I. DISEASES OF CEREAL CROPS

WHEAT

STEM RUST - Puccinia graminis Pers.

Alta.- Stem rust was first observed on wheat on Aug. 7. It was found in zones 8 to 11 in 12 fields out of 488 examined. Infection was never more than a trace. (See 1930 Report for explanation of zones).

Sask.- Stem rust was found at Broadview on July 17 and on the experimental plots at Saskatoon on July 18. Rust infection was heaviest in eastern and south-eastern Saskatchewan. Due to hot weather in late July and to the lack of reserve soil moisture much of the crop ripened rapidly, if not prematurely, and in consequence no damage was caused by rust except to late crops.

Man.- The first infection of stem rust was observed at Morden on June 20. By the end of June, traces of rust could be found in The Red River valley as far north as Winnipeg. On a rust survey trip made July 12 to 14, a trace or a low percentage of rust was observed on most plants at Jordan and on about 10 per cent of the plants at Morden. Traces of rust were present on common wheat throughout southern Manitoba as far west as Virden, but stem rust was difficult to find in areas, where durum wheat chiefly replaced common. On a similar trip on July 25 to 28 all plants of common wheat were affected in the Red River valley, infection reaching a maximum of 2 to 5 per cent between Portage la Prairie and Winnipeg. In the southwestern part about Deloraine the crops were light and rust was correspondingly light. Traces of rust were found there and at Brandon, Birtle and Dauphin, while in the Swan River valley traces of rust were present on 5 per cent of the plants.

At harvest time rust infection ranged from a trace to 5 per cent in the south-western and northern areas of the province, the damage being very slight. In the Red River valley the range of infection was from 5 to 15 per cent; damage was less than 2 per cent.

Durum wheats were in general only lightly infected.

Ont.- In a survey trip from Ottawa to Brockville in late July, only traces of stem rust were found on wheat.

On May 18 pycnia of Puccinia graminis were just appearing on the purple-leaved barberry in Lincoln county. Infection was

moderately heavy. Mature aecia were found on June 9 in the Arboretum, Ottawa, on Berberis vulgaris, B. vulgaris var. purpurea and B. sinensis.

The following barberry plantings were located by personal observation or from infromation supplied by others and have been examined:-

(1) North Gore, Carleton Co.: 12 small bushes on a church property.

(2) Central Experimental Farm, Ottawa: Escaped bushes were observed by Mr. Anderson on the Experimental Farm. A single purple-leaved bush was found on the Merivale road, near Carling Ave., Ottawa. It seems probable that this bush is an escape from the Experimental Farm.

(3) Ramsay Tp., Lanark Co.: The original hedge on an estate at Appleton was not seen, but this property is the centre, from which barberries have escaped and spread out over an area apparently of considerable extent. In 1930 eradication was attempted under The Barberry Shrub Act 1929 of Ontario, but from observations made this past fall it is evident that chemical methods must be used on the more difficult terrain and a more careful survey of the whole area must be made to determine how far the barberry has spread.

(4) Lanark village, Lanark Co.: Two barberries were found on an estate, but no escaped bushes were noticed.

(5) Town of Perth, Lanark Co.: The oldest hedge is probably that on a property at the north side of the town. Subsequently other hedges have been planted in the town. The barberry has escaped into three of the neighbouring municipalities.

(6) Andrewsville, Lanark Co.: A cultivated hedge was found on a farm on Lot 4, Con.A, Montague Tp. The barberry has spread up and down the river for at least 6 miles. The crops were examined in this area for stem rust. In none of the fields were more than traces of rust to be found and the barberry did not appear to play an important role this year in initiating what rust there was. However, the barberries evidently had been heavily rusted in the spring. (I.L. Conners)

Que.- Stem rust slightly infected 5 to 50 per cent of the stems in eastern Quebec. It caused no apparent damage as infection was late.

Cultivated barberries were noted at Chelsea station, Chelsea and at the monument "Aux Braves", Chemin de St. Foy, Quebec city. Mature aecia were found on common and purple barberry at Macdonald College on June 16. First infections were observed on June 2, the last on July 28.

N.B.- Garnet was slightly infected at the Experimental Station, Fredericton. Practically no rust was to be found throughout the province.

P.E.I.- Wheat was heavily infected by stem rust late in the season in all parts of the province, and was seriously damaged. Stem rust appears to be on the increase in recent years, possibly due to favourable weather conditions late in the season.

LEAF RUST - Puccinia triticina Erikss.

Alta.- Leaf rust was found in zones 8 to 11 in 20 fields out of 488 examined. The infections varied as follows: in 11 fields, trace; in 3, light; in 4, medium; and in 2, heavy.

Sask.- Leaf rust was found in 98 out of 298 fields examined. It was first reported at Saskatoon on July 6, and was common in most fields in Saskatchewan by July 28. Infections were light in southern Saskatchewan, while they were very heavy and severe at Kinistino and Beatty in zone 10.

Man.- Leaf rust appeared early this year. Primary infections were found at Morden on June 12 and at Winnipeg on June 16. It was quite severe in southern Manitoba, infections ranging from 25 to 80 per cent. In northern Manitoba range of infection was from 5 to 25 per cent.

