NOTES ON BACTERIAL DISEASES OF CEREALS AND SOME OTHER CROP PLANTS'

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Abstract

My purpose is to place on record the results of isolations of bacterial plant pathogens made chiefly from cereal host plants collected mainly in Manitoba in the period 1932–71 and to make as many of the cultures of pathogens as possible available for genetic and taxonomic studies by other investigators. Hypersensitivity to bacteria is shown to be readily demonstrable in cereal seedlings and an inhibitory factor that develops following the injection of heat-killed bacteria was found to be readily separable from the cells by either centrifugation or Seitz filtration. A unique method for finding evidence of the relative field resistance of cereal varieties to bacterial plant pathogens by comparison with a standard variety over a period of years is described. The results are given with infection by Xanthomonas translucens (J.J. and R.) Dowson emend. Hagborg in wheat and barley. A case is stated for the use of the taxon formae speciales in the classification of bacterial plant pathogens.

Résumé

Mes recherches ont pour objet d'enregistrer les résultats des prélèvements de bactéries phytopathogènes, principalement à partir de plants de céréales hôtes récoltés surtout au Manitoba de 1932 à 1971, et de rendre accessible le plus grand nombre possible de cultures de microbes pathogènes pour les études génétiques et taxonomiques des autres chercheurs. Il est facile de démontrer l'hypersensibilité des plantules de céréales aux bacteries, et on a constaté qu'un facteur inhibiteur qui se développe après injection de bactéries détruites par la chaleur était facilement separable des cellules par centrifugation ou filtration de Seitz. Le present rapport expose une méthode originale d'établie la resistance relative des variétés de céréales sur pied aux bacteries phytopathoghes, par comparaison avec une variété courante pendant quelques années. Les résultats portent sur l'infestation du blé et de l'orge par Xanthomonas translucens. On préconise l'emploi du taxon des formes spéciales dans le classement des bactéries phytopathoghes.

Nearly 200 cultures of bacterial plant pathogens isolated at Winnipeg during the 40-year period 1932–1971 are available in lyophilized form to anyone wishing to study them. Most of the cultures have been deposited in the American Type Culture Collection, Rockville, Maryland, some of them are in the International Collection of Bacterial Plant Pathogens, Department of Bacteriology, University of California, Davis, Calif. 95616, and most are available at Winnipeg. Transfers can be made from them and the original material re-sealed in vacuo for further storage. Numerous isolates of Xanthomonas translucens (Jones, Johnson and Reddy) Dowson and of Pseudomonas coronafaciens (Elliott) Stevens might prove useful in genetic studies of intraspecific variation. Data on the collections from which the stored cultures were isolated and on other collections from which no cultures were stored are listed in Table 4 and summarized in Table 1. The original records of the collections and of studies made with the isolates are available for scrutiny at the Agriculture Canada Research Station, Winnipeg.

The method of lyophilization, adapted

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Table 1. Summary of results of isolations at Winnipeg of bacterial plant pathogens from diseased plants

Host	Total number of collections	Number of collections yielding various genera of bacteria							
		Xanthomnas	Xanthomnas and Pseudomonas	xanthomnas and Unidentified	Pseudomonas	Corynebacterium	Erwinia	Agrobacterium	Unidentified
Aconitum	1				1				
Agropyron repens	6	6							
Agropyron sp.	1	1							
Alfalfa	6					6			
Apple	2						2		
Argentine rape	1	1							
Barley	75	70	2	2	1				
Bean	24	4			15	3			
Bromus inermis	2	1			1				
Cabbage	3	3							
Carrot	2	2							
Cucumber	8				6				2
Dahlia	1							1	
Flax	1				1				
Geranium	1								1
Hawthorn	1						1		
Hedera helix	1	1							
Lathyrus venosa	2				2				
Lilac	2				2				
Millet	1								1
Mountain ash	1								1
Oats	121				120				1
Peas	8				7				1
Plum	1				1				
Potato	1					1			
Rice	1	1							
Rye	18	14			3				
Sweetclover	1				1				
Taraxacum kok-saghz	3	3							
Tomato	22	1			16	4			
Turnip	5	5							
Triticale	2	2							
Ulmus pumila	1								1
Wheat	276	211	6		55		2		
Wild mustard	1								1
Total	603	326	8	2	233	14	5	1	8

from that of Annear (1), was similar to that described for preserving barley stripe mosiac with a drying tube of anhydrous magnesium perchlorate (18), although a higher vacuum was used with the bacteria. Washed 25–40 mesh silica sand was coated lightly with equal proportions of proteose peptone and monosodium glutamate. With a glass tube fitted with a piston, a pea-sized portion of the coated sand was transferred to a gas-collecting tube (Durham) which was plugged with cotton and autoclaved at 121.5°C for 20 min. The tube was dried at a pressure of 0.25 mm of mercury for 6 hr in vapor contact with anhydrous magnesium perchlorate. A suspension from a 3-inch, 2-day-old streak growth of the bacterial culture was made in 2 ml of a solution containing 0.5% of proteose peptone and 0.5% monosodium glutamate. The sand in the gas-collection tube was moistened with one drop of the suspension. This small tube was then placed in a Kimax flint glass culture tube (ID 12.5 mm, OD 15 mm, L 150 mm), along with a few granules of silica gel (S-682, Fisher) which changes to bluish green when the relative humidity is below 1%. A ball of asbestos fibre was pressed down onto the plug of the internal tube to protect it from the heat. The external tube was then heated and drawn out to facilitate the later sealing operation. The extended tube was evacuated to a pressure of 5 um of mercury and the vacuum maintained for 18 hr, after which the outer tube was sealed off as an evacuated ampoule. The integrity of the seal was tested in a water-saturated atmosphere for several hours.

Etiological studies

The isolation studies began as an attempt to ascertain the causes of dark head and culm discolorations in hybrid populations developed from crosses with H-44-24 by Goulden and Neatby (4). The variety H-44-24 was selected by McFadden (24) from a cross between Yaroslav emmer, Triticum dicoccum Schrank, and common wheat, Triticum aestivum L. "Black chaff" caused by "Bacterium translucens var. undulosum" had been described in the U.S.A. (27), but the discolorations at Winnipeg did not seem to be consistently of bacterial origin. As a result of isolations, inoculations and environmental studies, Hagborg (6) and Johnson and Hagborg (20, 21) concluded that three main factors were involved. These ware bacterial black chaff, alternaria blotch, and an inherent tendency for plants to develop melanism under certain environmental conditions. Other less common causes of head and culm discolorations were Puccinia graminis Pers., Cochliobolus sativus (Ito and Kurib.) Drechsl., Septoria nodorum Berk. and P. atrofaciens (McCulloch) Stevens. The dark discolorations appeared similar to the dark, water-insoluble pigmentation of the normally dark-pigmented wheats, the chemistry of which was explained by Lewicki (23). In addition, dark purple anthocyanin pigmentation, which

turned green when treated with a base and which was water soluble, occurred occasionally.

To cope with the problem of dark discolorations in general, the following procedures were adopted: (a) plants showing this tendency were discarded in the early generations and (b) the varieties in the Western Wheat Co-operative Tests were subjected annually to an artificial epiphytotic of bacterial black chaff in a field-plot test at Winnipeg to eliminate lines that had escaped detection in earlier generations and to detect susceptible lines from other plant breeders who did not cull out plants showing dark discolorations.

At a later date, much of the problem disappeared when the emmer wheat source of rust resistance was replaced by other sources in parental material. One of the diseases, bacterial black chaff, persisted in varieties with Thatcher parentage and this disease continued to flare up in commercial fields (16). Just how serious bacterial black chaff was at one time considered may be seen in the statements of Erwin F. Smith. In 1917, he said of bacterial black chaff, "should it increase, or even continue to prevail as extensively as in 1915 and this year, it will have to be reckoned with as a very serious disease of wheat, not as destructive as the rusts, but more destructive than the smuts and very likely more difficult to control" (25). At that time he had 14 people, besides himself, working on bacterial black chaff (26).

When destruction from smuts is low, as it has been recently in Manitoba, Smith's appraisal holds very well. For example in our 1971 disease loss survey (19), when bacterial black chaff was separated for the first time from other leaf-destroying diseases, the estimated loss from bacterial black chaff in Manitoba was 2.7 million bushels of wheat or 3.7% of potential production, and no losses from wheat smuts were recorded.

Bacterial diseases of cereals and grasses

Some items in Tables 1 and 4 require clarification. Wherever a Pseudomonas sp. and a Xanthomonas sp. were present together they were found to be P. atrofaciens and a special form of X. translucens. Two such organisms may cohabit the same small piece of surface-sterilized tissue, as in at least four collections of wheat (33032, 34002, 35024 and 37022) and one collection of barley (52072) where both organisms appeared in the same set of dilution plates.

Special forms of X. translucens were found in 217 collections of wheat, 72 of barley, and 14 of rye, while P. atrofaciens was found in 61 collections of wheat, 3 of barley, and 3 of rye. Although oats could become infected after wound inoculation with two different special forms, not a single

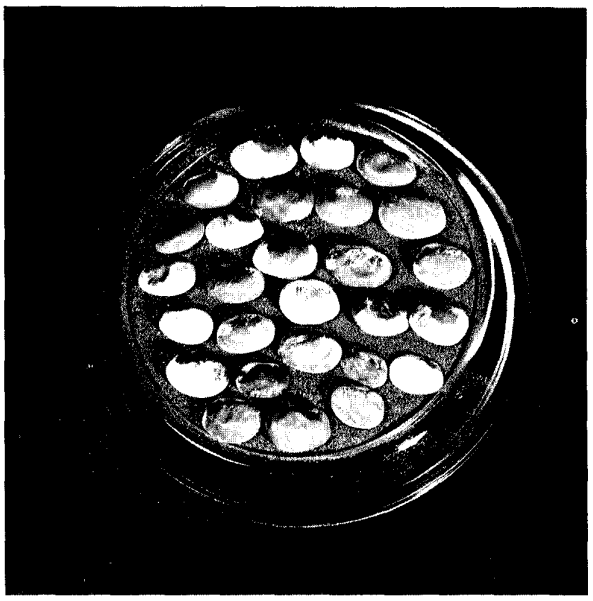

Figure 1. Seeds selected from a composite lot of "damaged" white navy beans obtained from the Grain Inspector, Board of Grain Commissioners for Canada, Chatham, Ontario, 1947.

field collection of oats yielded X. translucens.

In the 120 oat collections yielding bacterial pathogens, 1 was unidentified, 38 were halo-forming and 80 non-halo forming P. coronafaciens, and 1 was P. striafaciens. Apparently P. coronafaciens varies considerably in its ability to form the toxin responsible for halo production.

The low number of rye collections with bacterial infection does not imply resistance to X. translucens but is attributable primarily to the small proportion of the total cereal acreage devoted to rye in Manitoba.

In summation, of 487 collections of wheat, oats, barley, rye, and triticale that yielded bacterial pathogens, 305 were X. translucens, 119 P. coronafaciens, 61 P. atrofaciens, 1 P. striafaciens, and 1 an unidentified bacterial pathogen. One culture of X. translucens was isolated from plants of rice infected in an environmental chamber after inoculation with an isolate from wheat.

X. translucens was early subdivided into three so-called "varieties". Before the present 5 formae speciales were described in 1942 (10) the variety undulosa embraced some strains that are now classed as f. sp. cerealis. similarly var. hordei included strains that are now classed as f. sp. hordei-avenae. For this reason I have designated the earlier or incompletely tested isolates of var. undulosa as "either f. sp. undulosa or f. sp. cerealis". These comprise cultures from 74 collections. Besides these,

92 collections yielded f. sp. undulosa and 47 f. sp. cerealis. similarly 21 collections yielded either f. sp. hordei or f. sp. hordei-avenae, 8 f. sp. hordei, and 45 f. sp. hordei-avenae. In addition one collection of barley yielded f. sp. cerealis. X. translucens was also found in six collections of Agropyron repens (L.) Beauv., one collection of Agropyron sp., and one of Bromus inermis Leyss. All of the isolates from these grasses were f. sp. cerealis. P. atrofaciens was isolated from one collection of A. repens and one collection of B. inermis.

It will be noted that X. translucens f. sp. undulosa was isolated once (40015) from barley. This was from field plots of the variety star included in a wheat varietal test and inoculated with f. sp. undulosa. Although this special form infects barley after inoculation it is not known to occur in commercial fields of barley. Furthermore, the record of barley infection with X. translucens var. undulosa made in 1934 (5) was later found to be incorrect as the host plant was wheat, not barley.

Bacterial diseases of vegetables

supplementing the isolations from cereals and grasses, some isolations of bacteria were made from diseases in other hosts. A number were made from bean in connection with the development of a Health Approval Plan (13). This plan led to the adoption of "Part VIII - Health Approved Seed" under the Regulations of the Destructive Insect and Pest Act, Ottawa. It may be worthy of note that Collection 47008, from which the bacterial wilt organism Corynebacterium flaccumfaciens (Hedges) Dowson was isolated, was taken from a composite lot of "damaged" white navy beans (Phaseolus vulgaris L.) (Fig. 1) selected by the Grain Inspector, Board of Grain Commissioners for Canada, at Chatham, Ontario during the grading of carload lots originating throughout the commercial bean-growing areas of Ontario. From this collection I also isolated cultures of Xanthomonas phaseoli var. fuscans (Burkholder) Starr and Burkholder from four different bean seeds. One culture of these, 3645, was entered in the Canadian Collection of Micro-organisms (3). These may have been the first isolations of these two organisms in Canada. In Manitoba the halo blight of bean pathogen, Pseudomonas phaseolicola (Burkholder) Dowson, appeared to be somewhat more prevalent than that of common blight, X. phaseoli (Smith) Dowson.

Bacterial blight of peas caused by Pseudomonas pisi Sackett, sometimes caused heavy losses in field and garden peas in Manitoba. It was occasionally severe after hailstorms which predisposed the plants to infection (14). Similarly, the angular leaf spot of cucumber bacterium, P. lachrymans (Smith and Bryan) Alstatt, was frequently common in pickling cucumber.

In Manitoba the bacterial speck of tomato

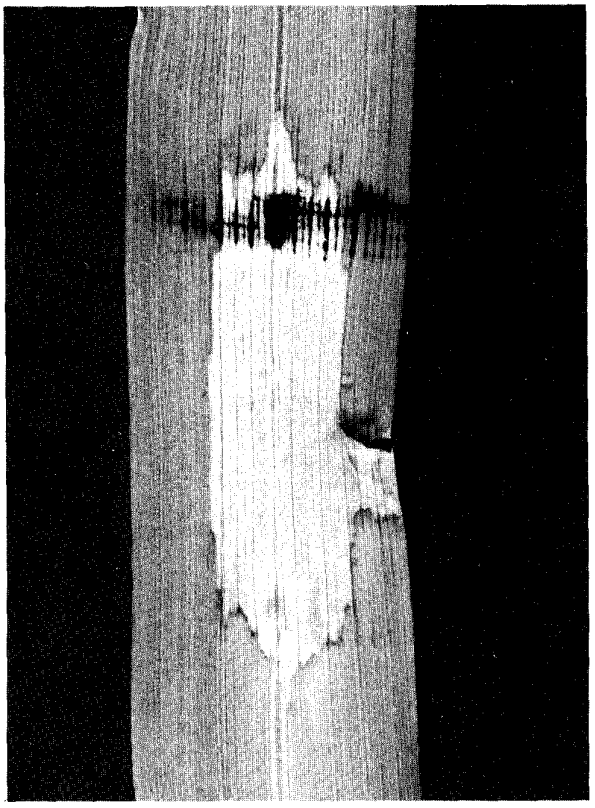

Figure 2. Seedling leaf of Titan barley 6 days after the injection of a suspension of 10^8 viable cells/ml of culture 3133, *P. atrofaciens*. (Black mark indicates margin of flooded area.)

pathogen, Pseudomonas tomato (Okabe) Alstatt, was first isolated from tomato in 1940, and in 1941 a survey indicated it was prevalent in the vicinity of Winnipeg, one grower having discarded 7 tons of tomatoes because of this disease (8). Bacterial spot, X. vesicatoria (Doidge) Dowson was isolated only once from tomato in Manitoba (9). Bacterial canker caused by C. michiganense (Smith) Jensen was occasionally present but was satisfactorily controlled by seed treatment with hot water (15).

