Air-borne rust inoculum over western Canada in 1974[1]

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In 1974 urediospores of *Puccinia graminis* and *P. recondita* were trapped from May 28 to August 5. Spores were carried into western Canada in early June, but their numbers increased slowly because dry weather limited rust development. Rapid rust development in early August did not affect the spore counts. During 1960-1974, when spore trapping began about mid-May and ended August 31, the numbers of urediospores caught varied widely, even in years when field observations indicated about equal prevalence. The numbers of spores caught are an inexact measure of rust prevalence and damage, but together with field observations they are usually good indicators of the amount and distribution of infection.

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En 1974, la récolte d'uredospores de *Puccinia graminis* et de *P. recondita* a dure du 28 mai au 5 août. Les annees precedentes. on commençait la collecte vers la mi-mai pour la terminer le 31 août. Au debut de juin 1974, les spores se sont disséminées dans l'ouest du Canada mais leur nombre a augmente lentement car le temps' sec a ralenti la croissance de la rouille. Le developpement rapide de la rouille au debut du mois d'août n'a pas influé sur le denombrement des spores.
Entre 1960 et 1974, la quantite d'uredospores recueillie a varie même lorsque les observations in situ semblaient prevoir une dissemination d'importance egale. Le nombre de spores recueilli est une mesure inexacte de l'etendue de la rouille et des dégâts qu'elle comment mais en le combinant aux observations in situ on obtient generalement une bonne indication de la distribution et de l'etendue de l'infection.

The amount of air-borne inoculum of leaf and stem rusts of cereals over western Canada in 1974 was estimated by counting the number of urediospores caught on vaseline-coated microscope slides exposed for 48-hour periods in spore traps, as reported annually since 1960 in the *Canadian Plant Disease Survey.* Slides exposed at all locations excepting Saskatoon were examined at Winnipeg. The slides exposed at Saskatoon were examined by the staff of the Agriculture Canada Research Station, Saskatoon, Saskatchewan.

In previous years slide exposures began about mid-May and ended about August 31. In 1974, exposures began on May 28 and ended on August 5. This is the critical period for rust development in western Canada. The date on which infections first appear and subsequent development during June and July usually indicate whether or not the rusts have destructive potential although the greatest numbers of spores are caught during August.

The spore trap data for June and July obtained since 1960, together with a generalized assessment of rust prevalence and rust damage (Table 2), show a good correlation between the observed prevalence of leaf rust and estimated damage, but there is no close relationship between these observations and the numbers of spores of both rusts caught on the slides. A relationship between the stem rust spore counts and damage was not expected because the varieties grown in the rust area of Manitoba and Saskatchewan from 1960 to 1973 were resistant and there was little or no damage. Stem rust prevalence was assessed by observing rust development on susceptible varieties in experimental plots and on susceptible wild barley *(Hordeum jubatum* L.). The numbers of spores caught in each category of prevalence vary considerably, although spore counts were highest in the years of greatest prevalence. In 1960 and 1961 the main variety Selkirk was resistant to leaf rust, and from 1967 to 1969 the widely grown variety Manitou was also resistant. Leaf rust prevalence and damage were slight during these periods but the number of leaf rust spores caught varied from 242 to 6913. In years when varieties were moderately susceptible and prevalence was moderate, spore counts ranged from 2392 in 1971, when damage was moderate, to 20,696 in 1964, when damage was light. In 1963 and 1965, when prevalence was high, large numbers of spores were caught. Evidently the number of spores caught during the critical period of June and July is an inexact indication of the amount of rust damage, presumably because of differences between the relative rates of crop growth and disease development. However, spore trap data and field observations, taken together, are usually good indicators of infection severity and distribution.

In the winter wheat area of the central United States wheat stem rust was more prevalent in 1974 than it has been for several years and wheat leaf rust also was widespread. However, the total numbers of spores caught on the slides in 1974 (Table 1) was much lower than usual (Tables 1 and 2). Spores from the south were carried into western Canada in early June but the numbers of spores caught increased slowly. The early

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Table 1. Number of urediospores of stem rust and leaf rust per square inch observed on vaseline-coated slides exposed for 48-hour periods at three locations in Manitoba and three locations in Saskatchewan in 1974