Ont.- In six fields of wheat between North Augusta and Ottawa in late July, infection ranged from 20 to 70 per cent.

Que.- Leaf rust was first observed at Macdonald College on June 30. Late infections ranged from 10 to 95 per cent on individual leaves. In eastern Quebec 75 per cent of the leaves were heavily infected with rust, which caused them to dry up prematurely.

N.B.- Red Fife and Huron wheat were moderately infected in Carleton and York counties.

P.E.I.- Leaf rust varied from a trace to very heavy on Aug. 1. During the next month it became very heavy in all parts of the province.

STRIPE RUST - Puccinia glumarum (Schmidt) Erikss. & Henn.

B.C.- Stripe rust was reported once from Vancouver island.

Alta.- Stripe rust was first observed in southern Alberta on July 8 on Hordeum jubatum. In central Alberta it was not seen until Aug. 10, when it was collected on the same grass. During

late August and September it became general in this region.

Stripe rust failed to overwinter in the tests and observations made on plants, which were heavily rusted late in October, 1931. The rust did not develop on the new foliage in April and May, when moisture conditions were apparently very favourable.

Sask.- Stripe rust was collected on Agropyron at Whitewood, Tp. 16, R.2, W. 2nd Meridian on Sept. 15. This collection is the most easterly made in Canada, being only some 35 miles from the Manitoba boundary. The rust was collected the previous day on Hordeum jubatum, at Regina and McLean, Tp. 18, R.16, W. 2nd M.

BUNT - Tilletia Caries (DC.) Tul. & T. foetens (Berk.) Tul.

Besides the field surveys in the separate provinces, Table 1 summarizes the data collected from the records of the Western Grain Inspection Division from Aug. 1, 1931 to October 31, 1932 on the amount and percentages of "smutty" wheat inspected. These data were kindly supplied by Dr. W.F. Hanna.

It will be seen from Table 1 that there has been a considerable reduction in the amount and percentage of "smutty" wheat inspected in the three months ending Oct. 31, 1932 in comparison with the corresponding period in 1931. The chief factor has been the marked decrease in the number of cars of durum wheat graded "smutty" in the latter period, the percentage falling from 5.7 per cent (6.5 per cent for the year 1931-32) to 1.2 per cent. The downward trend begun in 1931 has been definitely continued in 1932 in all kinds of wheat. The results of field inspections to be reported below confirm the inspection data.

Alta.- Bunt was found in 6 fields out of 488 inspected in widely scattered zones. The highest infection observed was one per cent.

Two cars of Garnet wheat grown at Chapman in 1932 graded "smutty" when inspected at Edmonton (1). This grain contained no bunt balls and lacked the characteristic odour of wheat infected with bunt. On examination the spores were found to be reticulated, but much smaller than those of Tilletia Caries. Examination of a sheaf of grain from the field, where the wheat was grown, disclosed the presence of a large percentage of weeds especially dock-leaved persicary, Polygonum lapathifolium L. Approximately

(1) Aamodt, O.S. & Malloch, J.G. "Smutty" wheat caused by Ustilago utriculosa on dock-leaved persicary. Can. Journ. Research 7:578-582, pl.1. 1932.

Table 1. Wheat Bunt in Western Canada

Period of Inspection	Cars Inspected	Cars "Smutty"	Percentage "Smutty"
3 months: Aug. 1, 1931 - Oct. 31, 1931			
Hard Red Spring	53,794	607	1.1
Alberta Red	57	8	14.0
Durum	3,509	200	5.7
All wheat	57,456	816	1.4
1 year: Aug. 1, 1931 - July 31, 1932			
Hard Red Spring	174,182	1,350	0.8
Alberta Red Winter	102	8	7.8
White Spring	262	0	0.0
Amber Durum	5,135	333	6.5
All wheat	179,768	1,695	0.9
3 months: Aug. 1, 1932 - Oct. 31, 1932			
Hard Red Spring	92,398	538	0.6
Alberta Red Winter	88	11	12.5
White Spring	85	1	1.2
Amber Durum	4,372	46	1.2
All wheat	97,001	599	0.6

one half of the persicary was heavily infected with a smut, Ustilago utriculosa (Nees) Tul. Aamodt and Malloch demonstrated conclusively that no bunt spores were present on the seed, but that the persicary smut had much the same effect on the flour and bread made fromthis "smutty" wheat as wheat contaminated with bunt spores. Thus, occasionally weeds may have a direct effect on the quality of crop from fields, in which they are growing.

Sask.- Bunt was observed in 6 fields out of 298 inspected, the highest infection being 4 per cent. Tilletia caries was found in 3 and T. foetens in one out of 4 samples examined,

Man.- Ten per cent of bunt was observed in one field at Neepewa.

Que.- Two fields showing 5 per cent of bunt were seen in Kamouraska county.

LOOSE SMUT - Ustilago Tritici (Pers.) Jens.

Alta.- Loose smut was found in 14 fields out of 488 examined, the average damage in infected fields being 0.6 per cent.

Sask.- A trace of loose smut was observed in 7 fields out of 298 examined.

Man.- Loose smut was found in 45 fields, causing an average damage of 1.6 per cent. Of these, 23 fields were sown with Reward wheat, the average damage being 2.2 per cent.