Turnip, cabbage and Argentine rape (11) were somtimes infected with X. campestris (Pammel) Dowson. This organism is probably present every year to some extent in cabbage and turnip on the prairies. The disease has not been reported in the large acreages of rapeseed grown presently but it would be surprising if it were not present at least in the vicinity of vegetable farms where other crucifers are cultivated.

During the Second World War a shortage of carrot seed resulted in seed production of this vegetable in Manitoba. Some infection with X. carotae (Kendrick) Dowson on the umbels was encountered (7).

Bacterial ring rot of potato, C.

sepedonicum (Spieckermann and Kotthoff) Skaptason and Burkhclder, was isolated only once, but that was no indication of rarity of the disease as it was detected by the Gram stain test in 377 of 747 samples submitted since 1939, mostly by inspectors of the Plant Protection Division.

Bacterial diseases of forase crops

Bacterial wilt of alfalfa caused by C. insidiosum (McCulloch) Jensen was surveyed for in 1946 (12) but was not considered capable of causing severe damage under the dry farming conditions practiced in Manitoba. P. svrinsae van Hall was isolated once from sweet clover, but it appeared to be of only sporadic occurrence on this host.

Hypersensitivity

One of the most interesting phenomena found in the study of bacterial diseases of plants is hypersensitivity reviewed by Klement and Goodman (22). They worked with thick leaves and pods and injected the inoculum with a hypodermic needle. I have been able to get similar results in the thin leaves of cereals by means of a simple device that floods the tissues by hydraulic pressure (17). If a young leaf of barley is flooded with a 10^8 cells/ml suspension of P. atrofaciens, hypersensitive necrosis develops in a few days (Fig. 2). If, however, a heat-killed suspension of the organism is injected, followed a day later by a suspension of the viable organism, no hypersensitive reaction develops. The inhibitory factor is readily separable (Seitz - filtration or centrifugation) from the cells after the heat treatment but not so easily separable from the viable cells (Hagborg, unpublished).

Varietal resistance to bacterial diseases of cereals

In studies of resistance to bacterial diseases in cereals evidence of varietal resistance is rare in the young seedling stage. To a great degree susceptibility to bacterial infection seems to be associated with the young tissues of seedling wheat, oats, or barley growing under the comparatively calm air of a greenhouse or environmental chamber. As the leaf tissues become older, the leaves may develop some resistance and lesions tend to be more restricted. This relationship becomes evident when the older, second-last leaves are inoculated at the same time as the younger flag leaves.

The most successful studies of varietal resistance to bacterial black chaff of wheat and bacterial blight of barley were made by inducing artificial epiphytotics of these diseases in field plot tests with four replicates. Each year the plots were rated for leaf-area destruction from bacterial infection. In wheat the degree of leaf-area destruction on the variety Marquis was used as the standard of comparison. In the varieties compared the mean rating of the test variety was taken as the numerator and the mean rating for Marquis in the same years as the denominator. This proportion, stated as a percentage, was the relative rating for the test variety. The results for a few selected varieties are shown in Table 2 and indicate that two, McMurachy and C.T. 615 (Sonora 64 x Tezanos Pintos Precoz), would be useful as sources of resistance. The most resistant variety, McMurachy, is low in quality, but the second best variety, C.T. 615, has a satisfactory level of resistance and good quality. Populations with C.T. 615 as one parent are now under study by the plant breeding staff of the Agriculture Canada Research Station, Winnipeg.

A similar comparison of certain barley varieties, with the variety O.A.C. 21 as the standard, indicated fairly high resistance to bacterial blight in the variety B.T. 313 and a little in Keystone (Table! 3).

General comments

The incredible paucity of records of bacterial infection in the crops of western Canada compared with records of fungus infection may be largely a result of the practice of most plant pathologists of plating out whole pieces of tissue on the surface of a nutrient agar when attempting to isolate a pathogen. To isolate bacterial pathogens, I made a practice of tearing the tissues apart after surface sterilization and washing, and then mixing the fragments in liquefied, but cooled, agar before plating. Three additional dilution plates were made in the liquefied, cooled, nutrient agar. Furthermore, I used peptone beef agar (Difco) rather than a medium with potato content. Colony type is much sharper and characteristic on peptone beef agar, and it is the medium on which most colony types were described in the literature. Plating pieces of diseased material on the surface of a nutrient agar does not result in development of a characteristic colony and there is no certainty that a culture transferred from it will be pure as it might have arisen from one or more saprophytic cells. On the other hand, if saprophytic organisms are present in dilution plates they can usually be recognized as such by colony type. Dilution plates, without water blanks, could be used by many plant pathologists who frequently may be overlooking bacterial pathogens. Each dilution plate furnishes useful information. The first, if no bacterial pathogen is present, may show the growth of a fungus pathogen from the pieces of tissue. If a bacterial pathogen is present there will typically be a progression in the four plates from small, crowded colonies in the first plate to a few, fully-developed colonies in the third or fourth plate.

Table 2. Relative resistance of certain wheat varieties to bacterial black chaff infection on the leaves under field conditions

Variety	Proportion		Number of years in test	Specific years of test
	Mean ratio	%		
McMurachy	7/28	25	13	1946-48, '51-59, '63
C.T. 615	11/35	31	3	1969-71
Selkirk	17/28	61	11	1955-63, '65-67, '70
Manitou	25/32	77	8	1962-63, '65-67, '69-71
Neepawa	29/36	81	6	1965-67, '69-71
Lee	25/31	81	11	1947-48, '51-59
Cypress	27/31	87	11	1958-59, '61-63, '65-67, '69-71
Marquis	30/30	100	21	1946-48, '51-59, '61-63, '65-67, '69-71
Park	31/31	100	10	1959, '61-63, '65-67, '69-71
Thatcher	32/30	107	21	1946-48, '51-59, '61-63, '65-67, '69-71
C.T. 153	47/30	157	9	1946-48, '51-56
Saunders	47/26	181	12	1947-48, '51-59, '63

Table 3. Relative resistance of certain barley varieties to infection by bacterial blight under field conditions

Variety	Proportion		Number of years in test	Specific years of test
	Mean ratio	%		
B.T. 313	10/26	31	2	1970, '71
Keystone	10/12	84	5	1961, '62, '64, '66, '67
OAC 21	15/15	100	12	1954, '56-59, '61, '62, '64, '66, '67, '70, '71
Conquest	24/22	109	6	1962, '64, '66, '67, '70, '71
Galt	69/61	113	4	1966, '67, '70, '71
Husky	17/15	113	8	1954, '56-59, '61, '62, '64
Parkland	15/13	115	10	1954, '56-59, '61, '62, '64, '66, '67
Montcalm	22/15	157	8	1954, '56-59, '61, '62, '64
Olli	64/19	337	9	1954, '56-59, '61, '62, '66, '71

Another general comment that I would like to make is that plant pathologists who work with bacterial diseases of plants might very well reduce the confusion in taxonomy by using the taxon "forma specialis" wherever it applies. They, of all taxonomists, should regard pathogenic capability as an important taxonomic character. This character is the primary object of the pathologists' interest in the phytopathogen and it is, therefore, of fundamental value in characterizing the phytopathogenic bacteria. To differentiate,

within species, between organisms differing in pathogenic capabilities Eriksson defined the taxon "forma specialis" in 1894. This taxon has been used to good advantage for many years by mycologists and plant pathologists working with fungi, especially with the rusts. Bacteriologists have not yet fully appreciated the significance of physiologic specialization.

More than 30 years ago (10) I described five formae speciales of Xanthomonas translucens. These were still considered valid in 1966 by the editors of Index Bergeyana (2). A few others have been recognized but many more organisms could be redescribed as formae speciales.

In reducing the number of species of phytopathogens, a procedure advocated on various grounds, it is essential to pathology that we retain a means of referring to bacteria that agree in many characters but differ in pathogenic capabilities. Among the taxons available, forma specialis, has been defined in both the International Rules of Botanical Nomenclature and the International Code of Nomenclature of Bacteria.

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Table 4 follows on pages 137-151

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants'

Collection No.	Date	Location* †	Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
32001	5/ 7/32	WINNIPEG MAN	4953	9709	WHEAT	CERES	LEAF	88	XTU.OR CER.			
32013	8/ 8/32	WINNIPEG MAN	4953	9709	WHEAT	MARQUIS	NECK AND INTNODE	110	XTU.OR CER.	111	XTU.OR CER.	
33002	13/ 6/33	MORDEN MAN	4911	9805	BARLEY	STAR	LEAF	156	XTH.OR H-A.			
33003	13/ 6/33	GRETNA MAN	4902	9735	OATS		LEAF	145	P.C.NO HALO	147	P.C.NO HALO	1713
33004	13/ 6/33	ST JEAN BT MAN	4916	9721	OATS		LEAF	148	P.C.NO HALO			
33005	19/ 6/33	OAK BLUFF MAN	4947	9920	BABLEY		LEAF	285	XTH.OR H-A.	286	XTH.OR H-A.	
33006	16/ 6/33	03* W† SEDDONS CR MAN	5004	9631	BARLEY		LEAF	149	XTH.OR H-A.	157	XTH.OR H-A.	
33007	19/ 6/33	01 W OAK BLUFF NAN	4947	9926	WHEAT		LEAF	158	XTU.OR CER.	150	XTU.OR CER.	
33008	19/ 6/33	01 E STARBUCK MAN	4946	9736	WHEAT		LEAF	164	XTU.OR CER.			
33009	19/ 6/33	01 W ELM CHEEK MAN	4941	9800	BARLEY		LEAF	151	XTH.OR H-A.	165	XTH.OR H-A.	
33010	19/ 6/33	06 W ST CLAUDE MAN	4940	9822	WHEAT		LEAF	152	XTU.OR CER.	160	XTU.OR CER.	
33011	19/ 6/33	02 W GLENBORO MAN	4932	9915	WHEAT		LEAF	153	XTU.OR CER.	161	XTU.OR CER.	
33012	20/ 6/33	02 S HARDING MAN	5000	10030	OATS		LEAF	154	P.C.NO HALO	163	P.C.NO HALO	3035
33013	23/ 6/33	WINNIPEG MAN	4953	9709	WHEAT	REWARD	LEAF	168	XTU.OR CER.	169	XTU.OR CER.	
33016	17/ 7/33	03 S JORDAN MAN	4923	9805	WHEAT	REWARD	NECK	173	XTU.OR CER.	174	XTU.OR CER.	
33019	18/ 7/33	02 E DELORAINE MAN	4912	10029	DURUM WH		LEAF	289	XTU.OR CER.	290	XTU.OR CBR.	
33023	18/ 7/33	PIPESTONE MAN	4934	10058	WHEAT		LEAF	179	XTU.OR CER.	180	XTU.OR CER.	
33021	18/ 7/33	03 W RESTON MAN	4935	10102	BARLEY		LEAF	181	XTH.OR H-A.	182	XTH.OR H-A.	
33022	18/ 7/33	02 W LINKLATER MAN	5034	10453	WHEAT	REWARD	NECK	183	PS.ATROFAC.	184	PS.ATROFAC.	
33023	18/ 7/33	01 SE BUTLER MAN	4947	10120	HARLEY		LEAF	186	XTH.OR H-A.			
33024	18/ 7/33	07 NE BUTLER MAN	4947	10120	WHEAT	MARQUIS	GLUME	216	XTU.OR CER.	217	XTU.OR CER.	
33025	18/ 7/33	06 E GRISWOLD MAN	4945	10025	BARLEY		LEAF	219	XTH.OR H-A.	220	XTH.OR H-A.	
33026	18/ 7/33	03 NW SINCLAIR MAN	4934	10116	WHEAT		LEAF	222	XTU.OR CER.	223	XTU.OR CER.	
33027	18/ 7/33	02 E OAK LAKE MAN	C947	10038	WHEAT		NECK	225	XTU.OR CER.			
33028	18/ 7/33	04 W VIRDEN MAN	4951	10055	WHEAT		GLUNE	232	XTU.OR CER.	233	XTU.OR CER.	
33029	16/ 7/33	03 W KEMNAY MAN	4951	10007	DURUM WH		LEAF	292	XTU.OR CER.	294	XTU.OR CER.	
33030	19/ 7/33	BRANDON MAN	4950	9957	HARLEY	COMFORT	KERNEL	190	XTH.OR H-A.			
33031	19/ 7/33	EXANOON MAN	4950	9957	WHEAT	5-28-1.8	LEAF	191	XTU.OR CER.			3068
33032	19/ 7/33	BRANDON MAN	4950	9957	WHEAT	MARQUIS	LEAF	194	PS.ATROFAC.	195	X.T.UNDULO	
33033	19/ 7/33	MINNEDOSA MAN	5014	9951	BARLEY		LEAF	295	XTH.OR H-A.			
33034	25/ 1/33	10 W OAK BLUFF MAN	4947	9926	DURUM WH		NECK	237	XTU.OR CER.	238	XTU.OR CER.	
33035	25/ 7/33	01 W FANNYSTELL MAN	4945	9750	HARLEY		LEAF	239	XTH.OR H-A.	240	XTH.OR H-A.	3070
33036	25/ 7/33	01 E ELM CHEEK MAN	4941	9000	WHEAT	CEXES	NECX	241	XTU.OR CER.	242	XTU.OR CER.	
33038	25/ 7/33	01 E TREHERNE MAN	4938	9041	WHEAT	CERES	PECK	245	XTU.OR CER.			
33039	25/ 7633	01 SW MARGARET MAN	4926	9951	DURUM WH		GLUME AND NECK	250	XTU.OR CER.	252	XTU.OR CER.	
33040	26/ 7/33	03 N HAMIOTA MAN	5010	10030	WHEAT	REWARD	GLUNE	301	XTU.OR CER.			
33041	26/ 7/33	03 N BIRTLE MAN	5032	10102	WHEAT	REWARD	GLUME	259	XTU.OR CER.	258	XTU.OR CER.	
33042	27/ 7/33	05 W MORGATE MAN	5041	9930	WHEAT	MARQUIS	GLUME	260	XTU.OR CER.	261	XTU.OR CER.	
33044	1/ 8/33	NEWTON MAN	4953	9302	WHEAT	MARQUIS	GLUME	313	XTU.OR CER.	314	XTU.OR CER.	
33049	10/ 8/33	WINNIPEG MAN	4953	9709	WHEAT		NECK	268	XTU.OR CER.			
33056	7/ 9j33	KAPUSKASIN ONT	4925	8226	WHEAT	R RXXMINHDY	NECK	277	XTU.OR CER.	278	XTU.OR CER.	
33058	20/10/33	WINNIPEG MAN	4953	9709	WHEAT		LEAF	282	XTU.OR CER.			

