas of Sask. out of 17 examined (H.W.M.). Net blotch infection was recorded as a trace in 1 field, slight in 2 and moderate in 4 in Man. (W.L. Gordon). Net blotch was nil on 2 varieties, a trace on 13 and infection varied from 5-75% on the remaining 10 at Ste. Anne de la Pocatiere, Que. (A. Payette). Trace to 25% infections were recorded on most varieties under test at Fredericton, N.B. (S.F. Clarkson).

LEAF RUST (Puccinia anomala). A moderate infection was observed on Trebi and Peatland at the Agassiz Farm, B.C. (W. Jones). Leaf rust was not important in Sask. in 1945; a trace was present in 1 field out of 19 examined (H.W.M.). A light sprinkling of leaf rust was present on barley varieties throughout Man. In many of the fields examined only trace infections were observed; in others, infections averaged from 1 to 5%. However, in a number of fields of Plush, a variety very susceptible to leaf rust, infections averaged as high as 35% (B. Peturson).

Leaf rust was moderate about Guelph, Ont. (J.D. MacLachlan). A slight infection was found in 3 fields in the Montreal district, Que. in August (T. Simard). Leaf rust was usually a trace on most varieties at Ste. Anne de la Pocatiere, but 3 varieties showed readable percentages (A. Payette). Leaf rust was virtually absent in the plots at Fredericton, N.B. (S.F. Clarkson). In the rust nurseries (q.v.) moderate to severe infections occurred at Agassiz, B.C., Winnipeg, Man., Guelph, Ont., and Lennoxville and L'Assomption, Que. (T. Johnson et al.).

STEM RUST (Puccinia graminis). Light infections were observed in 2 fields in heavy crops in Sask.; it was also present in a late crop at Saskatoon (H.W.M.). Stem rust was moderate about Guelph, Ont. (J.D. MacLachlan). A trace was noted on Velvet at Rose Valley, P.E.I. (R.B. McLaren). A slight infection was found in only 2 fields in the Montreal district, Que. (T. Simard). Traces occurred on several varieties in the plots at Ste. Anne de la Pocatiere (A. Payette). In the rust nurseris (q.v.) stem rust was moderate at Normandin, Que., but elsewhere it was nil to slight (T. Johnson et al.).

BROWNING ROOT ROT (Pythium spp.). Affected plants from Hazelcliffe, Sask., were received from P.M. Simmonds (T.C. Vanterpool).

SCALD (Rhyncosporium Secalis) infection was severe on Peatland, moderate on Plush and slight on Trebi in the plots at Agassiz, B.C.; it was also slight to moderate in the fall-sown varieties at Saanichton (W. Jones). Infection was a trace in 9 fields, slight in 7, moderate in 3 out of 32 examined in Alta.; a trace to slight infection was present in the plots at Olds, Lacombe, and Edmonton (M.W.C.). A light infection was recorded at Kinistino, Sask., and a trace at Saskatoon (H.W.M.). Scald was reported to be severe on certain lines of barley at Tisdale and the material was checked microscopically. According to H. Friesen, Field Husbandry Dept., the scald did not appear to have affected the yields appreciably (T.C. Vanterpool).

SPECKLED LEAF BLOTCH (Septoria Passerinii). Infection was a trace in 4 fields and slight in 5 out of 32 examined in Alta.; it was slight to moderate in the plots at Lacombe and a trace to slight at Lethbridge (M.W.C.). A light infection was noted in 2 fields out of 19 examined in Sask. (H.W.M.).

Speckled leaf blotch of barley was more common in Man. than for several years. Light to moderately heavy infections were found in many localities throughout the southern part of the province in late July and early August. In the rust nurseries (q.v.) it was moderate to heavy in B.C., and at several places in Ont. and Que. (T. Johnson). A moderate infection occurred on O.A.C. 21 at the Station, Kapuskasing, Ont. (R.G. Atkinson).