Ont.- A trace to 2 per cent of loose smut was reported in 3 fields out of 6 examined in Carleton and Grenville counties.

Loose smut was widespread and prevalent in Middlesex county. (G. C. Chamberlain),

Que.- A trace to 8 per cent of loose smut was observed in spring varieties at Macdonald College. In one field in L'Islet county 15 per cent of the heads were destroyed.

P.E.I.- In a survey of the province the average infection was high, being 22.5 per cent for all varieties grown. The destruction of 20 per cent of the heads was common in Huron and Red Fife in some localities (R. R. Hurst).

BLACK CHAFF - Pseudomonas translucens J.J. & R. var. undulosa (S.J. & R.) Stev.

Sask.- Ninety per cent or more of the leaves were severely affected by a bacterial leaf spot in a plot of Golden Ball at the Experimental Farm, Indian Head. This leaf spot was common and intermixed with Septoria leaf spot on Australian White and Hard Federation. It also caused moderate damage in 5 fields out of 298 examined. This spot is referred, with considerable doubt, to black chaff.

Man.- Black chaff was observed in 10 fields causing slight damage.

BASAL GLUME ROT - Pseudomonas atrofaciens (McCull.) Stev.

Alta.- Basal glume rot was found in 4 fields out of 488 examined. Infection was heavy in one field.

Sask.- Basal glume rot caused a trace to slight damage in

11 fields out of 298 examined

Man.- This disease was found in the following places; Morden, trace; Swan River and Benito, 2 per cent of the plants infected.

ERGOT - Claviceps purpurea (Fr.) Tul.

Alta.- Ergot was found in 6 fields, all in zone 10, out of 488 examined. In one field 80 per cent of the heads contained from 3 to 4 ergots each. In another field in the same district 50 per cent of the heads contained ergots.

Sask.- A trace of ergot was found in 1.4 per cent of the fields examined.

P.E.I.- A trace of ergot was observed in Huron wheat at the Experimental Station, Charlottetown.

POWDERY MILDEW - Erysiphe graminis DC.

Alta.- Traces to light infections were common especially in the northern part of the province.

Sask.- A trace of powdery mildew was seen on Hard Federation at the Experimental Farm, Indian Head.

Que.- Winter wheat was severely infected with powdery mildew at Macdonald College. On June 2, 80 per cent of the plants were infected and at maturity the heads were only half filled.

P.E.I.- Traces of powdery mildew were present on Huron at the Experimental Station, Charlottetown.

GLUME BLOTCH - Septoria nodorum Berk.

Alta.- Glume blotch was found in 26 fields out of 488 examined. Infection was as follows: trace, 12 fields; light, 8; medium, 5; heavy, 1.

Sask.- Glume blotch was observed mostly on prostrate culms, in 28 fields out of 298 examined. The damage was a trace to slight.

N.B.- A trace of glume blotch was found in one field in York county.

P.E.I.- Glume blotch caused slight damage on Huron wheat in Queens county.

SPECKLED LEAF BLOTCH - Septoria Tritici Desm.

Alta.- Speckled leaf blotch was found in 7 fields out of 488

examined, infection being a trace to medium.

Sask.- Speckled leaf blotch was common, but not serious on Australian White wheat at Indian Head.

Leaf spots, the causal organism of which was undetermined, caused a trace to moderate damage in 24 fields out of 298 examined.

FOOT ROTS

As the majority of the plant pathologists, who are working on cereal diseases in western Canada, have agreed that the term "foot rot" is appropriately used for those diseases, which occur on the basal parts of the culm and the adjacent portions of the roots, it will be used here in preference to "root rot". The latter term will be used only for those diseases, which occur exclusively on the roots of cereals.

Alta.- Take-all (Ophiobolus graminis Sacc.) was found in 33.2 per cent or 162 fields out of 488 examined. The average damage in the infected fields was estimated to be 3.3 per cent. The disease was found to be most prevalent and slightly more destructive in zones 9, 10, and 11. However, in most parts of southern Alberta the soil was too dry for typical take-all symptoms to develop and in consequence it may be more prevalent there than these figures indicate.

Foot rot attributed to Helminthosporium sativum Pamm., King & Bakke and Fusarium spp. was found in 48.8 per cent or 238 fields out of 488 examined. It was about equally prevalent in all parts of the province. The average damage in the infected fields was 1.2 per cent. In all fields affected with foot rot, the above organisms were considered to be the cause unless typical take-all symptoms were observed.

Sask.- Take-all was found in 18.1 per cent or 54 fields out of 298 examined. The average damage was usually a trace, but in zone 10 it was slight.

Foot rot due to Helminthosporium sativum and Fusarium spp. was found in 95.7 per cent or 285 fields out of 298 examined. On the average 50 per cent of the plants were infected; the damage was slight to moderate. This disease was widespread in the dry areas, where the actual damage was very difficult to assess.

Prematurity blight (cause unknown) was observed in 10 fields out of 298 examined; the damage was a trace.

Man.- Foot rot caused by Fusarium, Helminthosporium, etc. was found in 87.7 per cent or 135 fields out of 154 examined. Damage was as follows: trace, 33; slight, 69; medium, 22; severe, 11.