§ For explanation of abbreviations see page 151

*Distance (miles) and †direction from designated location

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Collection Date	Location	Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
33059	20/10/33	WINNIPEG MAN	4953	9709	WHEAT		NECK	283	XTU.OR CER.	284	XTU.OR CER.	
34002	8/ 6/34	03 W STL ROSE MAN	5103	9932	WHEAT		LEAF	323	XTU.OR CER.	322	PS.ATROFAC.	
34003	8/ 6/34	04 N MACDONALD MAN	5003	9828	OATS		LEAF	320	P.C.NO HALO	321	P.C.NO HALO	
34006	19/ 6/34	WINNIPEG MAN	4953	9709	WHEAT		LEAF	325	PS.ATROFAC.	324	PS.ATROFAC.	
34007	20/ 6/34	03 S CARMAN MAN	4932	9800	RYE		LEAF	326	X.T.SECAL.	327	X.T.SECAL.	
34008	27/ 6/34	WINNIPEG MAN	4953	9709	WHEAT		LEAF	330	XTU.OR CER.	331	XTU.OR CER.	
34009	27/ 6/34	WINNIPEG MAN	4953	9709	WhhAT		LEAF	338	XTU.OR CER.	339	XTU.OR CLR.	
34011	21/ 6/34	BRANDON MAN	4950	9957	BARLEY	COMFORT	LEAF	340	P.C.NO HALO	345	XTH.OR H-A.	
34012	21/ 6/34	BRANDON MAN	4950	9957	OATS		LEAF			347	P.C.NO HALO	1715
34013	1/ 7/34	STE ROSE MAN	5103	9932	WHEAT		LEAF	351	XTU.OR CER.	353	XTU.OR CER.	
34014	7/ 7/34	WINNIPEG MAN	4953	9709	OATS	PASKEWITZ	LEAF	357	P.C.NO HALO			1716
34017	10/ 7/34	WINNIPEG MAN	4953	9709	WHEAT		LEAF	363	XTU.OR CER.			
34026	24/ 7/34	MORDEN MAN	4911	9805	BARLEY		LEAF	377	XTH.OR H-A.	379	XTH.OR H-A.	
34029	16/ 8/34	WIBNIEEG MAN	4953	9709	WHEAT	THATCHER	GLUME	384	XTU.OR CER.	385	XTU.OR CER.	
34030	16/ 8/34	WINNIPEG MAN	4953	9709	WHEAT	C.T.201	GLUME	387	XTU.OR CW.	388	XTU.OR CER.	
34031	16/ 8/34	WINNIPEG MAN	4953	9709	WHEAT	C.T.305	GLUME	391	PS.ATROFAC.	392	XTU.OR CER.	
34035	18/ 8/34	WINLIPLG MAN	4953	9709	WHEAT	C.T. 107	LEAF	405	PS.ATROFAC.	406	PS.ATROFAC.	
34037	22/ 8/34	WINNIPEG MAN	4953	9709	WHEAT	C.T.305	LEAF	409	PS.ATROFAC.	410	PS.ATROFAC.	
34041	20/ 8/34	WINNIPEG MAN	4953	9709	WHEAT	C.T.202	INTNODE	416	PS.ATROFAC.			
34042	20/ 8/34	WINNIPEG MAN	4953	9709	WHEAT	C.T.201	INTNODE	421	XTU.OR CER.			
35006	28/ 6/35	BRANDON MAN	4950	9957	BARLEY		LEAF	448	XTH.OR H-A.	449	XTH.OR H-A.	
35007	10/ 8/35	BRANDON MAN	4950	9957	BARLEY		LEAF	451	XTH.OR W-A.			
35009	9/ 7/35	EDMONTON ALT	5333	11328	WHEAT		LEAF	453	PS.ATROFAC.	454	PS.ATROFAC.	
35010	10/ 7/35	BRANDON MAN	4950	9957	DURUM WH		LEAF	456	PS.ATROFAC.	532	PS.ATROFAC.	
35011	19/ 7/35	03 W FANNYSIELL MAN	4945	9750	DURUM WH		LEAF	460	XTU.OR CER.			
35012	19/ 7/35	06 W RATHWELL MAN	4940	9832	WHEAT	CERES	GLUME	462	XTU.OR CER.			
35013	20/ 7/35	05 NW VIRDEN MAN	4951	10055	WHEAT	CERES	GLUME	463	XTU.OR CER.	464	XTH.OR H-A.	
35014	19/ 7/35	10 S VIRUBN MAN	4951	10055	WHEAT	CERES	GLUME	536	XTU.OR CER.	537	XTU.OR CER.	
35015	20/ 7/35	02 S HARDING MAN	5000	10030	WHEAT	MARQUIS	GLUME	471	XTU.OR CER.			
35016	20/ 7/35	03 E OAK LAKE MAN	4947	10038	WHEAT	CERES	GLUME	472	XTU.OR CER.	473	XTU.OR CER.	
35017	20/ 7/35	06 N BINSCARTH MAN	5037	10116	WHEAT	MARQUIS	GLUME	546	PS.ATROFAC.			
35018	22/ 7/35	07 S BTHELBERT MAN	5131	10022	WHEAT	MARQUIS	GLUME	476	XTU.OR CER.	477	XTU.OR CER.	
35019	22/ 7/35	04 E SWAN RIVER MAN	5206	10116	WXLAT	REWARD	LEAF	478	XTU.OR CER.	479	XTU.OR CER.	
35020	21/ 7/35	02 N BOWSMAN MAN	5214	10114	WHEAT	REWARD	LEAF AND GLUME	481	XTU.OR CER.	495	XTU.OR CER.	3049
35021	21/ 7/35	05 N BOWSMAN MAN	5214	10114	WHEAT	REWARD	LEAF	US4	XTU.OR CER.			
35023	23/ 7/35	04 E PUKTAGE LA MAN	4957	9825	WHEAT	MARQUIS	GLUME	486	XTU.OR CLR.	487	XTU.OR CEH.	
35024	23/ 7/35	04 B MACDONALD MAN	5003	9828	WHEAT	MARQUIS	GLUME	489	PS.ATROFAC.	491	XTU.OR CER.	
35025	19/ 7/35	02 NW PIPESTONE MAN	4934	10058	WHEAT	MARQUIS	GLUME	541	XTU.OR CER.	542	XTU.OR CER.	
35026	20/ 7/35	04 N HARGRAVE MAN	4955	10105	WHEAT	CERES	GLUME	494	PS.ATROFAC.			
35028	10/ 8/35	01 W OCHRE RIVL. MAN	5103	9947	WHEAT	MARQUIS	GLUME	497	XTU.OR CER.	498	XTU.OR CER.	
35032	3/ 8/35	WINNIPEG MAN	4953	9709	WHEAT	C.T.206	GLUME	508	XTU.O CER			
35033	1/ 8/35	WINNIPEG MAN	4953	9709	WHEAT	C. T. 202	GLUME	531	XTU.OR CER			
35034	16/ 7/35	WINNIPEG MAN	4953	9709	WHEAT	REWARD	GLUME	512	PS.ATROFAC.	513	PS.ATROFAC.	

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Date	Location	Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
35035	10/ 8/35	01 W OCHRE RIVE	MAN	5103	9947	WHEAT	MARQUIS	KERNEL	515	PS.ATROFAC.	516	PS.ATROFAC.	
35037	15/ 8/35	ELNORA	ALT	5159	11312	WHEAT	MARQUIS	LEMMA AND KERNEL	517	PS.ATROFAC.	518	PS.ATROFAC.	
35038	15/ 7/35	WINNIPEG	MAN	4953	9709	WHEAT	R.L.716.1	LEMMA	522	PS.ATROFAC.	523	PS.ATROFAC.	
36001	6/ 6/36	E ELM CREEK	MAN	4941	9800	FALL RYE		LEAF	593	XTU.OR CER.	594	XTU.OR CER.	
36004	31/ 6/36	05 N NEEPAWA	MAN	5013	9929	WHEAT	MARQUIS	GLUME	616	XTU.OR CER.	617	XTU.OR CER.	3780
36017	30/ 7/36	06 E BIELD	MAN	5113	10111	WHEAT	MARQUIS	LEMMA	639	PS.ATROFAC.	640	PS.ATROFAC.	
36018	31/ 7/36	01 W OCHRE RIVE	MAN	5103	9947	WHEAT	REWARD	GLUME	650	XTU.OR CER.	651	XTU.OR CER.	
37001	9/ 7/37	05 E LA *SALLE*	MAN	4938	9712	BARLEY		LEAF	735	XTH.OR H-A.	736	XTH.OR H-A.	
37002	14/ 7/37	WINNIPEG	MAN	4953	9709	BARLEY	REGAL	*LEAF*	737	XTH.OR H-A.	738	XTH.OR H-A.	
37004	22/ 7/37	02 E PORTAGE LA	MAN	4957	9825	BARLEY		LEAP	741	XTH.OR H-A.	742	XTH.OR H-A.	
37005	9/ 7/37	05 E LA *SALLE*	MAN	4938	9712	DURUM WH		LEAF	743	XTU.OR CER.	744	XTU.OR CER.	
37006	21/ 7/37	04 E ST CLAUDE	MAN	4940	9822	WHEAT	CERES	GLUME	745	XTU.OR CER.	746	XTU.OR CER.	
37007	22/ 7/37	01 Nh BENARD	MAN	4955	9752	DURUM WH		LEAF	747	XTU.OR CER.	748	XTU.OR CER.	
37008	21/ 7/37	BRANDON	MAN	4950	9957	WHEAT	THATCHER	LEAF	749	XTU.OR CER.	750	XTU.OR CER.	
37009	21/ 7/37	BRANDON	MAN	4950	9957	WhEAT	C.T.125	LEAF	751	XTU.OR CER.	752	XTU.OR CER.	
37010	21/ 7/37	TREHERNE	MAN	4938	9841	*WHEAT*	APEX	GLUME	753	XTU.OR CER.	754	XTU.OR CER.	
37013	6/ 7/37	MELITA	MAN	4916	10100	OATS		*LEAF*	762	P.C.NO HALO	761	P.C.NO HALO	
37014	7/ 7/37	WINNIPEG	MAN	4953	9709	OATS		LEAF	763	P.C.NO HALO	764	P.C.NO HALO	1719
37015	9/ 7/37	05 SE LA SALLE	MAN	4938	9712	OATS		LEAF	759	P.C.NO HALO	760	P.C.NO HALO	1718
37021	24/ 7137	DARLINGFOR	MAN	4912	9822	WhEAT	MARQUIS	GLUME	770	PS.ATROFAC.	771	PS.ATROFAC.	
37022	24/ 7/37	04 h MORDEN	MAN	4911	9805	WHEAT	CERES	GLUME	772	PS.ATROFAC.	773	XTU.OR CER.	
37038	4/ 8/37	WINNIPEG	MAN	4953	9709	BARLEY	COLSESS	KERNEL	780	XTH.OR H-A.	781	XTH.OR H-A.	
37042	4/ 8/37	WINNIPEG	MAN	4953	9709	WHEAT	C.T. 114	INTNODE	800	PS.ATROFAC.			
37047	4/ 8/37	WINNIPEG	MAN	4953	9709	WHEAT	C.T.126	INTNODE	808	PS.ATROFAC.			
37065	0/ 0/37	POCATIERE	PQ	4722	7002	WHEAT	MARQUIS	GLUME	826	XTU.OR CER.	827	XTU.OR CER.	
37066	0/ 0/37	POCATIERE	PQ	4722	7002	WHEAT	THATCHER	GLUME	822	XTU.OR CER.	823	XTU.OR CER.	
37067	1/12/37	LACOMBE	ALT	5228	11344	WHEAT	RL1134X6806	GLUME AND NECK	832	PS.ATROFAC.			
37068	1/12/37	LACOMBE	ALT	5228	11344	WHEAT	RL592XG2448	GLUME AND NECK	838	PS.ATROFAC.	839	PS.ATROFAC.	
38006	16/ 6/38	OAKVILLE	MAN	4956	9758	OATS		LEAF	865	P.C.NO HALO	866	P.C.NO HALO	
38016	13/ 8/38	SWAN RIVER	MAN	5206	10116	WHEAT	THATCHER	GLUME	884	XTU.OR CER.	885	XTU.OR CER.	3074
38017	13/ 8/38	LANGDON	ND	4876	8822	WHEAT	ND 1339	GLUME	886	PS.ATROFAC.	887	PS.ATROFAC.	
38022	19/ 8/38	WINNIPEG	MAN	4953	9709	WHEAT	C.T.122	GLUME	899	PS.ATROFAC.			
38026	18/ 8/38	WINNIPEG	MAN	4953	9709	WHEAT	C.T.132	GLUME	904	XTU.OR CER.	905	XTU.OR CER.	
38029	18/ 8/38	WINNIPEG	MAN	4953	9709	WhEAT	*C.T.802*	GLUME	908	PS.ATROFAC.	909	PS.ATROFAC.	
39001		WINNIPEG	MAN	4953	9709	FLAX		COTLEDN	929	UNIDENT.P.P.	933	UNIDENT.P.P.	0933
39002	15/ 6/39	DARLINGFOR	MAN	4912	9822	OATS		LEAF	960	P.C.NO HALO	961	P.C.NO HALO	
39003	15/ 6/39	PILOT MOUW	MAN	4916	9855	OATS		LEAF	962	P.C.NO HALO	963	P.C.NO HALO	
39001	15/ 6/39	BXANDON	MAN	4950	9957	BARLEY	REGAL	LEAF	995	XTH.OR H-A.	996	XTH.OR H-A.	
39005	15) 6/39	BRANDON	MAN	4950	9957	OATS	VCTXGN R578	LEAF	965	P.C.NO HALO	966	P.C.NO HALO	
39006	16/ 6/39	10 S VIRDEN	MAN	4951	10055	FALL RYE		LEAF	970	PS.ATROFAC.			
39007	16/ 6/39	03 E PTPESTONE	MAN	4934	10058	FALL RYE		LEAF	971	PS.ATROFAC.	998	PS.ATROFAC.	