LOOSE SMUT (Ustilago nuda) and FALSE LOOSE SMUT (U. nigra). Loose smut (U. nuda) affected 10% of heads of Newal with a trace on other varieties at Agassiz, B.C. (W. Jones). A trace of the loose smuts was recorded in 4 fields, slight infection in 4 and 8% in one in Alta.; infection in Newal was 5% at Olds and 2% at Lacombe and a trace occurred in several varieties at Lethbridge (M.W.C.). The loose smuts (chiefly U. nuda) were found in 6 fields out of 19 examined in Sask.; the highest infection being 5% (R.C. Russell). In Man., 12 fields were examined: U. nigra alone was present in collections from 3 fields (5-15%); U. nuda alone in 3 collections (10-20%); mostly U. nigra, but some U. nuda in 1 (22%); mostly U. nuda but some U. nigra in 1 (14%). Infections (tr.-3%) of "loose smut" were reported from 4 additional fields (W.L. Gordon, W. Popp). Loose smut affected 15% of the heads in a field of O.A.C. 21 at the Station, Kapuskasing, Ont. (R.G. Atkinson). Loose smut infection was slight in 6 fields and moderate in one out of 48 fields examined in the Montreal district, Que. (T. Simard). Traces were recorded on 7 varieties and 10% infection on Br. 1283 in the plots at Ste. Anne de la Pocatiere, Que. (A. Payette).

COVERED SMUT (Ustilago Hordei). Infection was a trace in 6 fields and slight in 2 out of 32 examined in Alta. (M.W.C.). A single field affected by covered smut was seen in Sask. All 9 samples examined of barley of the 1944 crop showed smut spores and all but one would require treatment (R.C. Russell). A slight infection was observed in 6 out of 48 fields examined in the Montreal district, Que. (T. Simard).

BACTERIAL BLIGHT (Xanthomonas translucens). A trace was recorded in the irrigation nursery, Saskatoon, Sask. (T.C. Vanterpool). Bacterial blight (X. translucens f. sp. hordei) was found in one field out of 17 examined in Man. (W.A.F. Hagborg).

SPIKELET BLIGHT (thrips) caused moderate damage in a field at Berwyn, Alta. (A.W. Henry).

RYE

ERGOT (Claviceps purpurea) records were - a trace in a field in Alta. (M.W.C.); infection very light about Saskatoon, Sask., but few fields visited (H.W.M.); infection less than in former years on fall rye at Fort Garry, Man.; sphacelial stage present on July 8; a cold wet spring appeared to retard germination of the overwintered sclerotia as they did not germinate

until late in June, about 2 weeks later than usual (A.J. Brown); trace in field at Swan River (W.E. Sackston); trace in field at Nictoaux and near Kentville, N.S. (J.F. Hockey).

POWDERY MILDEW (Erysiphe graminis). Slight infection on Prolific in the University plots, Vancouver, B.C. (W. Jones).

ROOT ROT (Helminthosporium sativum) caused trace of damage in a field at Vulcan, Alta. (W.C. Broadfoot).

LEAF RUST (Puccinia secalina) infection was slight to moderate on some varieties at the University, Vancouver, B.C. and at the Station, Agassiz (W. Jones).

SCALD (Rhyncosporium Secalis) was slight on some varieties at U.B.C., Vancouver, and at Agassiz, B.C. (W. Jones).

SURVEY OF NURSERY MATERIAL FOR PLANT DISEASES IN 1945

T. Johnson, B. Peturson and W.J. Cherewick

In Table 2 are given the results of examinations of material from 30 uniform rust nurseries across Canada. The examinations were carried out at the Winnipeg Laboratory.

Ten varieties of wheat, 8 of oats and 3 of barley were grown in the nurseries. The varieties were as follows: Wheat - Apex, McMurachy, Regent, Carleton, Little Club, Marquis, Spelmar, Thatcher, Vernal, and Norka; oats - Bond, Erban, Trispernia, Ajax, Vanguard, White Russian, S-811, and RL 1228 (Victoria x 524); barley - Goldfoil, Heil's Hanna, and Plush. Varieties now or formerly of commercial importance in Canada are underlined.