Ont.- A sample of Reward wheat grown at Packenham gave a germination of only 60 per cent when it was tested in the Seed Branch Laboratory, Ottawa. Darkened and discoloured seeds were conspicuous in the sample. These were picked out, surface sterilized and plated on agar. None of the seed was free of fungi, 50 per cent yielding Helminthosporium sativum, the rest non-parasitic species as Alternaria, Macrosporium, etc.

BROWNING ROOT ROT - Pythium spp.

Alta.- Browning root rot caused 15 per cent damage in one field in zone 8.

Sask.- Browning root rot was observed in 31 fields out of 298 examined. It was estimated that 19 per cent of the plants were infected, the damage was slight. Pythium oospores were found in the lesions of all specimens examined. In one field at Kinistino (zone 10), 90 per cent of the plants were infected. (H. W. Mead).

Browning root rot was very severe on several summerfallow fields between Environ and Sonningdale. Severely affected fields were also found at Scott, Wilkie, Saskatoon, Dana and Lanigan. In general, browning root rot appeared to be more severe on lighter land than it has for the past few years. Invariably it is worse on wheat on early-ploughed, well-worked summer fallow (T. C. Vanterpool).

Ont.- Durum wheat was found heavily infected with root rot caused by Lagena radicicola Vanterpool & Ledingham at Vineland Station on May 27. (J.H.L. Truscott).

HEAD BLIGHT - Giberella Saubinetii (Mont.) Sacc. & Fusarium spp.

Man.- A trace of head blight was seen at Benito and Brandon.

P.E.I.- A moderate infection was noted late in the season on Huron and White Fife at the Experimental Station, Charlottetown.

BRITTLE DWARF - Cause unknown

Sask.- Brittle dwarf was described for the first time in the Canadian Plant Disease Survey for 1931, p.11. This year early in August, it was found in one field each at 3 places in central or southern Saskatchewan as follows: Kindersley, Aberdeen and Balgonie. In each field the damage was a trace. In addition it was common in the Plant Pathology and the Field Husbandry plots at Saskatoon, where it was first observed. Diseased plants occurred most frequently on the edges of the plots.

WHITE TIP - Cause unknown

Sask.- White tip was observed in 3 fields, causing about 10 per cent damage in two. This disease is probably caused by extremely hot weather during the filling of the heads.

SEED INJURY

Sask.- In 2 fields in zone 9, injury apparently due to Penicillium spp. was observed on seedlings which were about 4 inches high and one month old. The estimated damage was one per cent.

DROUGHT INJURY OR FIRING

Sask.- Early in July, a survey trip through central Saskatchewan including the districts of Regina, Moose Jaw and Indian Head, revealed a large amount of Drought Injury or Firing of wheat. At about heading time there is a distinct browning and dying of the leaves. The plants are also noticeably retarded. It is caused in all probability by a lack of reserve moisture especially at the lower depths. This trouble is sometimes called browning, but it should not be confused with browning root rot (P. M. Simmonds and B. J. Sallans).

GLUME DARKENING - Cause unknown

Sask.- Glume darkening was observed in Reward at Indian Head.

NEMATODE DISEASE - Heterodera punctata Thorne

Sask.- Slight damage was caused in one field in zone 7 by this nematode.

Aphelenchus avenae Bastian was found as a saprophyte in 11 places in one field near Edmonton.

PHYSIOLOGICAL DISEASES

A memorandum on physiological or mechanical diseases was prepared in June 1932 by Professor T. C. Vanterpool, University of Saskatchewan, Saskatoon, after personal consultation with Prof. W. P. Fraser and Dr. P. M. Simmonds and correspondence with Drs. J. H. Craigie, A. W. Henry and G. B. Sanford. His memorandum has been copied below with some alterations and omissions. In addition to the memorandum, Prof. Vanterpool submitted excellent photographs of straw break and stem kink, which unfortunately cannot be reproduced here.

I Straw Break (Breaking over of Wheat Straw)

Straw Break is characterized by an abrupt breaking over of the culm usually about a half to one inch above the second node.

This break is seldom complete and consequently the plants bend upward almost invariably at the node immediately above the break and ordinarily attains maturity. The heads of affected plants although upright, are considerably nearer the ground, but are nevertheless readily gathered in harvesting operations. On the Canadian prairies, the breaking over occurs after the middle of July and isolated plants scattered throughout the field are affected. A stricken field does not have the appearance of lodged grain. The bends, however, always occur in one direction thereby indicating that strong winds and rain are responsible for the final break, although the primary cause of the weakness in the straw is not known. In some instances foot-rotting fungi may be the indirect cause.

Plants affected with straw break are ordinarily free from any signs of hail damage. However, plants slightly bent over by hail have been found which have regained an upright position in the manner described above.

Straw break is of special interest for many farmers confuse it with hail injury and expect compensation from hail insurance companies when straw break occurs in fields which happen to be insured.

Haskell (1) has described a breaking over of wheat straw which appears to be identical with straw break.