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Date			Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
39008	15/ 6/39			THORNHILL	MAN	4912	9814	OATS		LLAF	972	P.C.NO HALO	973	P.C.NO HAM	
39009	16/ 6/39			OAK LAKE	MAN	4947	10038	OATS		LEAF	975	P.C.NO HALO	976	P.C.NO HALO	
39015	16/ 6/39			GLENBORO	MAN	4932	9915	WHEAT		LEAF	1001	PS.ATROFAC.	1002	PS.ATROFAC.	
39016	16/ 6/39			NESBITT	MAN	4937	9952	WHEAT		LEAF	1003	PS.ATROFAC.	1004	PS.ATROFAC.	
39017	15/ 6/39			LA RIVIERE	MAN	4913	9843	WHEAT		LEAF	983	PS.ATROFAC.	984	PS.ATROFAC.	
39018	16/ 6/39			VIRDEN	MAN	4951	10055	OATS		LEAF	1005	P.C.NO HALO	1006	P.C.NO HALO	
39019	13/ 6/39			WINNIPEG	MAN	4953	9709	OATS	ANTHONY	LEAF	1007	P.C.NO HALO	1008	P.C.NO HALO	
39020	21/ 6/39			WINNIPEG	MAN	4953	9709	OATS		LEAF	1009	P.C.NO HALO	1010	P.C.NO HALO	
39021	23/ 6/39			WINUIPEG	M N	4953	9709	BARLEY	COLSESS	LEAF	1011	XTH.OR H-A.			
39022	27/ 6/39			WINNIPEG	MAN	4953	9709	OATS	ANTHONY	LEAF	1013	P.C.NO HALO	1014	P.C.NO HALO	3003
39023	27/ 6/39			WINNIPEG	MAN	4953	9709	OATS	VICTORY	LEAF	1015	P.C.NO HALO	1016	P.C.NO HALO	1720
39025	29/ 6/39			WINNIPEG	MAN	4953	9709	BARLEY	SUCCESS	LEAF	1018	X.T.HORDEI	1019	X.T.HORDEI	
39026	4/ 7/39			WINNIPEG	MAN	4953	9709	OATS		LEAF	1020	P.C.NO HALO	1021	P.C.NO HALO	
39027	14/ 7/39			WINNIPEG	MAN	4953	9709	WINTR WT		LEAF	1022	X.T.UNDULO	1023	X.T.UNDULO	
39032	19/ 7/39	10	S	VIRDEN	MAN	4951	10055	WHEAT	THATCHER	GLUME	1027	X.T.UNDULO	1028	X.T.UNDULO	5437
39037	19/ 7/39	01	W	SCAXTX	MAN	4944	10057	RYE		LEAF	1031	PS.ATROFAC.	1032	PS.ATROFAC.	
39040	13/ 7/39			ELMBROOK	ONT	4405	7705	OATS	MABEL	LEAF	1035	P.C.NO HALO	1036	P.C.NO HALO	1702
39044	21/ 7/39	02	W	GLADSTONE	MAN	5015	9850	WHEAT	RENOWN	GLUME	1037	X.T.UNDULO	1038	X.T.UNDULO	
39045	21/ 7/39	02	W	GLADSTONE	MAN	5015	9850	WHEAT	RENOWN	INTNODE	1045	PS.ATROFAC.	1046	PS.ATROFAC.	
39051	21/ 7/39	01	W	NEEPAWA	MAN	5013	9929	WHEAT	RENOWN	GLUME	1064	PS.ATROFAC.	1065	PS.ATROFAC.	
39052	21/ 7/39			PIGEON LAK	MAN	4957	9736	BARLEY		LEAF	1066	X.T.HORDEI	1067	X.T.HORDEI	
39054	21/ 7/39	01	W	BASSWOOD	MAN	5019	10002	OATS		LEAF	1071	P.C.NO HALO	1072	P.C.NO HALO	1721
39058	22/ 7/39			RIUING MIN	MAN	5035	9924	OATS		LEAF	1076	P.C.NO HALO	1077	P.C.NO RALO	1703
39059	22/ 7/39	03	S	EDEN	MAN	5023	9927	OATS		LEAF	1079	P.C.NO HALO			1722
39062	24/ 7/39	08	S	STE AGATHE	MAN	4934	9710	WHEAT		GLUME	1082	X.T.UNDULO	1083	X.T.UNDULO	
39063	31/ 7/39			WINNIPEG	MAN	4953	9709	WHEAT		GLUME	1086	X.T.UNDULO	1087	X.T.UNDULO	
39064	31/ 7/39			WINNIPEG	MAN	4953	9709	WHEAT		LEMMA	1088	PS.ATROFAC.	1089	PS.ATROFAC.	
39065	3/ 6/39			WINNIPEG	MAN	4953	9709	WAX BEAN		POD	1090	P.PHASEOL.	1091	P.PHASEOL.	
39066	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	35-71	GLUME	1093	X.T.UNDULO	1094	X.T.UNDULO	
39067	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	REWARD	GLUME	1096	X.T.UNDULO	1097	X.T.UNDULO	
39068	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	C.T. 21	GLUME	1098	X.T.UNDULO	1099	X.T.UNDULO	
39069	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	RENOWN	GLUME	1100	X.T.UNDULO	1101	X.T.UNDULO	
39071	3/ 8/39			WINNIPEG	MAN	9953	9709	WHEAT	C.T. 135	GLUME	1105	X.T.UNDULO	1106	X.T.UNDULO	
39072	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	C.T.309	GLUME	1108	X.T.UNDULO	1109	X.T.UNDULO	
39073	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	THATCHER	GLUME	1110	X.T.UNDULO	1111	X.T.UNDULO	
39074	25/ 7/39	02	W	BUHNSIUE	MAN	4958	9829	WHEAT	THATCHER	GLUME	1115	PS. ATROFAC.			
39075	3/ 8/39			WINNIPEG	MAN	4953	9709	WHEAT	THATCHER	INTNODE	1116	X.T.UNDULO	1117	X.T.UNDULO	
39077	25/ 7/39			KENMORE	ONT	4513	7524	OATS	VICTORY	LEAF	1119	P.C.NO HALO	1120	P.C.NO HALO	1723
39078	13/ 8/39			MELFORT	SAS	5252	10436	WHEAT	THATCHER	LEAF AND NECK	1048	X.T.UNDULO	1049	X.T.UNDULO	
39079	8/ 8/39			GRONLID	SAS	5306	10428	WHEAT	REGENT	LEAF	1102	PS.ATROFAC.	1103	PS.ATROFAC.	
40002	27/ 6/40			WINNIPEG	MAN	4953	9709	OATS	ANTHONY	LEAF	1139	P.C.NO HALO	1140	P.C.NO HALO	
40003	17/ 6/40			PORTAGE LA	MAN	4957	9825	OATS		LEAF	1141	P.C.NO HALO	1142	P.C.NO HALO	
40004	17/ 6/40	07	NW	MORRIS	MAN	4921	9722	OATS	VANGUARD	LEAF	1145	P.C.NO HALO			

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Collection Date	Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
40005	19/ 6/40	04 W MORRIS	MAN	4921	9722	BR INERM		LEAF	1169	P.C.V.ATRO.	1170	P.C.V.ATRO.	
40008	19/ 6/40	ST ADOLPHE	W N	4940	9706	OATS		LEAF	1171	P.C.NO HALO	1172	P.C.NO HALO	
40009	19/ 6/40	UNION POIN	MAN	4931	9714	OATS		LEAF	1151	P.C.NO HALO	1152	P.C.NO HALO	1724
40010	19/ 6/40	STE AGATHE	MAN	4934	9710	OATS		LEAF	1153	P.C.NO HALO	1154	P.C.NO HALO	
40011	19/ 6/40	03 N MORRIS	MAN	4921	9722	BARLEY		LEAF	1156	X.T.HORDEI			
40014	27/ 6/40	WINNIPEG	MAN	4953	9709	BARLEY		LEAF	1173	X.T.H-AV.	1174	X.T.H-AV.	5735
40015	3/ 7/40	WINNIPEG	MAN	4953	9709	BARLEY	STAR	LEAF	1175	X.T.UNDULO	1176	X.T.UNDULO	
40016	4/ 7/40	PORTAGE LA	MAN	4957	9825	WHEAT	RENOWN	LEAF	1177	PS.ATROFAC.	1178	PS.ATROFAC.	
40018	5/ 7/40	07 NW MORRIS	MAN	4921	9722	OATS	VANGUARD	LEAF	1179	P.C.NO HALO	1180	P.C.NO HALO	
40022	5/ 7/40	STE AGATHE	MAN	9934	9710	OATS		LEAF	1185	P.C.NO HALO	1186	P.C.NO HALO	
40027	10/ 7/40	WINNIPEG	MAN	4953	9709	OATS	EARLY MILLR	LEAF	1191	P.C.NO HALO	1192	P.C.NO HALO	
40028	18/ 7/40	WINKLER	MAN	4911	9756	OATS	VANGUARD	LEAF	1193	P.C.NO HALO	1194	P.C.NO HALO	
40029	15/ 7/40	MORDEN	MAN	4911	9805	OATS	ERBAN	LEAF	1195	P.C.NO HALO	1196	P.C.NO HALO	1725
40030	15/ 7/40	MORDEE	MAN	4911	9805	OATS	BOND	LEAF	1197	P.C.NO HALO			
40031	9/ 7/40	MATHER	MAN	4906	9907	OATS		LEAF	1199	P.C.NO HALO	1200	P.C.NO WLO	1726
40032	9/ 7/40	SOMERSET	MAN	4924	9839	OATS	VANGUARD	LEAF	1202	P.C.NO HALO			
40033	15/ 7/40	LA RIVIERE	MAN	4913	9843	OATS		LEAF	1204	P.C.NO HALO	1205	P.C.NO HALO	3034
40034	15/ 7/40	MANITOU	MAN	4915	9831	OATS		LEAF	1206	P.C.NO HALO			1705
40036	16/ 7/40	BRANDON	MAN	4950	9957	OATS		LEAF	1209	P.C.NO HALO	1210	P.C.NO HALO	
40037	15/ 7/40	CARROLL	MAN	4936	10002	OATS		LEAF	1211	P.C.NO HAM	1212	P.C.NO HALO	
40039	17/ 7/40	MACDONALD	MAN	5003	9828	OATS		LEAF	1167	P.C.NO HALO	1168	P.C.NO HALO	3797
40040	9/ 7/40	RUSSELL	MAN	5047	10115	OATS		LWF	1213	P.C.NO HALO	1214	P.C.NO HALO	
40041	8/ 7/40	HIGH BLUFF	MAN	5000	9815	OATS		LEAF	1215	P.C.NO HAM	1216	P.C.NO HALO	1706
40045	16/ 7/40	MINIOTA	MAN	5008	10100	WHEAT		GLUME	1219	PS.ATROFAC.	1220	PS.ATROFAC.	
40048	25/ 7/40	WINNIPEG	MAN	4953	9709	BEAN		POD	1221	X.PHASEOLI	1222	X.PHASEOLI	3778
40054	24/ 7/40	HARTNEY	MAN	4928	10030	OATS	VANGUARD	LEAF	1232	P.C.NO MLO	1234	P.C.NO HALO	1727
40055	25/ 7/40	AUSTIN	MAN	4947	9855	WHEAT	RENOWN	GLUME AND PETIOLE	1235	X.T.CEREAL.	1236	X.T.CEREAL.	1503
40062	31/ 7/40	VISTA	MAN	5037	10043	OATS	VANGUARD	LEAF	1247	P.C.NO HALO			1728
40063	1/ 8/40	SOLSGIRTH	MAN	5029	10054	OATS		LWF	1249	P.C.HALO	1250	P.C.HALO	1708
40064	2/ 8/40	KELWOOD	MAN	5038	9922	MTS		LEAF	1251	P.C.NO HALO			
40068	0/ 8/40	MORDEN	MAN	4911	9805	TOMATO		FRUIT	1253	P.TOMATO	1254	P.TOMATO	
40070	0/ 9/40	FORT SIMPS	NWT	6200	12200	OATS		LEAF	1257	P.C.NO HALO	1258	P.C.NU HALO	1729
41009	2/ 7/41	WINNIPEG	MAN	4953	9709	RYE		LEAF	1285	X.T.UNDULO	1286	X.T.UNDULO	
41020	10/ 7/41	OAK LAKE	MAN	4947	10038	WHEAT	THATCHER	LEAF	1307	X.T.UNDULO			
41021	10/ 7/41	06 W BRANDON	MAN	4950	9957	WHEAT	THATCHER	LEAF	1309	X.T.UNDULO			
41035	19/ 8/41	WINNIPEG	MAN	4953	9709	TOMATO	BUUNTY	FXUIT	1331	P.TOMATO	1332	P.TOMATO	
41036	19/ 8/41	BAGOT	MAN	4957	9837	TOMATO		FRUIT	1333	X.VESICAT.	1334	X.VESICAT.	
41039	10/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO	BOUNTY	FRUIT	1341	P.TOMATO	1342	P.TOMATO	
41040	11/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1343	P.TOMATO	1344	P.TOMATO	
41041	11/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1345	P.TOMATO	1346	P.TOMATO	
41042	10/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1347	P.TOMATO	1348	P.TOMATO	
41043	11/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1349	P.TOMATO	1350	P.TOMATO	
41044	10/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1351	P.TOMATO	1352	P.TOMATO	

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Collection No.	Date	Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
41045	10/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1353	P.TOMATO	1354	P.TOMATO	
41046	10/ 9/41	WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1355	P.TOMATO	1356	P.TOMATO	
41054	6/12/41	WINNIPEG	MAN	4953	9709	POTATO		PETIOLE	1367	COR.SEPED.	1368	COR.SEPED.	
42001	0/ 0/42	TORONTO	ONT	4339	7923	HED HELX		LEAF	1389	X.HEDERAE	1390	X.HEDERAE	
42002	0/ 0/42	WINNIPEG	MAN	4953	9709	TOMATO	BUUNTY	COTLEDN	1392	P.TOMATO			
42007	15/ 6/42	WINNIPEG	MAN	4953	9709	OATS	VICTORY	LEAF	1411	P.C.HALO	1412	P.C.HALO	
42009	15/ 6/42	WINNIPEG	MAN	4953	9709	OATS	VICTORY	LEAF	1413	P.C.HALO	1414	P.C.HALO	
42015	9/ 7/42	WINNIPEG	MAN	4953	9709	OATS	AJAX	LEAF	1423	P.C.NO HAW			
42016	12/ 7/42	PORTAGE LA	MAN	4957	9825	BEAN		LEAF	1425	P.PHASEOL.			
42020	15/ 7/42	BRANDON	MAN	4950	9957	BARLEY	NEWAL	LEAF	1429	X.T.H-AV.	1449	X.T.H-AV.	
42021	15/ 7/42	BRANDON	MAN	4950	9957	BARLEY	PLUSH	LEAF	1430	X.T.H-AV.	1450	PS.ATROFAC.	
42022	15/ 7/42	BRANDON	MAN	4950	9957	BARLEY	U.S.5	LEAF	1451	X.T.H-AV.			
42035	30/ 7/42	SASKATOON	SAS	5207	10638	WHEAT	PELISSIER	LF SHTH	1435	PS.ATROFAC.	3635	PS.ATROFAC.	3635
42036	18/ 8/42	KYLE	SAS	5050	10802	WHEAT	THATCHER	GLUME	1436	X,T,UNDULO			4126
42039	22/ 8/42	PARKSIDE	SAS	5310	10633	WHEAT	THATCHER	GLUME	1440	PS.ATROFAC.			
42055	29/ 7/42	CRESTON	BC	4906	11631	OATS	MABEL	LEAF	1475	P.C.NO HALO			3784
42059	0/ 0/42	KEMPTVILLE	ONT	4501	7539	OATS	ERBAN	LEAF	1489	P.C.HALO			
42061	9/ 9/42	WINNIPEG	MAN	4953	9709	TX K-SAG		LEAF	1476	X.TARAXICI			
42073	0/ 0/42	KAPUSKASIN	ONT	4925	8226	WHEAT	THATCHER	GLUME	1499	X,T,UNDULO	1500	X,T,UNDULO	
42076	24/11/42	WINNIPEG	MAN	4953	9709	TX K-SAG		LEAF	1527	X.TARAXICI			
43002	10/ 2/43	WINNIPEG	MAN	4953	9709	TX K-SAG		ROOT	1533	X.TARAXICI	1534	X.TARAXICI	
43005	14/ 7/43	05 W ELM CREEK	MAN	4941	9800	WHEAT	THATCHER	LEAF	1544	X,T.CEREAL.			3638
43006	14/ 7/43	TREHERNE	MAN	4938	9841	OATS		LEAF	1505	P.C.HALO			1710
43015	14/ 7/43	10 N STONEWALL	MAN	5009	9721	OATS	VANGUARD	LEAF	1549	P.C.HALO			1711
43018	23/ 7/43	MORDEN	MAN	4911	9805	WHEAT	GARNET	LEAF	1551	X,T,UNDULO			
43019	23/ 7/43	MORDEN	MAN	4911	9805	WHEAT	MARQUIS	LEAF	1552	X,T,UNDULO			
43020	23/ 7/43	03 S CARMAN	MAN	4932	9800	OATS		LEAF	1613	P.C.HALO			5589
43024	4/ 8/43	WAWANESA	MAN	4936	9941	WHEAT	RENOWN	HEAD	1557	X,T.CEREAL.			
43026	6/ 8/43	01 W STE ROSE	MAN	5103	9932	WHEAT	THATCHER	GLUME	1563	X,T,UNDULO			
43027	6/ 8/43	03 N EDEN	MAN	5023	9927	OATS		LEAF	1614	P.C.HALO			1712
43029	6/ 8/43	MACDONALD	MAN	5003	9828	BARLEY	TWO ROW	LEAF	1565	X.T.H-AV.			3044
43039	25/ 8/43	WINNIPEG	MAN	4953	9709	WHEAT	CT405	GLUME	1579	X,T,UNDULO			
43040	25/ 8/43	WINNIPEG	MAN	4953	9709	WHEAT	CT404	GLUME	1583	X,T.CEREAL.	1584	X,T,UNDULO	3042
43041	25/ 8/43	WINNIPEG	MAN	4953	9709	WHEAT	APEX	GLUME	1589	X,T,UNDULO	1590	X,T,UNDULO	
43046	23/ 8/43	ROSTHERN	SAS	5240	10617	WHEAT		GLUWE	1593	PS.ATROFAC.	1594	PS.ATROFAC.	
43048	18/ 8/43	WINNIPEG	MAN	4953	9709	SOYBEAN		LEAF	1585	P,GLYCINEA			1636
43054	3/ 9/43	WINKLER	MAN	4911	9756	SOYBEAN	KABATT	LEAF	1658	P,GLYCINEA	1659	P,GLYCINEA	
43064	0/ 0/43	MANOTICK	ONT	4513	7541	WHEAT	RENOWN	GLUME	1609	X,T,UNDULO			
43066	0/ 0/43	KAPUSKASIN	ONT	4925	8226	WHEAT	THATCHER	GLUME	1610	X,T,UNDULO			
43075	1/12/43	WINNIPEG	MAN	4953	9709	SOYBEAN	PAGODA	LEAF	1636	P,GLYCINEA	1637	P,GLYCINEA	
44003	21/ 2/44	WINNIPEG	MAN	4953	9709	OATS	RICHLAND	SEM JNT	1746	P,C,HALO			
44014	12/11/44	WINNIPEG	MAN	4953	9709	TOMATO	BOUNTY	FRUIT	1774	P.TOMATO			
44017	8/ 7/44	MORDEN	MAN	4911	9805	WHEAT		LEAF	1777	X,T,CEREAL,			
44018	4/ 7/44	HEADINGLEY	MAN	4953	9724	WHEAT	THATCHER	LEAF	1778	X.T.UNDULO			