Readings for each disease were made on all varieties and separate tables were prepared for the intensity of infection of the rusts and powdery mildew. The detailed tables, however, are omitted, but in Table 2 is shown the severity of each disease on the more susceptible varieties for each Station.

(Note: In the original report a brief general discussion on each disease was included; this material appears on the preceding pages at the appropriate points - I.L. Conners).

Table 2. Pathogenic fungi found present on wheat, oats, and barley grown at 30 localities in Canada in 1945.

Locality	Wheat						Oats				Barley			
	P.gr. Tritici	P. triticina	E. graminis	S. nodorum	S. Avenae f.	Head discolor. (Apex, Regent)	P. gr. Avenae	P. coronata	E. graminis	S. Avenae	P. graminis	P. anomala	E. graminis	S. Passerinii
Saanichton, B.C.	0	3	2	0	0	1	1	0	1	0	0	0	3	0
Smithers, B.C.	0	1	4	0	0	0	0	0	1	0	0	0	0	0
Agassiz, B.C.	-	4	2	0	1	3	2	0	0	1	0	3	3	0
Beaverlodge, Alta.	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Edmonton, Alta.	1	1	0	0	1	1	1	0	0	0	0	0	0	0
Lacombe, Alta.	1	1	0	0	1	1	1	0	0	0	0	0	0	0
Lethbridge, Alta.	0	1	4	0	0	0	0	0	0	0	0	0	0	0
Scott, Sask.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melfort, Sask.	2	4	0	0	2	0	3	2	0	0	2	1	0	3
Indian Head, Sask.	3	4	0	0	1	0	2	1	0	0	1	1	0	0
Brandon, Man.	3	4	0	0	3	2	4	3	0	1xx	2	1	0	2
Winnipeg, Man.	2	4	0	0	3	2	4	4	0	1xx	2	3	1	2
Morden, Man.	3	4	0	0	3	1	4	4	0	-	2	1	0	4
Fort William, Ont.	3	4	0	1	3	1	3	1	0	0	2	2	0	0
Kapuskasing, Ont.	2	4	0	0	2	2	3	1	0	1x	2	1	2	0
St. Catharines, Ont.	1	4	2	0	2	0	1	2	0	1x	1	1	3	-
Guelph, Ont.	3	4	1	2	2	3	2	4	0	1x	1	3	4	0
Kemptville, Ont.	1	4	0	0	2	1	2	4	0	1xx	0	2	4	0
Ottawa, Ont.	2	4	3	0	1	1	3	4	0	0	1	1	4	0
Manotick, Ont.	1	4	1	0	2	1	2	3	0	-	1	1	3	0
Macdonald College, Que.	2	4	0	0	2	3	2	3	0	1x	0	1	4	0
Lennoxville, Que.	0	4	1	2	3	1	2	3	0	1	0	4	3	0
Ste. Anne de la Pocatiere, Que.	1	4	0	0	3	2	2	3	0	0	0	2	0	0
Normandin, Que.	2	4	1	0	1	1	2	2	0	1x	3	0	0	3
L'Assomption, Que.	2	4	1	0	2	3	3	4	0	0	1	3	3	0
Fredericton, N.B.	1	4	0	0	1	2	4	4	0	0	2	0	0	0
Kentville, N.S.	0	3	0	0	0	3	4	4	0	0	0	1	0	0
Pictou, N.S.	1	2	0	0	1	2	1	2	0	1xx	0	0	0	0
Lower South River, N.S.	1	1	0	0	0	1	3	2	0	0	1	0	0	0
Charlottetown, P.E.I.	0	4	0	0	1	1	1	1	0	0	0	0	0	0

x Proved to be S. Avenae by pathogenicity tests.
xx Proved to be lightly pathogenic to wheat, but not on oats. Therefore same as S. Avenae forma on wheat.

Note: 1 = trace; 2 = light; 3 = moderate; 4 = heavy.