References:

1. Haskell, R. J. Breaking over of wheat straw. U.S.D.A. Plant Disease Reporter 14:157-158. 1930.

2. Canadian Plant Disease Survey Rept. 11:11. 1932.

3. U.S.D.A. Plant Disease Reporter 14:224. 1930 (Apparently straw break and not crinkle joint as reported).

4. U.S.D.A. Plant Disease Reporter Suppl. 81:52. 1931.

II. Stem Kink (Contortion, Krinkle Joint, Crinkle Joint)

Stem Kink was first reported from western Canada as Krinkle Joint (2). It is recognized by a kink, bend, or buckling of the lower internodes of the stem immediately above the nodes, usually above the second. As the plant matures, the stem breaks at this point, the plant falls over and usually produces no grain. It is believed that unfavourable meteorological conditions cause the culm and head to be firmly held in the upper enclosing sheaths, which fail to expand and open normally. On the return of good growing conditions the stem buckles in the region of greatest meristematic activity producing a characteristic kink. It is

possible that much of the crinkle joint of various observers belongs to this category, although stem distortion in the meristematic region may deviate from the type here described. It seems highly probable that the contortion of wheat stems as described from New South Wales (1) is identical with stem kink.

References:

1. Darnell-Smith, G.P. Wheat straw breaking down through "Contortion" or the attacks of insects. Agr. Gazette, N.S.W. 25:377-378. 1914.

2. Drayton, F.L. A summary of the prevalence of plant diseases in the Dominion of Canada 1920-1924. Dom. Dept. Agr. Bull. 71 n.s.:9-10. 1926.

III. Distortion and Buckling of the Spike-bearing Internode.

The sheath enclosing the head fails to unroll normally with the result that, as growth continues, there is a buckling of the internode bearing the head, more commonly called the neck, immediately below the head. Distortion of the head also often occurs. The trouble is more common in bearded varieties. Observations made by Mr. B. J. Sallans indicate that the sheath enclosing the head may sometimes fail to unroll on account of being injured by hail. Other adverse meteorological conditions may produce the same effect. Similar distortions have been found where the affected parts contain bacteria. This abnormality also occurs in barley and oats.

OATS

STEM RUST - Puccinia graminis Pers.

Alta.- Stem rust was observed in zones 8 to 10 in 11 out of 152 fields examined. The damage was a trace in 9 fields and light in 2..

Sask.- Stem rust heavily infected oats in the extreme southeastern part of the province, where the damage was moderate. In other parts of Saskatchewan, infections were light and the damage was a trace to slight. Rust appeared late, during late July and early August in both the south and north. It was collected July 28 on wild oats at Saskatoon.

Man.- Primary infections of stem rust were found on oats on June 29 at Winkler. In general oats was found slightly more heavily infected than wheat in most parts of the province on a survey trip made July 25 to 28. No appreciable damage to the crop occurred except to very late fields, which were few in number.

Ont.- Out of 67 fields examined between Ottawa and Brockville in late July, no rust was found in 29. Traces were abundant near Manotick, Tincap and between North Augusta and Merrickville. Between Carsonby and Becketts Landing, only an occasional field showed rust. Traces of stem rust were present at Franktown and Smiths Falls, while near Kilmarnock rust infection was about 3 per cent.

Que.- Stem rust was first collected on oats on July 25 at Macdonald College. Infection was never more than slight. In Kamouraska county infection was slight. In one field of Alaska, 15 per cent of the stems bore pustules.

N.B.- A trace of stem rust was found in one field in Westmoreland county.

N.S.- A heavy infection of stem rust was observed in Halifax county; in 2 fields in Colchester county infection was slight.

P.E.I.- Traces of stem rust were found on all varieties.

CROWN RUST - Puccinia coronata Corda

Sask.- Traces of crown rust were found in 5 fields out of 77 examined. It was mostly on the lower leaves or in late fields.

Man.- A light sprinkling of crown rust was present as far north as Benito. It caused no appreciable damage. Three pustules of rust were found on a buckthorn hedge at Macdonald on June 23.

Ont.- On a survey trip between Ottawa and Brockville in late July, crown rust was found in 42 fields out of 80 examined. In 29 fields only traces of rust occurred but around Merricksville, Andrewsville and Burritts Rapids, heavy stands especially on the bottom lands near the Rideau river commonly showed infections ranging from 40 to 60 per cent. Escaped buckthorns are plentiful in this area. In one field at North Augusta, 10 per cent of rust was present, but no buckthorn was found. Traces of crown rust were also found at Kilmarnock, Smiths Falls and Franktown.

The following buckthorn plantings were located by personal observation or from information supplied by others and have been examined, except where noted.

(1) Merivale Road, near City View, Carleton Co.: Escaped bushes were noted along the road, but the source was not determined.

(2) Central Experimental Farm, Ottawa: Escaped bushes are common in the Arboretum. Whether they may have escaped from the Arboretum was not determined.

(3) Ramsay Tp. Lanark Co.: Escaped bushes were seen opposite a buckthorn hedge 15 to 20 ft. high growing on a farm on Lot 9, Con. 9. A similar hedge is said to occur on a farm on Lot 11, Con. 8. The actual area, over which buckthorn has here escaped, was not determined.

(4) Town of Perth, Lanark Co.: The original hedge was on what is now the Hospital property. Escaped bushes are extremely abundant in the town, but they may be found in at least three of the adjoining municipalities.