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Collection NO.	Date		Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
44019	5/ 7/44		BINSCARTB	MAN	5037	10116	OATS		LEAF	1779	P.C.HALO			
44021	5/ 7/44		SHELLMOUTH	MAN	5056	10126	OATS		LEAF	1781	P.C.HALO			
44023	4/ 7/44		WOODSIDE	MAN	5011	9846	OATS		LEAF	1844	P.C.HALO			
44026	5/ 7/44		SHOAL LAKE	MAN	5026	10034	OATS		LEAF	1786	PS.ATROFAC.	1845	P.C.HALO	1786
44031	6/ 7/44		BRANDON	MAN	4950	9957	WHEAT	RENOWN	GLUME	1795	X.T.CEREAL.			3039
44042	2/ 8/44	05 S	STE ROSL	MAN	5103	9932	WHEAT	THATCHER	GLUME	1807	XTU.OR CER.			
44045	9/ 8/44		WINNIPEG	MAN	4953	9709	WHEAT	R.L.2040	GLUME	1811	X.T.CEREAL.			3040
44046	9/ 8/44		WINNIPEG	MAN	4953	9709	WHEAT	K.L. 1834.1	GLUME	1812	XTU.OR CER.			
44047	9/ 8/44		WINNIPEG	MAN	4953	9709	WHEAT	R.L. 1834.1	GLUME	1815	XTU.OR CER.	1817	XTU.OR CER.	
44048	5/ 7/44		GILBERT PL	MAN	5108	10030	OATS		LEAF	1846	P.C.HALO			
44049	9/ 8/44		WINNIPEG	MAN	4953	9709	WHEAT	R.L.2040	GLUME	1819	XTU.OR CER.	1820	XTU.OR CER.	
44050	9/ 8/44		WINNIPBG	MAN	4953	9709	WHEAT	R.L. 3038	GLUME	1822	XTU.OR CER.	1823	XTU.OR CER.	
44052	9/ 8/44		WINNIPEG	MAN	4953	9709	WLEAT	C.T.408	GLLME	1828	X.T.UNDULO			
44055	0/ 8/44		MORDEN	MAE	4911	9805	WHEAT	RENOWN	GLUME	1837	XTU.OR CER.			
44063	12/ 9/44		MORDEN	MAN	4911	9805	TURNIP		LEAF	1853	X.CAMPEST.			
44066	8/ 9/44		WINNIPEG	MAN	4953	9709	SOYBEAN	KABATT	LEAF	1857	P.GLYCINEA	1860	P.GLYCINEA	
44068	22/ 9/44		SASKATOON	SAS	5207	10638	CABBAGE		STALK	1863	X.CAMPEST.			
44076	25/ 9/44		WINNIPEG	MAN	4953	9709	TOMATO		FRUIT	1871	P.TOMATO	1872	P.TOMATO	1871
45015	19/ 6/45		MORDEN	MAN	4911	9805	LILAC	NOKOMIS	LEAF	2009	P.SYRINGAE	2010	P.SYRINGAE	2009
45016	19/ 6/45		MORDEN	MAP;	4911	9805	LILAC	SKINRS LOUV	L W F	2027	P.SYRINGAE			2027
45020	19/ 6/45		MURDEN	Mnh	4911	9805	ASIA ELM		LEAF	2011	UNIDENT.P.P.	2012	UNIDENT.P.P.	
45030	19/ 6/45		MORDEN	MAN	4911	9805	PLUM		FRUIT	2014	P.SYRINGAE			
45038	27/ 6/45		RESTON	MAN	4935	10102	ACONITUM	MONKSHOOD	STALK	2018	P.SYRINGAE			
45039	25/ 6/45	02 N	BRADWELL	SaS	5157	10615	MEL ALBA	SW.CLOVER	ROOT	2020	P.SYRINGAE	2021	P.SYRINGAE	
45041	8/ 7/45		GILBLRT PL	MAN	5108	10030	OATS	R.L.1273	LLAF	2030	P.C.HALO	2031	P.C.HALO	2030
45043	9/ 7/45	01 S	MINNEDOSA	MAN	5014	9951	BARLEY		LEAF	2049	X.T.HORDEI	2050	X.T.HORDEI	
45051	18/ 7/45		BRANDON	MAN	4950	9957	WHEAT	THATCHER	LEAF	2054	X.T.UNDULO			
45053	10/ 7/45		PORTAGE LA	MAN	4957	9825	OATS		LEAF	2038	P.C.NO HALO			2038
45058	27/ 7/45	05 W	MARIAPOLIS	MAN	4921	9900	WHEAT	THATCHER	LEAF	2040	X.T.UNDULO			3045
45093	1/ 8/45	04 E	SWAN RIVER	MAN	5206	10116	RYE		LEAF	2043	X.T.UNDULO			
45095	30/ 7/45	03 N	MINNEDOSA	MAN	5014	9951	WHEAT	RENOWN	GLUME	2063	X.T.UNDULO			
45096	30/ 7/45	05 W	BASSWOOD	MAN	5019	10002	WHEAT	RENOWN	GLUME	2045	X.T.UNDULO			
45109	11/ 8/45		WINNIPEG	MAN	4953	9709	WHEAT		GLUME	2074	X.T.UNDULO			
45111	20/ 8/45		WINNIPEG	MAN	4953	9709	BEAN		LEAF	2075	X.PHASEOLI			
45113	20/ 8/45		WINNIPEG	MAN	4953	9709	BEAN		LEAF	2076	P.PHASEOL.			2076
45114	20/ 8/45		WINNIPEG	MAN	4953	9709	BEAN	CALAPPROVED	LEAF	2077	X.PHASEOLI			
45115	20/ 8/45		WINNIPEG	MAN	4953	9709	BEAN		LEAF	2078	P.PHASEOL.			2079
45116	25/ 7/45		WINNIPEG	MAN	4953	9709	BEAN		LEAF	2079	P.PHASEOL.			2079
45128	10/ 8/45	06 NE	MORDEN	MAN	4911	9805	AKG RAPE		LEAF	3000	X.CAMPEST.	3001	X.CAMPEST.	3000
46008	28/ 1/46		BRANDON	MAN	4950	9957	TURNIP		ROOT	3024	X.CAMPEST.	3025	X.CAMPEST.	
46015	23/ 3/46		WINNIPEG	MAN	4953	9709	BARLEY	STAR	LEAF	3032	X.T.H-AV.			
46021	5/ 6/46	01 S	SWAN RIVER	MAN	5206	10116	ALFALFA		ROOT	3080	COR.INSID.	3081	COR.INSID.	
46023	5/ 6/46	02 N	ETHELBERT	MAN	5131	10022	ALFALFA		ROOT	3083	COR.INSID.	3084	COR.INSID.	
46024	11/ 6/46		GROSSE ISL	MAN	5000	9725	ALFALFA		ROOT	3085	COR.INSID.	3086	COR.INSID.	

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Collection No.	Date			Location		Lat.	Long.	Host	variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
46025	12/ 6/46			WINNIPEG B	MAN	5031	9658	ALFALFA		ROOT	3088	COR.INSID.	3089	COR.INSID.	
46026	12/ 6/46			KOMARNO	MAN	5028	9712	ALFALFA		ROOT	3092	COR.INSID.	3093	COR.INSID.	3095
46032	8/ 7/46			NINGA	MAN	4913	9951	OATS		LEAF	3110	P.C.HALO	3111	P.C.HALO	3110
46033	8/ 7/46	03	N	HORTON	MAN	4908	10007	OATS		LEAF	3112	P.C.HALO	3113	P.C.HALO	3112
46034	8/ 7/46	03	E	LYLETON	MAN	4902	10110	OATS		LEAF	3114	P.C.HALO	3115	P.C.HALO	
46035	9/ 7/46	06	S	TILSTON	MAN	4924	10118	OATS		LhAF	3116	P.C.HALO	3117	P.C.HALO	
46036	12/ 7/46	02	S	EDEN	MAN	5023	9927	OATS		LEAF	3131	P.C.NO HALO	3132	P.C.NO HALO	3132
46037	11/ 7/46	01	S	BOWSMAN	MAN	5214	10114	RYE		LEAF	3169	X.T.UNDULO	3170	X.T.UNDULO	
46039	10/ 7/46	05	S	HARDING	MAN	5000	10030	WHEAT	REGENT	LhAF	3133	PS.ATROFAC.	3134	PS.ATROFAC.	3133
46040	11/ 7/46	04	W	KENVILLE	MAN	5200	10120	OATS		LEAF	3135	P.C.HALO	3136	P.C.HALO	
46043	10/ 7/46	01	h	NEWDALE	MAN	5020	10006	OATS		LEAF	3120	P.C.HALO	3121	P.C.HALO	
46044	10/ 7/46	02	E	VISTA	MAN	5037	10043	WHEAT	THATCHER	LEAF	3122	X.T.UNDULO			
46046	10/ 7/46	03	N	GRISWOLD	MAN	4945	10025	OATS		LEAF	3164	P.C.HALO			3164
46054	20/ 7/96			WINNIPEG	MAN	4953	9709	TOMATO	BOUNTY	LEAF	3126	P.TOMATO			3126
46057	30/ 7/46			HIGH BLUFF	MAN	5000	9815	OATS		LEAF	3173	P.C.HALO			3173
46060	5/ 8/46			PORTAGE LA	MAN	4957	9825	FIELD PE	ARTHUR	POD	3152	P.PISI	3153	P.PISI	
46061	5/ 8/46			PORTAGE LA	MAN	4957	9825	PEAS	DASHAWAY	STALK	3154	P.PISI	3155	P.PISI	4591
46072	6/ 8/46			SELKIRX	MAN	5009	9652	TOMATO		STALK	3143	P.TOMATO	3144	P.TOMATO	
46073	9/ 8/46			WINNIPEG	MAN	4953	9709	TOMATO	BOUNTY	FRUIT	3146	COR.MICH.	3147	COR.MICH.	
46074	9/ 8/46			WINNIPEG	MAN	4953	9709	TOMATO	BOUNTY	STALK	3148	COR.MICH.	3149	COR.MICH.	3148
46075	27/ 8/46			BRANDON	MAN	4950	9957	CUCUMBER	MINCU	LEAF	3179	P.LACHRY.	3180	P.LACHRY.	
46078	26/ 8/46			MORDEN	MAN	4911	9805	LIMA BN		LEAF	3187	UNIDENT.P.P.			3187
46082	27/ 8/46			WINNIPEG	MAN	4953	9709	BEAN	TEKDERGREEN	POD	3196	P.PHASEOL.			3196
47008	17/ 6/47			CHATHAM	ONT	4224	8211	BEAN		KLRNEL	3290	COR.FLACC.	3291	COR.FLACC.	3291
47037	9/10/47			WINNIPEG	MAN	4953	9709	TURNIP		ROOT	3318	X.CAMPEST.	3319	X.CAMPEST.	3318
47039	20/10/47			WINNIPEG	MAN	4953	9709	BEAN	G STRLS GPD	STALK	3320	UNIDENT.P.P.	3321	UNIDENT.P.P.	
47046	5/11/47			WINNIPEG	MAN	4953	9709	BEAN	G STRLS GPD	STALK	3333	COR.FLACC.	3334	COR.FLACC.	3333
48006	25/ 6/48			WINNIPEG	MAN	4953	9709	WHEAT		LEAF	3391	X.T.UNDULO	3392	X.T.UNDULO	
48007	3/ 7/48			WINNIPEG	MAN	4953	9709	BEAN		LEAF	3407	P.PHASEOL.	3408	P.PHASEOL.	
48029	20/ 7/48			WINNIPEG	MAN	4953	9709	WHEAT	SAUNDERS	LEAF	3409	X.T.UNDULO	3410	X.T.UNDULO	3409
48031	19/ 7/48			WINNIPEG	MAN	4953	9709	OATS	EXETER	LEAF	3412	P.C.HALO			
48032	19/ 7/48			WINNIPEG	MAN	4953	9709	OATS	EXETER	LEAF	3414	P.C.HALO			
48033	19/ 7/48			DAUPHIN	MAN	5109	10003	CUCUMBER		LEAF	3415	P.LACHRY.	3416	P.LACHRY.	3416
48034	17/ 7/48			WINNIPEG	MAN	4953	9709	BEAN		LEAF	3417	X.PHASEOLI			
48035	17/ 7/48			WINNIPEG	MAN	4953	9709	TOMATO		LEAF	3420	P.TOMATO	3421	P.TOMATO	3420
48040	12/ 7/48			BROOKDALE	MAN	5004	9934	OATS		LEAF	3427	P.C.HALO	3428	P.C.HALO	3428
48044	23/ 7/48			PILOT MOUN	MAN	4916	9855	OATS	AJAX	LEMMA	3431	P.C.HALO			3431
48048	26/ 7/48			WINNIPEG	MAN	4953	9709	BARLEY		LEAF	3465	X.T.H-AV.			4121
48050	28/ 7/48			WINNIPEG	MAN	4953	9709	CABBAGE		LEAF	3438	X.CAMPEST.			4790
48084	30/ 8/48			WINNIPEG	MAN	4953	9709	WHEAT		GLUME	3507	X.T.UNDULO			
48092	20/ 8/48			WINNIPE	MAN	4953	9709	CUCUMBER		STALK	3516	UNIDENT.P.P.	3517	UNIDENT.P.P.	
49010	2/ 6/49			LAROCHE LE	MAN	4922	9659	PEAS	PRIDE	LEAF	3541	P.PISI	3542	P.PISI	
49012	3/ 6/49			SEDDONS CR	MAN	5004	9631	LATH	VEN	LEAF	3543	UNIDENT.P.P.	3544	UNIDENT.P.P.	3812
49013	3/ 6/49			SEDDONS CK	MAN	5004	9631	LATH	VEN	STALK	3545	UNIDENT.P.P.	3546	UNIDENT.P.P.	