Date	Winnipeg		Morden		Brandon		Indian Head		Regina		Saskatoon	
	Stem rust	Leaf rust	Stem rust	Leaf rust	Stem rust	Leaf rust	Stem rust	Leaf rust	Stem rust	Leaf rust	Stem rust	Leaf rust
May 28-29	0	0	0	0	0	0	0	0	0	0	0	0
30-31	0	0	0	0	0	0	0	0	0	0	0	0
May total	0	0	0	0	0	0	0	0	0	0	0	0
June 1-2	0	1	0	0	0	0	0	0	0	0	0	0
3-4	0	0	0	0	0	0	0	5	0	0	0	0
5-6	0	0	0	2	0	1	0	4	0	3	0	0
7-8	0	10	0	1	0	0	0	0	0	1	0	0
9-10	0	0	0	0	0	0	0	0	0	0	0	0
11-12	0	0	0	0	0	0	0	1	1	0	0	0
13-14	0	0	0	1	0	6	0	2	0	3	0	0
1516	0	4	0	2	0	1	0	0	0	1	0	0
17-18	0	1	1	3	0	0	0	5	0	14	0	0
19-20	0	1	0	11	0	10	0	9	0	60	0	0
21-22	0	1	0	2	0	1	0	7	0	6	0	0
23-24	1	5	0	12	0	9	0	30	0	36	1	2
25-26	0	48	0	109	0	26	7	46	19	143	1	8
27-28	3	5	3	11	8	41	2	10	4	9	0	7
29-30	0	1	0	3	1	7	1	8	1	7	0	6
June total	4	77	4	157	9	102	10	127	25	283	2	23
July 1-2	0	1	0	2	0	3	0	3	0	3	0	12
3-4	0	1	0	1	0	2	0	6	0	7	0	22
5-6	1	9	4	31	0	1	0	5	0	1	0	3
7-8	1	4	0	1	0	1	0	1	0	3	0	5
9-10	0	1	1	6	0	2	0	9	0	9	0	17
11-12	0	3	0	10	0	3	0	4	0	6	0	8
13-14	0	3	0	1	0	2	0	1	0	2	0	4
15-16	0	3	0	2	0	1	0	3	1	15	0	11
17-18	1	3	0	0	0	0	0	2	0	3	0	1
19-20	0	1	3	9	0	1	0	1	0	2	0	14
21-22	1	1	0	1	1	2	0	1	0	3	1	30
23-24	0	3	1	7	0	1	0	0	0	4	4	71
25-26	1	7	0	16	1	12	0	13	1	21	0	67
27-28	3	9	0	6	0	25	1	26	1	50	0	39
29-30	0	4	0	17	0	1	1	3	3	20	0	170
31-1	3	8	0	12	1	17	0	13	3	38	3	168
July total	11	61	9	122	3	74	2	91	9	187	8	642
Aug. 2-3	0	6	2	10	0	3	0	0	0	8	3	16
4-5	2	7	0	1	0	6	0	5	2	22	8	180
Aug. total	2	13	2	11	0	9	0	5	2	30	11	196
1973 total	17	151	15	290	12	185	12	223	36	500	21	861

Table 2. Numbers of stern rust and leaf rust urediospores caught in spore traps at six locations during June and July from 1960 to 1972, with the prevalence and damage to wheat for each rust

Location	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	Average
Stern rust														
Winnipeg	486	15	242	697	970	70	122	56	32	6	659	34	41	264
Morden	494	25	740	1,217	1,774	86	125	55	70	12	141	69	58	375
Brandon	47	6	240	460	506	119	50	14	11	12	20	29	94	124
Indian Head	9	13	57	639	300	1,018	202	5	15	21	52	15	43	184
Regina	13	9	23	1,186	1,111	3,465	108	42	11	4	74	33	106	476
Saskatoon	0	6	8	271	59	427	30	0	1	0	0	0	14	63
Total	1,049	74	1,310	4,470	4.720	5,185	637	172	140	55	946	180	356	
Average	175	13	219	745	787	865	107	29	24	10	158	30	60	
Prevalence*	T	T	M	M	M	M	T	Sl	T	T	Sl	Sl	Sl	
Damage*	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	Sl	
Leaf rust														
Winnipeg	502	29	250	6,160	6,077	1,998	847	303	3,154	57	2,559	279	1,034	1,789
Morden	1,197	51	2,203	16,081	6,718	2,759	1.728	1.407	2,292	44	905	835	1,090	2.870
Brandon	236	22	758	6,242	2,750	5,216	500	173	301	62	254	300	1,347	1.397
Indian Head	154	19	279	24,159	1,428	30,982	7,512	130	453	82	763	186	1,249	5,185
Regina	94	34	303	29,726	3,551	51,433	7,473	178	382	17	947	185	2,208	7.426
Saskatoon	326	87	261	49,707	172	40,777	11,265	281	331	347	1,693	607	1,082	8,226
Total	2,509	242	4,054	132,075	20,696	133,165	29,325	2,472	6,913	609	7,121	2,392	8,010	
Average	419	41	676	22,013	3,450	22,195	4,888	412	1,153	102	1,187	399	1,335	
Prevalence	Sl	Sl	H**	H	M	H	Sl	Sl	Sl	Sl	M	M	M	
Damage	Sl	Sl	L	M	L	S	Sl	Sl	L	Sl	M	M	M	

* Prevalence: T = trace, Sl = slight, M = moderate, H = high.
Damage: Sl = slight, L = light, M = moderate, S = severe.

** Late rust development.

part of the growing season in 1974 was dry and rust developed slowly on cereal crops. Nevertheless, stem rust developed on susceptible varieties and on wild barley in Manitoba, Saskatchewan, and eastern Alberta, and wheat leaf rust also was prevalent before harvest. This rust development occurred mainly in August and consequently did not affect the spore counts during June and July.

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