(5) Lanark village, Lanark Co.: A small buckthorn hedge was found on the south side of the village. It has escaped over the neighbouring hillside. Two buckthorns were found on a farm on Lot 6, Con. 11, Drummond Tp. near Lanark village. No escapes were found between the farm and the village.

(6) In the Andrewsville area, a buckthorn hedge was found across the Rideau river in Wolford Tp. Grenville Co. It has spread far and wide on both sides of the river. The presence of escaped buckthorn in this area has made it unprofitable to grow oats on account of the losses from crown rust.

(7) Antrim area, Carleton Co.: Hedges of buckthorn occur on adjacent farms on Lot 11, Con. 6, Fitzroy Tp. The bushes have escaped up to at least 1½ miles from the original plantings. (See 1930 Report).

(8) Eastons Corners, Grenville Co.: A buckthorn hedge was found here. Whether or not the bush has escaped was not determined

(9) West of Spencerville, Grenville Co., buckthorns have escaped, but this area has not been investigated. Complaints and specimens of heavily rusted oats were sent to the Division of Botany several years ago.

It has been observed personally and reported to me by observers at first hand, that the buckthorn is responsible for serious epidemics of crown rust on oats growing in close proximity to the bush. (I. L. Conners).

Que.- Buckthorns infected with crown rust were observed on June 2, at Macdonald College and vicinity. Aecia were mature on June 16. Only traces of crown rust were found this year at Macdonald college. Usually oats is moderately to severely infected.

N.B.- Victory was moderately infected with crown rust at the Experimental Station, Fredericton.

N.S.- Infections of crown rust ranged from a trace to 5 per cent in infected fields in Colchester, many being free from rust. In Pictou county a trace was found in one field.

P.E.I.- Crown rust was first observed on August 13 at Charlottetown. A survey in early September showed that this rust was widespread in the province and caused slight to severe damage. Buckthorns were moderately infected with crown rust in Queens county.

SMUT - Covered Smut - Ustilago levis (Kellerm. & Swingle) Magn. and Loose Smut - Ustilago Avenae (Pers.) Jens.

Alta.- Covered smut was widespread in Alberta; 23 per cent or 35 fields out of 152 examined were smutty. The average damage was 5.2 per cent in the infected fields or 1.2 per cent loss for all fields. Infections ranging from 25 to 40 per cent were observed in several fields. Loose smut was found in only 5 fields, the highest infection being observed was 3 per cent.

Sask.- Covered smut was found in 29 out of 77 fields examined, the average damage being slight. Loose smut was found in only 2 fields; the average damage was a trace.

Man.- Covered smut was reported from 11 fields, the average damage in the infected fields being 14.4 per cent.

Ont.- In a survey trip from Ottawa to Brockville in late July, smut was found in 57 fields out of 78 examined. In 46 of these fields the species present was recorded; 2.5 per cent of the heads were destroyed by covered smut and 2.7 per cent by loose. The highest infections were: covered smut, 16 per cent; loose, 30 per cent. Smut seemed to be more prevalent between Ottawa and Manotick, than elsewhere.

Que.- About Macdonald College, infections of loose smut varied from a trace to 10 per cent. In Kamouraska county, 5 per cent of loose smut was found in two fields examined and 30 per cent in a third; a trace of covered smut was also found in one field.

N.B.- Banner oats were slightly infected by both loose and covered smuts at the Experimental Station, Fredericton. A specimen of loose smut was also received from Bath.

N.S.- Covered smut destroyed 3 per cent of the heads in one field in Colchester county. Loose smut infections were reported

as follows: in Colchester county, 10 per cent in 3 fields; in Pictou county, 3 per cent in one field.

P.E.I.- Loose smut of oats was general in the province this year. Recorded infections ranged from 5 to 10 per cent.

HALO BLIGHT - Pseudomonas coronofaciens (Ch. Elliott) Stev.

Alta.- Halo blight was reported from 56 fields out of 152 examined. The damage was assessed as follows: trace, 42 fields light, 14. The disease was most prevalent in zones 9 and 10.

Sask.- This blight was found in 3 fields out of 77 examined; 10 to 20 per cent of the plants were moderately affected.

Man.- Halo blight was general at Morden.

Que.- This disease was observed at Macdonald College the last week of May when the plants were 6 to 8 inches high. Infections were slight to moderate.

BACTERIAL STRIPE BLIGHT - Bacterium (Pseudomonas) striafaciens Ch. Elliott.

Alta.- Bacterial stripe blight was found in 58 fields out of 152 examined and is fairly widespread. Damage was reported as follows: trace, 25 fields; light to medium, 33 fields.

Man.- A bacterial leaf disease badly injured the leaves at Winnipeg.

Ont.- Blade blight caused by Phytomonas Avenae (Manns.) Bergey et al, was present on specimens from Sturgeon Falls. The leaves were seriously affected on account of the damage done by secondary fungi (D. H. Jones).

FOOT ROTS

Alta.- Foot rot caused by Fusarium spp. was found in 2 per cent of the fields. Damage was a trace except at Beaverlodge, where it was reported to be heavy.

Sask.- Foot rot attributed to Helminthosporium sativum and Fusarium spp. affected 57 fields out of 77 examined. In the infected fields, 26 per cent of the plants were diseased on the average and the damage was slight.