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

collection No.	Date	Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
49021	11/ 6/49	LAROCHELLE	MAN	4922	9659	FALL RYE		LEAF	3553	X.T.UNDULO	3554	X.T.UNDULO	3554
49026	23/ 6/49	WINNIPEG	MAN	4953	9709	PEAS	DELW COMMDO	LEAF	3565	UNIDENT.P.P.			
49030	23/ 6/49	05 E WINKLER	MAN	4911	9756	FALL RYE		LEAF	3569	X.T.UNDULO	3570	X.T.UNDULO	3570
49033	24) 6/49	LIMERICK	SAS	4940	10615	BARLEY		LEAF	3571	X.T.H-AV.			
49034	14/ 7/49	WINNIPEG	MAN	4953	9709	BEAN		LEAF	3573	P.PHASEOL.	3574	P.PHASEOL.	3573
49035	16/ 7/49	WINNIPEG	MAN	4953	9709	BARLEY	TITAN	LEAF	3575	X.T.H-AV.	3576	X.T.H-AV.	4813
49036	12/ 7/49	SASKATOON	SAS	5207	10638	OATS		LEAF	3578	P.STRIAF.			
49059	0/ 0/49	EDINBURGH	SCO	5557	310	OATS		LEAF	3580	P.C.HALO	3581	P.C.HALO	
49061	21/ 7/49	WINNIPEG	MAN	4953	9709	TOMATO		PETIOLE	3584	COR.MICH.	3585	COX.MICH.	3584
49062	75/ 7/49	WINNIPEG	MAN	4953	9709	TOMATO		STALK	3589	COR.MICH.			
49063	28/ 7/49	DONCREST	SAS	5235	10250	OATS		LEAF	3616	P.C.NO HALO			3616
49077	9/11/49	WINNIPEG	MAN	4953	9709	HED HALX		LEAF	3625	X.HEDERAE			3625
50001	15/ 3/50	WINNIPEG	MAN	4953	9709	BARLEY	TITAN	LEAF	3643	X.T.H-AV.	3644	X.T.H-AV.	
50013	22/ 8/50	05 W SLLKIRK	MAN	5009	9652	MILLET		LLAF	3718	UNIDENT.P.P.	3719	UNIDENT.P.P.	3719
50014	26/ 8/50	BRANDON	MAN	4950	9957	WHEAT	LEE	NECK	3720	X.T.CEREAL.			
50023	6/ 9/50	BELLE PLAI	SAS	5024	10509	WHEAT	RESCUE	KERNEL	3730	PS.ATROFAC.	3731	PS.ATROFAC.	
50026	21/ 9/50	CHOICELAND	SAS	5327	10425	WHEAT		NECK	3736	X.T.UNDULO	3738	X.T.UNDULO	4136
50027	4/10/50	LUMSDEN	SAS	4902	10110	CABBAGE		STALK	3748	X.CAMPEST.	3749	X.CAMPEST.	
50028	10/10/50	POCATIERE	PQ	4722	7002	ALFALFA		ROOT	3746	COR.INSID.	3747	COR.INSID.	
51012	15/ 1/51	WINNIPEG	MAN	4953	9709	WHEAT	REDMAN	GLUME	3775	X.T.CEREAL.	3776	X.T.CEREAL.	
51023	15/ 9/51	SASKATOON	SAS	5207	10638	RYL	PROLIFIC	LEAF	3829	UNIDENT.P.P.	3830	UNIDENT.P.P.	
51026	15/ 6/51	WINNIPEG	MAN	4953	9709	OATS		LEAF	3831	P.C.HALO			
51027	15/ 6/51	WINNIPEG	MAN	4953	9709	OATS		LEAF	3832	P.C.NO HALO			
51031	6/ 7/51	05 S MARQUETTE	MAN	5003	9736	OATS		LEAF	3853	P.C.HALO	3854	P.C.HALO	
51032	12/ 7/51	WINKLER	MAN	4911	9756	HAWTHORN		PEDUNCL	3855	ER.AMYLOV.	3856	ER.AMYLOV.	3856
51034	17/ 7/51	WINNIPEG	MAN	4953	9709	OATS		LEAF	3859	P.C.HALO	3860	P.C.HALO	
51036	25/ 7/51	MEADOWS	MAN	4949	9731	PEAS	FREEZONIAN	LEAF	3863	P.PISI	3864	P.PISI	
51060	9/ 8/51	04 N PORTKGE LA	MAN	4957	9825	PEAS	DASHAWAY	LEAF	3886	P.PISI	3887	P.PISI	
51061	10/ 8/51	02 SE ST EUSTACH	MAN	4958	9747	PEAS	ARTHUR	LEAF	3888	P.PISI	3889	P.PISI	
51062	10/ 8/51	02 SE ST EUSTACH	MAN	4958	9747	CUCUMBER		LEAF	3890	P.LACHRY.	3891	P.LACHRY.	
51064	15/ 8/51	BELLEVIEW	MAN	4936	10050	WHEAT	SAUNDERS	LEAF	3894	PS.ATROFAC.	3895	PS.ATROFAC.	3894
51065	17/ 8/51	WINNIPEG	MAN	4953	9709	WHEAT	C.T. 713	GLUME	3896	PS.ATROFAC.	3899	PS.ATROFAC.	
51069	30/ 7/51	WINNIPEG	MAN	4953	9709	BARLEY	PANNIER	LEAF	3945	X.T.H-AV.			4805
51070	14/ 8/51	WINNIPEG	MAN	4953	9709	WHEAT	APEX	LEMMA	3901	PS.ATROFAC.	3902	PS.ATROFAC.	3901
51071	21/ 8/51	WINNIPEG	MAN	4953	9709	WHEAT	C.T. 153	GLUME	3903	PS.ATROFAC.	3905	PS.ATROFAC.	3905
51072	30/ 7/51	WINNIPEG	MAN	4953	9709	WHEAT	C.T. 153	LEAF	3909	X.T.UNDULO	3910	X.T.UNDULO	
51073	28/ 8/51	PULP RIVER	MAN	5148	10038	WHEAT	REGENT	KERNEL	3923	PS.ATROFAC.	3924	PS.ATROFAC.	
51074	28/ 8/51	PULP RIVEA	YAN	5148	10038	WHEAT	REGENT	LEMMA	3925	PS.ATROFAC.			3925
51075	28/ 8/51	PULP RIVER	MAN	5148	10038	WHEAT	REGENT	GLUME	3926	PS.ATROFAC.			3926
51088	0) 0/51	CHARLOTTET	PEI	4614	6308	DAHLIA		ROOT	3990	AGRO.TUMEF.	3991	AGRO.TUMEF.	4722
52008	6/ 6/52	03 W ST NORBERT	MAN	4946	9710	OATS		LEAF	4011	P.C.NO HALO	4012	P.C.NO HALO	4011
52014	10/ 7/52	STEEP ROCK	MAN	5126	9848	OATS		LEAP	4072	P.C.HALO			4072
52015	10/ 7/52	NIPAWIN	SAS	5322	10400	OATS		LEAP	4019	P.C.NO HALO	4058	P.C.NO HALO	
52016	11/ 7/52	05 W ST NORBERT	MAN	4946	9710	RYL		LEAF	4020	X.T.SECAL.	4059	X.T.SECAL.	

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Date	Location	Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
52019	16/ 7/52	OAK LAKE MAN	4947	10038	QUACK GR		LEAF	4021	X.T.CEREAL.	4060	X.T.CEREAL.	
52020	17/ 7/52	GRISWOLD MAN	4945	10025	WILD MUS		POD	4022	UNIDENT.P.P.	4061	UNIDENT.P.P.	
52021	16/ 7/52	KEMNAY MAN	$951	10007	WHEAT		GLUME	4023	PS.ATROFAC.	4063	PS.ATROFAC.	4023
52022	16/ 7/52	ST FRANCOI MAN	4955	9732	BARLEY		LEAF	4101	X.T.H-AV.	4079	X.T.H-AV.	4079
52023	16/ 7/52	POPLAR POI MAN	5004	9758	BARLEY		LEAF	4081	X.T.CEREAL.	4082	X.T.CEREAL.	4081
52025	17/ 7/52	03 N PIPESTONE MAN	4934	10058	RYE		LEAF	4024	X.T.SECAL.	4064	X.T.SECAL.	
52026	17/ 7/52	04 W RESTON MAN	4935	10102	RYE		LEAF	4025	X.T.SECAL.	4065	X.T.SECAL.	
52027	17/ 7/52	02 N PIPESTONE MAN	4934	10058	OATS		LEAF	4066	P.C.NO HALO			
52028	16/ 7/52	ST EUSTACH MAN	4958	9747	CUCUMBER		LEAF	4027	P.LACHRY.	4067	P.LACHRY.	
52030	16/ 7/52	ST EUSTACH MAN	4958	9747	CUCUMBER		LEAF	402%	P.LACHRY.	4068	P.LACHRY.	
52035	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	MARQUIS	GLUME	4029	XTU.OR CER.			4029
52038	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	MARQUIS	GLUME	4032	X.T.UNDULO			
52040	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT	REDMAN	GLUME	4034	X.T.UNDULO			
52041	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT		GLUME	4035	X.T.UNDULO			
52042	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT		GLUME	4036	X.T.UNDULO			
52043	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	LEE	GLUME	4037	X.T.UNDULO			
52045	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	LEE	GLUME	4039	X.T.UNDULO			
52046	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	LEE	GLUME	4040	X.T.UNDULO			
52047	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	C.T. 179	GLUME	4041	X.T.UNDULO			
52049	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT	C.T. 179	GLUME	4042	X.T.UNDULO			
52050	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	C.T. 179	GLUME	4043	X.T.UNDULO			
52051	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	C.T. 316	GLUME	4044	X.T.UNDULO			
52055	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT	C.T. 707	GLUME	4049	X.T.UNDULO			
52056	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT		GLUME	4050	X.T.UNDULO			
52059	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT	H44-24	GLUME	4053	X.T.UNDULO			
52060	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT	H44-24	GLUME	4054	X T UNDULO			
52061	15/ 7/52	WINNIPEG MAN	4953	9709	WHEAT	H44-24	GLUME	4056	X T UNDULO			
52062	15/ 7/52	WINNIPEG MAN	4953	9709	WhEAT	H44-24	GLUME	4057	[illegible]			
52066	1/ 8/52	WINNIPEG MAN	4953	9709	WHEAT	LEE	LEAF	4087	PS.ATROFAC.	4088	PS.ATROFAC.	
52068	1/ 8/52	WINNIPEG MAN	4953	9709	WHEAT	C.T. 186	LEAF	4089	PS.ATROFAC.	4090	PS.ATROFAC.	4089
52071	1/ 8/52	BRANDON MAN	4950	9957	BARLEY	VANTAGE	LEAF	4075	PS.ATROFAC.	4076	PS.ATROFAC.	
52072	1/ 8/52	02 W ST FRANCOI MAN	4955	9732	BARLEY	MONTCALM	LEAF	4093	PS.ATROFAC.	4094	X.T.H-AV.	4094
52078	15/ 8/52	WINNIPEG MAN	4953	9709	CARROT	NANTES	LEAF	4110	X.CAROTAE	4111	X.CAROTAE	
52079	15/ 8/52	SASKATOON SAS	5207	10638	WHEAT		GLUME	4102	PS.ATROFAC.	4103	PS.ATROFAC.	4103
53005	29/ 5/53	WINNIPEG MAN	4953	9709	GERANIUM		STALK	4140	UNIDENT.P.P.	4141	UNIDENT.P.P.	
53006	15/ 6/53	BRANDON MAN	4950	9957	OATS	EXETER	LEAF	4143	P.C.NO HALO	4145	P.C.NO HALO	
53009	10/ 7/53	WINNIPEG MAN	4953	9709	BARLEY		LEAF	4271	X.T.HORDEI	4272	UNIDENT.P.P.	
53010	10/ 7/53	WINNIPEG MAN	4953	9709	WHEAT	SAUNDERS	LEAF	4273	X.T.UNDULO	4274	PS.ATROFAC.	4274
53011	13/ 7/53	WINNIPEG MAN	4953	9709	BARLEY		LEAF	4149	X.T.H-AV.	4150	UNIDENT.P.P.	
53013	14/ 7/53	WINNIPEG MAN	4953	9709	TURNIP	ALLSWEET	LEAF	4152	X.CAMPEST.			4152
53014	14/ 7/53	WINNIPEG MAN	4953	9709	CUCUMBER	NEW PROLIFC	LEAF	4153	UNIDENT.P.P.	4154	UNIDENT.P.P.	4154
53015	14/ 7/53	WINNIPEG MAN	4953	9709	PEAS	HMSTDRXMRVL	LEAF	4155	P.PISI	4156	P.PISI	
53016	14/ 7/53	WINNIPEG MAN	4953	9709	SOYBEAN		LEAF	4157	P.GLYCINEA	4158	P.GLYCINEA	4157
53017	15/ 7/53	BRANDON PAN	4950	9957	BARLEY	MTCLMXANOID	LEAF	4159	X.T.H-AV.	4160	X.T.H-AV.	