A trace of prematurity blight was found in 3 fields.

Man.- Helminthosporium-Fusarium foot rot caused very slight

damage in 14 out of 19 fields examined.

N.B.- Foot rot due to Helminthosporium was widespread; the damage was slight.

BLAST - Cause unknown

Alta.- At least a trace of damage from blast was present in all fields examined. Estimated losses of 15 to 20 per cent were observed in a few fields.

Sask.- A trace to slight damage was recorded in 40 per cent of the fields. One field of wild oats near Saskatoon was severely blasted.

N.B.- Blast was widespread; the damage was slight.

P.E.I.- Traces of blast were found at the Experimental Station, Charlottetown.

LEAF BLOTCH - Helminthosporium Avenae Eidam

Alta.- Leaf blotch caused a trace of damage in one field out of 152 examined.

Ont.- Two specimens of an undetermined leaf blight collected in Carleton county in 1930 were found on examination to be affected with leaf blotch. The leaves were severely withered.

P.E.I.- Leaf blotch caused moderate damage to 25 per cent of the leaves in fields in Queens and Prince counties.

SPECKLED LEAF BLOTCH - Leptosphaeria avenaria Webber (Septoria Avenae Frank)

Que.- Speckled leaf blotch was found on July 14 at Macdonald College. Infection varied from slight to moderate according to the variety and location in the field.

BARLEY

STEM RUST - Puccinia graminis Pers.

Alta.- A trace of stem rust was found in 2 fields in zone 10 out of 75 examined.

Sask.- Stem rust was found in 6 fields out of 27 examined. Damage was moderate in zone 1, nil or a trace in other zones.

Man.- Infections of stem rust varied from 10 to 35 per cent in the Red River valley; the damage was slight.

Ont.- Traces of stem rust were found in late July in 4 fields in Carleton and Grenville counties.

N.B.- A trace of rust was found in 2 fields in York and Sunbury counties.

P.E.I.- Traces to 10 per cent of rust were found at the Experimental Station, Charlottetown.

LEAF RUST - Puccinia anomala Rostr.

Sask.- A trace of leaf rust was present in 3 fields out of 27 examined. It was found rather late in the season on late barley.

Man.- A trace to light infections of leaf rust were found at Ste. Anne des Chênes, Poplar Point and Portage la Prairie.

Ont.- A trace to 10 per cent of leaf rust was found near Burritts Rapids.

Que.- Barley was slightly to moderately infected with leaf rust at Macdonald College.

COVERED SMUT - Ustilago Hordei (Pers.) Kellerm. & Swingle

Alta.- Covered smut was present in 25 out of 75 fields examined. The two highest infections recorded were 30 per cent in a field in zone 8 and 15 per cent in one in zone 11. The average damage in infected fields was 2.9 per cent. Covered smut is thus about one half as prevalent and destructive as it was last year.

Sask.- A trace to moderate infections of covered smut were reported from 4 fields out of 27 examined.

Man.- Infections of 2 and 5 per cent respectively were reported from 2 fields.

Ont.- A trace of covered smut was recorded in 2 out of 3 fields examined in Carleton county.

Que.- A sample of barley seed very heavily inoculated with covered smut was received from a Montreal seed house. It was from

a crop grown this year in the province. Diseased specimens were also received from Timiskaming.

N.B.- Slight infections of this smut were found in all varieties in the test plots at Fredericton.

P.E.I.- In 58 fields examined throughout the province, 4 to 50 per cent of the heads were destroyed by covered smut in the infected fields.

LOOSE SMUT - Ustilago nuda (Jens.) Rostr.

Alta.- Loose smut was found in only 3 fields out of 75 examined. The highest infection was 3 per cent.

Sask.- A trace of loose smut was recorded from 2 fields out of 27 examined.

Ont.- A trace of loose smut was found in one out of 2 fields examined near Ottawa.

Que.- Infections of loose smut varied from a trace to 4 per cent in the different varieties at Macdonald College.

N.S.- Infections ranging from 10 to 20 per cent were reported in 3 fields in Colchester and Pictou counties.

P.E.I.- Infections of loose smut varied from 0.5 to 15 per cent in Queens county.

SPRIPE - Helminthosporium gramineum Rabh.

Alta.- Stripe was reported in 4 fields in zone 10 out of 75 examined. It did very little damage this year, infections ranging from a trace to light.

Sask.- Traces of stripe were found on Colsess barley at Saskatoon and on this and other varieties at Indian Head.

Ont.- A trace of stripe was noticed in one field near North Gower.

Que.- Stripe slightly to moderately infected 6-rowed varieties at Macdonald College.

N.B.- Stripe was widespread on several varieties, but the damage was slight.

P.E.I.- A few to 10 per cent of the plants were found affected in fields in Queens and Prince counties. The average damage was slight.

FALSE STRIPE - Cause undetermined.
Alta.- A trace of false stripe was found in 2 fields.

NET BLOTCH - Pyrenophora teres (Died.) Drechsl.
(Helminthosporium teres Sacc.)
Alta.- Net blotch was present in 28 out of 75 fields examined, it was most prevalent in zones 9 and 10. The damage was estimated as follows: trace, 12 fields; light, 16.