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection NO.	Date			Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
53019	16/ 7/53	05	E	BOISSEVAIN	MAN	4914	10003	BARLEY		LEAF	4173	X.T.H-AV.	4174	X.T.H-AV.	4173
53020	16/ 7/53	05	E	BROOMHILL	MAN	4923	10105	BARLEY		LEAF	4175	X.T.H-AV.	4176	X.T.H-AV.	4175
53021	15/ 7/53			PIGEON LAK	MAN	4957	9736	BARLEY		LEAF	4177	X.T.H-AV.	4178	X.T.H-AV.	4177
53022	15/ 7/53			ST FRANCOI	MAN	4955	9732	BARLEY		LEAF	4179	X.T.H-AV.	4180	X.T.H-AV.	4179
53023	15/ 7/53	03	6	SIDNEY	MAN	4954	9904	BARLEY		LEAF	4181	X.T.H-AV.	4182	PS.ATROFAC.	4182
53024	16/ 7/53			PIPESTONE	MAN	4934	10058	BARLEY		LEAF	4185	X.T.H-AV.	4187	X.T.H-AV.	4185
53025	15/ 7/53			BRANDON	MAN	4950	9957	BARLEY		LEAF	4190	X.T.H-AV.	4191	X.T.H-AV.	
53026	16/ 7/53	02	E	MORDEN	MAN	4911	9805	DURUM WH		LF SMTH	4192	PS.ATROFAC.	4193	PS.ATROFAC.	4192
53027	16/ 7/53	05	E	DELORAINE	MAN	4912	10029	WHEAT	LEE	LEAF	4194	X.T.UNDULO			
53029	15/ 7/53			BRANDON	MAN	4950	9957	WHEAT		LEAF	4196	X.T.UNDULO			
53030	16/ 7/53	02	E	PILOT MOUN	MAN	4916	9855	WHEAT	THATCHER	LEAF	4199	PS.ATROFAC.	4276	PS.ATROFAC.	4276
53031	16/ 7/53	04	SW	VIRDEN	MAN	4951	10055	WHEAT	THATCHER	LEAF	4201	X.T.CEREAL.			
53032	15/ 7/53			BRANDON	MAN	4950	9957	WHEAT	CHINOOK	LEAF	4204	PS.ATROFAC.			4204
53033	15/ 7/53			POPLAR POI	MAN	5004	9758	WHEAT		LEAF	4205	PS.ATROFAC.			4205
53034	16/ 7/53	02	E	MORDEN	MAN	4911	9805	DURUM WH		LEAF	4207	X.T.CEREAL.			
53035	16/ 7/53	05	S	PIPESTONE	MAN	4934	10058	DURUM WH		LEAF	4209	X.T.CEREAL.			
53036	16/ 7/53	05	E	BROOMHILL	MAN	4923	10105	WHEAT	LEE	LEAF	4211	X.T.CEREAL.			
53038	16/ 7/53	05	E	BROOMHILL	MAN	4923	10105	AGP RPNS		LEAF	4216	X.T.CEREAL.			
53039	15/ 7/53		E	OAK LAKE	MAN	4947	10038	AGP SP		LEAF	4217	X.T.CEREAL.			
53040	16/ 7/53	05	E	DELORAINE	MAN	4912	10029	AGP RPNS		LEAF	4228	X.T.CEREAL.			
53041	15/ 7/53	05	E	DELORAINE	MAN	4912	10029	BR INERM		LEAF	4230	X.T.CEREAL.			4230
53042	15/ 7/53			DOUGLAS	MAN	4953	9946	RYE		LEAF	4232	X.T.CEREAL.			
53043	16/ 7/53	05	E	BROOMHILL	MAN	4923	10105	RYE		LEAF	4234	X.T.CEREAL.			
53044	16/ 7/53			KILLARNEY	MAN	4912	9942	AGP RPNS		LEAF	4277	PS.ATROFAC.			
53045	15/ 7/53			BRANDON	MAN	4950	9957	BEAN	TENDERGREEN	LEAF	4236	P.PHASEOL.			
53046	15/ 7/53			BRANDON	MAN	4950	9957	OUTS		LEAF	4238	P.C.NO HALO			4238
53047	15/ 7/53	08	S	JORDAN	MAN	4923	9805	OATS		LEAF	4240	P.C.HALO			
53048	9/ 7/53			STEINBACH	MAN	4932	9641	BEAN		LEAF	4161	P.PHASEOL.	4162	P.PHASEOL.	
53049	15/ 7/53			WINNIPEG	MAN	4953	9709	OATS		LEAF	4163	P.C.NO HALO			
53051	20/ 7/53			WINNIPEG	MAN	4953	9709	BARLEY	3870	LEAF	9166	X.4.H-AV.			
53052	20/ 7/53			WINNIPEG	MAN	4953	9709	BARLEY	HARLAN	GLUME	4169	X.T.H-AV.	4170	X.T.H-AV.	4170
53053	16/ 7/53			MINNEDOSA	MAN	5014	9951	OATS		LEAF	4171	P.C.NO HAM	4172	P.C.NO HALO	
53055	22/ 7/53			AVONLEA	SAS	5000	10504	APPLE		SPUR	4243	ER.AMYLOV.	4244	ER.AMYLOV.	4243
53056	4/ 8/53			WINNIPEG	MAN	4953	9709	CUCUMBER		LEAF	4220	P.LACHRY.			4220
53061	6/ 8/53			EDMONTON	ALT	5333	11328	BARLEY	TITAN	LEAF	4223	X.T.H-AV.			
53064	22/ 8/53			WINNIPEG	MAN	4953	9709	CARROT		LEAF	4249	X.CAROTAE	4250	X.CAROTAE	
53079	21/ 8/53			WINNIPEG	MAN	4953	9709	WHEAT	MARQUIS	LEAF	4293	X.T.UNDULO	4294	X.T.UNDULO	
54015	25/ 6/54			FANNYSTELL	MAN	4945	9750	BARLEY		LEAF	4350	X.T.H-AV.	4351	X.T.H-AV.	
54016	25/ 6/54			FANNYSTELL	MAN	4945	9750	BARLEY		LEAF	4352	X.T.H-AV.	4352	X.T.H-AV.	
54017	25/ 6/54			FANNYSTELL	MAN	4945	9750	OATS		LEAF	4354	P.C.HALO			
55002	7/ 2/55			WINNIPEG	MAN	4953	9709	WHEAT	LITTLE CLUB	LEAF	4374	ER.UREDOV.			
56008	13/ 4/56			WINNIPEG	MAN	4953	9709	WHEAT	THATCHER	LEAF	4499	X.T.UNDULO	4500	X.T.UNDULO	4499
56018	10/ 7/56	01	S	DOMAIN	MAN	4936	9719	BARLEY		LEAF	4511	X.T.H-AV.			4511
56020	10/ 7/56			MORDEN	MAN	4911	9805	TOMATO		LEAF	4513	P.TOMATO			

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Date		Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Species	Isolate 2 No.	Species	Culture stored
56024	1/ 8/56		WINNIPEG	MAN	4953	9709	WHEAT	C.T. 424	HEAD	4523	X.T.UNDULO			
56029	21/ 8/56		WINNIPEG	MAN	4953	9709	WHEAT	C.T. 424	GLUME	4524	X.T.UNDULO	4525	X.T.UNDULO	4528
56030	21/ 8/56		WINNIPEG	MAN	4953	9709	WHEAT	C.T. 733	GLUME	4533	X.T.UNDULO	4534	X.T.UNDULO	4821
57024	31/ 5/57		MORDEN	MAN	4911	9805	APPLE		BRANCH	4615	ER.AMYLOV.	4617	ER.AMYLOV.	
58018	15/ 5/58		MORDEN	MAN	4911	9805	APPLE	COLLET	BRANCH	4731	ER.AMYLOV.	4732	ER.AMYLOV.	
58021	25/ 6/58		MORDEN	MAN	4911	9805	OATS	RODNEY	LEAF	4740	P.C.NO HALO	4741	P.C.NO HALO	4740
58022	11/ 7/58		WINNIPEG	MAN	4953	9709	BARLEY	OLLI	GLUME	4743	X.T.H-AV.	4744	X.T.H-AV.	4743
58023	11/ 7/58		WINNIPEG	MAN	4953	9709	BARLEY	OLLI	GLUME	4745	X.T.H-AV.			4745
58036	29/ 7/58		WINNIPEG	MAN	4953	9709	WHEAT	KENYA FARMR	PEDUNCL	4751	X.T.UNDULO	4752	X.T.UNDULO	4751
58035	29/ 7/58		WINNIPEG	MAN	4953	9709	WHEAT	KENYA FARMR	GLUME	4749	X.T.UNDULO	4750	X.T.UNDULO	4749
58039	29/ 7/58		WINNIPEC	MAN	4953	9709	WHEAT		LEAF	4765	X.T.CEREAL.			4765
58039	29/ 7/58		WINNIPEG	MAN	4953	9709	WHEAT		LEAF	4766	X.T.CEREAL.			4766
58042	21/ 7/58		FLEMING	SAS	5005	10130	BARLEY		LEAF	4758	X.T.H-AV.	4759	X.T. H-AV.	4758
58049	13/ 6/58		WINNIPEG	MAN	4953	9709	MTN ASH		TRUNK	4762	UNIDENT.P.P.			4762
58054	26/11/58		WINNIPEG	MAN	4953	9709	WHEAT	LITTLE CLUB	LEAF	4795	ER.UREDOV.	4796	ER.UREDOV.	
59006	17/ 6/59		CARMAN	MAN	4932	9800	OATS		LEAF	4847	P.C.NO HALO	4848	P.C.NO HALO	4847
59031	17/ 7/59		PORTAGE LA	MAN	4957	9825	BARLEY	LTH 4363-32	LEAF	4875	X.T.H-AV.			4875
60010	2/ 8/60		BEULAH	MAN	5016	10102	WHEAT	PEMBINA	NECK	5010	XTU.OR CER.	5011	XTU.OR CER.	5010
60012	4/ 8/60		NIVERVILLE	MAN	4937	9701	WHEAT	PEMBINA	LEAF	5015	XTU.OR CER.	5016	XTU.OR CER.	5015
62031	19/ 7/62	01	E GAINSBOROU	SAS	4910	10126	OATS		LEAF	5260	P.C.HALO			5260
62033	18/ 7/62		CHRISTIE	MAN	4904	9715	BARLEY	MONTCALM	LEAF	5252	X.T.HORDEI	5253	X.T.HORDEI	
62036	18/ 7/62	01	W FANNYSTELL	MAN	4945	9750	OATS		LEAF	5266	P.C.HALO			5266
62037	18/ 7/62	01	W CYPRUS RIV	MAN	4934	9905	OATS		LEAF	5264	P.C.NO HALO			5264
62038	16/ 7/62		WINNIPEG	MAN	4953	9709	BARLEY		LEAF	5262	X.T.HORDEI	5263	X.T.HORDEI	5262
63006	19/ 6/63	32	W OAK BLUFF	MAN	4947	9926	OATS		LEAF	5313	P.C.NO HALO	5314	P.C.NO HALO	
63012	4/ 7/63		WINNIPEG	MAN	4953	9709	OATS		LEAF	5338	P.C.NO HALO	5339	P.C.NO HALO	5338
63015	16/ 7/63		MELFORT	SAS	5252	10436	OATS	GARRY	LEAF	5331	P.C.NO HALO	5332	P.C.NO HALO	5331
63017	11/ 7/63		WINNIPEG	MAN	4953	9709	BARLEY	PANNIER	LWF	5335	X.T.H-AV.	5337	X.T.H-AV.	
63021	16/ 7/63		WINNIPEG	MAN	4953	9709	BARLEY	LTH 5134-4	LEAF	5348	X.T.H-AV.			
63022	17/ 7/63		WINNIPEC	MAN	4953	9709	BARLEY	L50824-12-5	LEAF	5350	X.T.H-AV.			5350
63023	16/ 7/63		VANKLEEK H	ONT	4531	7439	OATS		LEAF	5352	P.C.HALO	5353	P.C.HALO	5352
63024	19/ 7/63	02	S GLENLEA	MAN	4938	9709	OATS		LEAF	5354	P.C.NO HALO			5354
63027	19/ 7/63		STE AGATHE	MAN	4934	9710	OATS		LEAF	5356	P.C.NO HALO			5356
63039	29/ 7/63		WRPAGE LA	MAN	4957	9825	BARLEY		LEAF	5393	X.T.H-AV.			5393
63042	25/ 7/63		HAMIOTA	MAN	5010	10030	WHEAT	PEMBINA	GLUME	5385	PS.ATROFAC.			5385
63046	25/ 7/63		HAMIOTA	MAN	5010	10030	WHEAT	PEMBTNA	LEAF	5383	PS.ATROFAC.			5383
63048	27/ 7/63		EDGERTON	ALT	5245	11027	WHEAT	SHUNDERS	GLUME	5374	PS.ATROFAC.			5374
63067	17/ 8/63		GLADSTONE	MAN	5015	9850	OATS	RODNEY	LEAF	5423	P.C.NO HALO	5429	P.C.NO HALO	5429
64018	24/ 9/64		LASHBURN	SAS	5308	10936	BARLEY	MONTCALM	KERNEL AND KERNEL	5484	X.T.H-AV.	5485	X.T.HORDEI	5484
64029	23/12/64		WINNIPEC	MAN	4953	9709	TURNIP		ROOT	5497	X.CAMPEST.	5498	X.CAMPEST.	5499
65007	15/ 7/65		GLENLEA	MAN	4938	9709	OHTS		LEAF	5514	P.C.NO HALO	5515	P.C.NO HALO	
65018	21/ 8/65		DOMAIN	MAN	4936	9719	WHEAT	MANITOU	LEAF	5529	X.T.CEREAL.	5530	X.T.CEREAL.	5544
65021	0/ 0/65		REGINH	SAS	5025	10439	DURUM WL	D.T.184	GLUME	5522	X.T.UNDULO	5523	X.T.UNDULO	5523

Table 4. Isolates of plant pathogenic bacteria from collections of diseased plants

Collection No.	Date		Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
65022	21/ 8/65		DOMAIN	MAN	4936	9719	WHEAT	MANITOU	LEAP	5531	X,T,UNDULO	5532	X,T,UNDULO	5533
66015	4/ 7/66		WINNIPEG	MAN	4953	9709	DURUM Wh		LEAF	5544	X,T,UNDULO			
66018	28/ 6/66		MORDEN	MAN	4911	9805	OATS		L W F	5548	P,C,NO HALO			
66021	28/ 6/66	01	E ELM CREEK	MAN	4941	9800	WHEAT	MANITOU	LhAF	5554	X,T,CEREAL,			
66022	21/ 7/66	03	W GRAYSVILLE	MAN	4930	9810	RYE		LEAF	5556	X,T,SECAL,			5556
66023	21/ 7/66	05	N CARMAN	MAN	4932	9800	RYE		LEAF	5558	X,T,SECAL,			5558
67001	17/ 7/67		GLENLEA	MAN	4938	9709	WHEAT	REWARD	LEAF	5621	X,T,CEREAL,	5622	X,T,CEREAL,	
67003	17/ 7/67		GLENLEA	MAN	4938	9709	OATS	VICTORY	LEAF	5629	P,C,NO HAM			
67004	18/ 7/67		GLENLEA	MAN	4938	9709	DURUM WH	STEWART 63	LEAF	5627	X,T,CEREAL,	5628	X,T,CEREAL,	5628
68001	19/ 6/68		WINNIPEG	MAN	4953	9709	OATS		LEAF	5636	P,C,NO HALO	5637	P,C,NO HALO	
68003	10/ 7/68		STONY MTN	MAN	5005	9714	OATS		LEAF	5639	P,C,NO HAM	5640	P,C,NO HALO	5639
68005	19/ 6/68	01	N STONY MTN	MAN	5005	9714	OATS		LEAF	5642	P,C,NO HALO			5642
68006	19/ 6/68	01	E STONEWALL	MAN	5009	9721	OATS		LEAF	5643	P,C,NO HAM			
68007	19/ 6/68	02	S STONEWALL	MAN	5009	9721	OATS		LEAF	5644	UNIDENT,P,P,	5645	UNIDENT,P,P,	
68008	19/ 6/68	05	N WINNIPEG	MAN	4953	9709	BARLEY		LEAF	5646	X,T,H-AV,	5647	X,T,HORDEI	5646
68011	22/ 7/68		LETELLIER	MAN	4908	9718	WhEAT	MANITOU	LhAF	5661	X,T,UNDULO	5662	X,T,UNDULO	5661
68012	22/ 7/68	01	W ST JOSEPH	MAN	4909	9724	BARLEY		LEAF	5663	X,T,H-AV,	5664	X,T,H-AV,	5663
68013	22/ 7/68	03	W ST JOSEPH	MAN	4909	9724	DURUM Wh		LEAF	5657	X,T,CEREAL,			5657
68015	22/ 7/68		WINNIPEG	MAN	4953	9709	TRITICAL		LEAF	5670	X,T,UNDULO	5671	X,T,UNDULO	5670
68016	22/ 7/68		WINNIPEG	MAN	4953	9709	WhhAT	MANITOU	LhAF	5672	X,T,UNDULO	5686	X,T,UNDULO	5686
68017	22/ 7/68		WINNIPEG	MAN	4953	9709	TRITICAL	ROSNER	LEAF	5673	X,T,UNDULO	5674	X,T,UNDULO	5673
68018	22/ 7/68		WINNIPEG	MAN	4953	9709	WHEAT	MEXICAN	LEAF	5675	X,T,UNDULO	5676	X,T,UNDULO	
68021	31/ 7/68		WINNIPEG	MAN	4953	9709	WHEAT	PITIC 62	LEAF	5688	X,T,UNDULO	5689	X,T,UNDULO	5689
68022	1/ 8/68	02	N GRETNA	MAN	4902	9735	AGP RPNS		LEAF	5690	X,T,CEREAL,	5691	X,T,CEREAL,	5690
68023	31/ 7/68		WINNIPEG	MAN	4953	9709	WhEAT	TRIPLE DIRK	LEAF	5692	X,T,UNDULO	5695	X,T,UNDULO	
68024	31) 7/68		WINNIPEG	MAN	4953	9709	WLEAT	MANITOU	LEAF	5698	X,T,UNDULO			5698
68025	1/ 8/68		HALBSTADT	MAN	4905	9720	WHEAT	MANITOU	GLUME	5699	X,T,UNDULO	5700	X,T,UNDULO	5699
68026	1/ 8/68	01	E GRETNA	MAN	4902	9735	WHEAT	MHNITOU	LhAF	5701	X,T,UNDULO	5703	X,T,UNDULO	5703
68027	1/ 8/68	02	N GRETNA	MAN	4902	9735	WHEAT	MANITOU	LEAF	5706	X,T,CEREAL,			5706
68028	2/ 8/68		GLENLEA	MAN	4938	9709	DURUM WH		LEAF	5709	X,T,CEREAL,	5710	X,T,UNDULO	
68029	12/ 8/68	15	S GLENLEA	MAN	4938	9709	WHEAT	MARQUIS	LEAF	5713	UNIDENT,P,P,			5713
68030	12/ 8/68		GLENLEA	MAN	4938	9709	WHEAT	MARQUIS	LEAF	5714	X,T,UNDULO	5715	X,T,UNDULO	5714
69006	31/ 3/69		WINNIPEG	MAN	4953	9709	RICE	IKRI 442LTC	LEAF	5749	X,T,UNDULO			
69008	24/ 6/69	06	W ST JOSEPH	MAN	4909	9724	AGP RPNS		LEAF	5752	X,T,CEREAL,			
69009	24/ 6/69	01	E ALTONA	MAN	4906	9733	AGP RPNS		LEAF	5754	X,T,CEREAL,			
69017	25/ 7/69	03	S ALTONA	MAN	4906	9733	WHEAT		LhAF	5775	X,T,UNDULO			
69018	25/ 7/69	01	SE GRETNA	MAN	4902	9735	WhEAT	SELKIRK	LEAF	5756	X,T,CEREAL,			
69019	25/ 7/69	02	E GRETNA	MAN	4902	9735	WHEAT	MANITOU	LEAF	5758	X,T,UNDULO			
69020	25/ 7/69	01	E GRETNA	MAN	4902	9735	WHEAT	MANITOU	LEAF	5760	X,T,UNDULO			
69023	30/ 7/69	01	N MINTO	MAN	4923	9959	WHEAT	MANITOU	LEAF	5764	X,T,UNDULO			5764
69024	30/ 7/69	01	E LAUDER	MAN	4923	10040	WhhAT	MANITOU	LEAF	5766	X,T,CEREAL,			
69025	31/ 7/69	03	E MANITOU	MAN	4915	9831	WhEAT	MANITOU	LEAF	5768	X,T,UNDULO			
69026	31/ 7/69	02	E CRYSTAL CI	MAN	4909	9856	WHEAT		LEAF	5770	X,T,UNDULO			5770
69027	30/ 7/69	03	W HARTNEY	MAN	4928	10030	DURUM WH		LEAF	5772	X,T,CEREAL,			5772

Table 4. Isolates of plant pathoyenic bacteria from collections of diseased plants

Collection No.	Date			Location		Lat.	Long.	Host	Variety	Plant part	Isolate 1 No.	Isolate 1 Species	Isolate 2 No.	Isolate 2 Species	Culture stored
69029	11/ 8/69			GLENLEA	MAN	4938	9709	WHEAT	SAUNDERS	GLUME	5777	X,T,UNDULO			5777
69030	24/ 7/69			WINNIPEG	MAN	4953	9709	BARLEY		LEAP	5781	X,T,H-AV,			5781
69035	8/ 9/69			LACOMBE	ALT	5228	11344	WINTR WT		LEAF	5791	X,T,CEREAL,	5792	X,T,CEREAL,	5791
70001	8/ 7/70			STE ROSE	MAN	5103	9932	OATS		LEAF	5869	P.C.HALO	5870	P.C.HALO	5869
70002	13/ 7/70			WINNIPEG	MAN	4953	9709	OATS		LEAP	5871	P,C,NO HALO	5872	P,C,NO HALO	
70003	28/ 7/70	10	N	LA RIVIERE	MAN	4913	9843	WHEAT	MANITOU	LEAF	5875	X,T,CEREAL,	5876	X,T,CEREAL,	
70005	28/ 7/70	04	E	MANITOU	MAN	4915	9831	WHEAT	NEEPAWA	LEAF	5879	X,T,CEREAL,	5880	X,T,CEREAL,	
70006	23/ 7/70			OAK BLUFF	MAN	4947	9926	BARLEY	SIX ROW	LEAF	5873	X,T,H-AV,	5874	X,T,H-AV,	5873
70008	29/ 7/70			MELITA	MAN	4916	10100	WHEAT	MANITOU	GLUME	5893	X,T,CEREAL,			
70009	5/ 8/70			LACOMBE	ALT	5228	11344	WhEAT	PARK	LEAF	5902	X,T,CEREAL,	5903	X.T.CEREAL.	5902
70011	11/ 8/70	04	W	MELITA	MAN	4916	10100	WHEAT	NEEPAWA	GLUME	5910	X,T,CEREAL,	5911	X.T.CEREAL.	
70012	11/ 8/70	03	S	NELITA	MAN	4916	10100	DURUM WH			59	X.T.CEREAL.	5905	E	
70018	12/ 8/70	13	N	PIPESTONE	MAN	4934	10058	DURUM Wh		LEAF	58	X.T.CEREAL.	5890	E	
70019	12/ 8/70	04	E	OAK LAKE	MAN	4947	10038	WHEAT	NEEPAWA	LEAF AND GLUME	59	X.T.UNDULO	5915	J	
70020	12/ 8/70	05	E	BRANDON	MAN	4950	9957	WHEAT	NEEPAWA	LEAF AND GLUME	5895	X,T,CEREAL,	5896	X,T,CEREAL,	
70021	11/ 8/70	02	S	MELITA	MAN	4916	10100	DURUM WH	STEWART 63	NECK	5897	X.T.CEREAL.	5926	X,T,CEREAL,	5897
70022	12/ 8/70			CABRI	SAS	5037	10828	DURUM WH	D.T. 388	GLUME	5898	X.T.CEREAI	5899	X.T.CEREAL.	
70023	10/ 8/70			DAUPHIN	MAN	5109	10003	WHEAT	NEEPAWA	LEAF	5900	X.T.CEREAL	5901	X.T.CEREAL.	5900
70024	12/ 8/70	01	N	PIPESTONE	MAN	4934	10058	WHEAT	NEEPAWA	LEAP	5891	X.T.CEREAL.	5892	X.T.CEREAL.	
70025	12/ 8/70	08	N	PIPESTONE	MAN	4934	10058	WHEAT		GLUME	5906	X.T.CEREAL.	5907	X,T,CEREAL,	5906
70026	21/ 8/70			WINNIPEG	MAN	4953	9709	BEAN		POD	5916	COR,FLACC,	5921	COR,FLACC,	
71009	13/ 7/71			WINNIPEG	MAN	4953	9709	WHEAT		LEAF	6001	X,T,UNDULO			
71010	13/ 7/7 1			WINNIPEG	MAN	4953	9709	BARLEY		LEAF	6003	X,T,H-AV,			
71012	5/ 8/7 1			GLENBORO	MAN	4932	9915	WhEAT	MANITOU	LEAF	6023	X,T,UNDULO			
71015	5/ 8/71			OAK LAKE	MAN	4947	10038	BARLEY		LEAP	6019	X,T,H-AV,	6020	X,T,H-AV,	
71017	4/ 8/7 1			ALEXANDER	MAN	4950	10017	BARLEY	SIX ROW	LEAF	6030	X,T,H-AV,			
71018	4/ 8/7 1			CARBERRY	MAN	4952	9920	WHEAT	MANITOU	LEAF	6026	X,T,UNDULO			
71019	4/ 8/71			ALEXANDER	MAN	4950	10017	WHEAT	MANITOU	LEAP	6033	X,T,CEREAL,			
71024	10/ 8/71	07	W	KEYES	MAN	5014	9907	WHEAT		HEAD	6006	X,T,UNDULO	6007	X,T,UNDULO	
71025	10/ 8/71	02	W	KEYES	MAN	5014	9907	WHEAT		LEAP	6040	X,T,CEREAL,			
71028	26/ 7/71			RATHWELL	MAN	4940	9832	BARLEY		LEAF	6042	X,T,H-AV,			
71029	26/ 7/71	04	S	TREHERNE	MAN	4938	9841	WHEAT		LEAF	6044	X,T,UNDULO			
71033	4/ 8/71	01	SW	KILLARNEY	MAN	4912	9942	WHEAT		LEAF	6048	X.T.CEREAL.			
71037	10/ 8/71	01	SE	KEYES	MAN	5014	9907	WHEAT		LEAF	6054	X,T,CEREAL,			
71039	10/ 8/71	01	SW	KEYES	MAN	5014	9907	WHEAT		LEAF	6056	X.T.CEREAL.			
71040	13/ 8/71			GLENLEA	MAN	4938	9709	WhEAT	NEEPAWA	LEAF	6058	X,T,UNDULO			
71041	14/ 8/71	02	S	MACDONALD	MAN	5003	9828	WhEAT	NYEPAWA	LEAF	6061	X,T,CEREAL,			
71043	17/ 8/71	03	W	HOBSON	MAN	5003	9820	WHEAT		LEAF	6065	X,T,CEREAL,			
71045	17/ 8/71	02	S	TOWNLINE	MAN	5004	9819	WHEAT		LEAF	6068	X,T,CEREAL,			
71046	17/ 8/71			GENEST	MAN	5000	9825	WHEAT		LEAF	6070	X,T,CEREAL,			
71049	17/ 8/71	04	S	MACDONALD	MAN	5003	9828	WHEAT		GLUME	6076	X,T,CEREAL,			
71051	3/ 9/71			SHOAL LAKE	MAN	5026	10034	WHEAT	NEEPAWA	GLUME	6081	X,T,UNDULO			

* Distance (miles) and 'direction from designated location.

ABBREVIATIONS ***USED IN*** TABLE *4*

AGP RPNS = *Agropyron repens* (L.) Beauv.;
AGRO TUMEF = *Agrobacterium tumefaciens* (Smith and Townsend) Conn. 1942;
BELLE PLAI = Belle Plaine;
CALAPPROVED = Giant Stringless Greenpod bean;
CHARLOTTET = Charlottetown;
M R = *Corynebacterium* Lehmann & Neumann 1896;
COR FLACC = *Cor. flaccumfaciens* (Hedges) Dowson 1942;
COR INSID = *Cor. insidiosum* (McCulloch) Jensen 1934;
MR MICH = *Cor. michiganense* (Smith) Jensen 1934;
COR SEPED = *Cor. sepedonicum* (Spieckermann and Kotthoff) Skaptason & Burkholder 1942;
CRYSTAL CI = Crystal City;
CYRPUS RIV = Cypress River;
DARLINGFOR = Darlingford;
DHW COMMDO = Delwiche Commando;
ER = *Erwinia* Winslow et al. 1920;
ER AMYLOV = *Er. amylovora* (Burrill) Winslow et al. 1920;
ER UREDOV = *Er. uredovora* (Pon et al.) Dye 1963;
FANNYSTELL = Fannystelle;
FIELD PE = Field peas;
FORT SIMPS = Fort Simpson;
GAINSBOROU = Gainsborough;
G STRLS GPD = Giant Stringless Greenpod bean;
GILBERT PL = Gilbert Plains;
HALO = Producing a chlorotic halo in oats;
HED HELX = *Hedera helix* L.;
IRRI 422 ETC = International Rice Research Institute 442-2-50-2-2-3;
KAPUSKASIN = Kapuskasing;
LATH VEN = *Lathyrus venosa* Muhl.;
LIMA BN = Lima bean;
LTH 4363-32 = Lethbridge, AB 36-1991 × Titan;
LTH 5134-4 = Lethbridge, Harlan × Montcalm;
L 50824-12-5 = Lacombe, 508-24-12-5;
MTCLM X ANOID = Montcalm × Anoidium;
MTN = Mountain;
P = *Pseudomnas* Migula *1894:*
P.C. = *Pseudomnas coronafaciens* (Elliott) Stevens 1925;
P.C. NO HALO = *Pseudomnas coronafaciens,* lesions lacking chlorotic halo;
P. STRIAF = *Pseudomonas striafaciens* (Elliott) Starr & Burkholder 1942;
P. GLYCINEA = **Pseudomnas** *glycinea* Coerper 1919;
PIGEON LAK = Pigeon Lake;
PLWT MOUN = Pilot Mound;
F. LACHRY = *Pseudomonas lachrymans* (Smith and Bryan) Carsner 1918;
PS ATROFAC = *Pseudomonas atrofaciens* (McCulloch) Stevens 1925;
POPLAR POI = Poplar Point;
P. PHASEOL = **Pseudomnas** *phaseolicola* (Burkholder) Dowson 1943;
P. TOMATO = *Pseudomnas tomato* (Okabe) Alstatt 1944;
PORTAGE LA = Portage la Prairie;
P. PISI = *Pseudomonas pisi* Sackett 1916;
QUACK GR = *Agropyron repens* (L.1 Beauv.;
R RK X MINHDY = Red Rock × Minhardy;
SEDDONS CR = Seddons Corner near Buchan, Man.;
ST. EUSTACH = St. Eustache;
ST. FRANCOI = St. Francois;
STE ROSE = Ste. Rose du Lac;
TX K-SG = *Taraxicum Kok-saghz* Rod.;
ST. JEAN BT = St. Jean Baptist;
UNIDENT PP = Unidentified bacterial plant pathogen;
UNION FQIN = Union Point:
VANKLEEK H = Vankleek Hill;
VCT X GN R 578 = Victory × Green Russian, strain 578;
WHEAT = Spring Wheat (bread wheat);
WINNIPEG B = Winnipeg Beach;
X = *Xanthomonas* Dowson 1939;
X. CAMPEST = X. *campestris* (Pammel) Dowson 1939;
X. CAROTAE = X. *carotae* (Kendrick) Dowson 1939;
X. HEDERAE = X. *hederae* (Arnaud) Dowson 1939;
X. PHASEOLI = X. *phaseoli* (Smith) Dowson 1939;
X.T. = *Xanthomonas translucens* (Jones, Johnson and Reddy) Dowson 1939;
X.T. CER = X. *t.* f. sp. *cerealis* Hagborg 1942;
X.T. H = X. *t.* f. sp. *hordei* Hagborg 1942;
X.T. H-A = *x. t.* f. sp. *hordei-avenae* Hagborg 1942;
X.T. SECAL = *X. t.* f. sp. *secalis* (Reddy, Godkin and Johnson) Hagborg 1942;
X.T. UNDULO and XTU = X. *t.* f. sp. *undulosa* (Smith et al.) Hagborg 1942;
X. VESICAT = X. *vesicatoria* (Doidge) Dowson 1939.