Sask.- Net blotch was found in 11 fields out of 27 examined. The average damage in the infected fields was slight.

Man.- Medium infections of net blotch were found in two fields at Basswood and Poplar Plains.

Ont.- Net blotch was found in 3 fields in Carleton county; 20 to 50 per cent of the leaves were affected, damage being a trace.

Que.- Net blotch severely infected one 2-rowed variety at Macdonald College.

N.B.- A trace of net blotch was found in one field in Doak Settlement, York county.

P.E.I.- Traces of net blotch were found everywhere, but the damage was insignificant.

SPOT BLOTCH - Helminthosporium sativum P.K. & B.
Alta.- Spot blotch was found in 19 fields, chiefly in zone 10, out of 75 fields examined; the damage was a trace in 5 fields and slight in 14.

Man.- Spot blotch was reported from two places, being fairly severe at Souris, and slight at Ste. Anne des Chênes.

Que.- This disease was severe on one 2-rowed variety at Macdonald College.

FOOT ROTS

Sask.- Foot rot attributed to Helminthosporium sativum and Fusarium spp. was found in 23 fields out of 27 examined. In the infected fields over 40 per cent of the plants were attacked; the damage was slight to moderate.

Man.- Helminthosporium-Fusarium foot rot caused slight damage in 14 fields.

N.B.- Foot rot caused by Helminthosporium was widespread, but infection was slight in the plots at the Experimental Station, Fredericton.

P.E.I.- Each year barley is affected by foot rot in the late seedling stage. Although the plants appear to be seriously injured at that time, they generally recover. Fusaria have been isolated from diseased plants.

SCALD - Rhynchosporium Secalis (Oud.) Davis

Alta.- Scald was found in 5 fields in zone 10; the damage was a trace in 2 fields and light in 3.

ERGOT - Claviceps purpurea (Fr.) Tul.

Alta.- A trace of ergot was present in one field.

Sask.- Barley was moderately affected with ergot in one field at Saskatoon.

N.B.- Ergot was present in one per cent of the heads in a field at Fredericton.

P.E.I.- A trace of ergot was found in one field.

POWDERY MILDEW - Erysiphe graminis DC.

P.E.I.- Traces of powdery mildew were recorded on O.A.C. 21 and Duckbill at Charlottetown.

BACTERIAL BLIGHT - Pseudomonas translucens J.J.R.

Sask.- A trace of bacterial blight was found on Colsess barley in the Field Husbandry plots, Saskatoon.

BRITTLE DWARF - Cause unknown

Sask.- Brittle dwarf was found for the first time on barley when the disease was observed on Colsess in the Field Husbandry

Plots at Saskatoon the first week of August by Messrs. W. G. Sallans and R. J. Ledingham. About 7 per cent of the plants were affected. The symptoms on barley are very similar to those on wheat.

RYE

STEM RUST - Puccinia graminis Pers.

Sask.- Considerable rust was found on late volunteer rye in the Field Husbandry plots, Saskatoon. Traces were found in one field in zone 1.

LEAF RUST - Puccinia dispersa Erikss.

Alta.- A trace of leaf rust was found in one field out of 8 examined.

Sask.- A light sprinkling of leaf rust was observed on July 9 on the experimental plots, Indian Head. In 3 fields out of 8 examined, infection varied from a trace to moderate.

Man.- A trace of leaf rust was recorded from Foxwarren and Morden.

Ont.- Leaf rust was common on lower leaves of rye in Lincoln county; damage was negligible.

Que.- Rye was moderately infected with leaf rust at Macdonald College; damage was slight.

ERGOT - Claviceps purpurea (Fr.) Tul.

Alta.- Ergot was found in 4 fields out of 8 examined. In one field in zone 8 the damage was heavy, as 90 per cent of the heads were infected. Traces only were present in the other fields.

Sask.- Ergot was found in 5 fields out of 8 examined; damage was slight. At the Experimental Farm, Indian Head, 4 to 5 per cent of the heads contained from one to 3 ergots each.

POWDERY MILDEW - Erysiphe graminis Pers.

Ont.- Powdery mildew was common on winter rye in Lincoln county; damage was negligible.

Que.- Moderate infections of powdery mildew were recorded at

Macdonald College, with no apparent damage

BACTERIAL BLIGHT - Pseudomonas translucens J.J.R. var. Secalis (J.R. & G.) Stapp

Alta.- Bacterial blight caused light damage in one field.

Sask.- A stem streak, possibly due to bacteria, caused slight damage in one field.

FOOT ROTS

Sask.- Foot rot attributed to Helminthosporium sativum and Fusarium sp. was found in 6 out of 8 fields examined. The damage was slight.

Five per cent of the plants in one field were affected by prematurity blight.

Man.- Foot rot caused slight damage in 8 fields examined.

STERILITY

Sask.- Ten to 25 per cent of the heads were sterile in Dakold etc. in the Field Husbandry plots, Saskatoon. This trouble is ordinarily attributed to hot, dry winds at heading time, but such was not true this year. A study of the meterological and soil conditions at that time suggests that the trouble in 1932 was due to the upper layer of soil being too dry at a critical time for the plant. The majority of the sterile heads were on the shorter and presumably weaker culms. This trouble was also observed on field trips.