Diseases of specialty crops in Saskatchewan: 1. Notes on buckwheat and sunflower 1972-73

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Surveys of a small number of fields in 1972 and 1973 showed that the most prevalent disease of buckwheat was botrytis stem rot. The most common disorders of sunflower were herbicide injury and rust. *Rhizoctonia* sp. in 1972 and *Sclerotinia sclerotiorum* in 1973 were recorded for the first time on buckwheat in Canada

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L'etude de quelques champs de sarrasin *Fagopyron esculentum* en 1972 et en 1973 a révélé que la maladie la plus courante de cette recolte est la pourriture de la tige par *Botrytis*. Les troubles les plus frequents observes sur le tournesol *Helianthus annuus* sont causes par les herbicides et la rouille. *Rhizoctonia* sp. et *Sclerotinia sclerotiorum* ont ete respectivement trouves pour la premiere fois en 1972 et 1973 sur le sarrasin au Canada

As part of a continuing program in our laboratory on the diseases of specialty crops in Saskatchewan (2,3,5), surveys were conducted in **1972** and **1973** on buckwheat (*Fagopyrum esculentum* Moench) and sunflower *(Helianthus annuus* L.). These crops are important to individual farmers who grow them under contract, but the total provincial acreages in the years concerned were minute compared with crops like rapeseed and wheat. Indeed, acreages of both buckwheat and sunflower declined compared with **1971 (5).** Estimated provincial acreages of buckwheat were **5,500** in **1972** and **3,500** in **1973,** and of sunflower **23,000** in **1972** and **2,500** in **1973.**

Methods

Since much of the survey was done in conjunction with other work (2,3), it was not possible to survey fields in the same parts of Saskatchewan in both years, nor to obtain representative samples of the provincial acreages. Thus, for buckwheat five fields were surveyed in **1972** in the Kerrobert area (about 100 miles W of Saskatoon), and, in **1973,** two fields in the Prince Albert area (about 90 miles N of Saskatoon) and six fields in the Nipawin-Carrot River area (150 miles NE of Saskatoon) were surveyed. In the case of sunflower, four fields, all in a large area about **100** miles WSW of Saskatoon and one field near Outlook (60 miles S of Saskatoon) were surveyed in **1972,** while in **1973** the survey included seven fields in SE Saskatchewan, one in the Saskatoon area and two in the North Battleford area. All except the Outlook field were on dry land. In most cases the fields were visited only once, in either late August or early September, shortly before harvest. However, all the buckwheat fields in **1973** were examined on July 11, when the plants were in the seedling stage, as well as at the end of the growing season.

Quantitative estimates of disease were made in each field at the end of the season. In both crops the presence or absence of each disease was scored on a total of 200 plants per field. In **1972** the 200 plants consisted of **50** plants from a row in each of four parts (usually the four corners) of the field. In **1973,** to save time, 100 plants were scored from each of two well-separated parts of the field. The percentages of plants infected were subsequently calculated. Diseases that were observed outside the sampling areas were also noted, but were not considered in the calculation of percentages of infected plants. No attempt was made in the case of foliar diseases to assess percentage leaf areas infected. When the cause of a disease was uncertain, isolations were made from infected tissues using routine laboratory procedures.

Results

The causal agents of diseases or disorders recorded in this survey (Tables 1, **2)** were as follows: Buckwheat: botrytis stem rot *[Botrytis cinerea* Pers.], fusarium root rot *[Fusarium* spp.], rhizoctonia root rot *[Rhizoctonia* sp.], sclerotinia stem rot *[Sclerotinia sclerotiorum* (Lib.) de Bary], aster yellows [?mycoplasma]; Sunflower: herbicide injury (herbicide drift), rust [*Puccinia helianthi* Schu.], fusarium root rot *[Fusarium* spp.], rhizoctonia root rot *[Rhizoctonia* sp.], sclerotinia stem rot and head rot [S. *sclerotiorum],* rhizopus head rot [*Rhizopus* spp., probably mostly *R. arrhizus* Fischer (5)], downy mildew [*Plasmopara halstedii* (Farl.) Berl. & de Toni].

The most common disease of buckwheat was botrytis stem rot (Table 1), with one field showing a **14.5%** infection. Though the infected plants were often either severely wilted, or dead, with dense fungal sporulation on the infected tissue, it is doubtful if losses due to the disease were equivalent to the percentages of infected plants. Some plants were obviously killed at an early stage of growth, when compensation from other plants in the row could be effective. On September 4, **1973,** in

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Table 1. Diseases of buckwheat

Date	Variable	Botrytis stem rot	Fusarium root rot	Rhizoctonia root rot	Sclerotinia stem rot	Aster yellows
2 Sept. 1972	Percentage of fields with infection	100	80	40	0	0
	Range of percentage infection in sampling areas	3.5–14.5	0 – 3.0	0 – 3.8	–*	–
	Mean percentage infection in sampling areas	8.5	1.1	1.0	–	–
11 July 1973	Percentage of fields with infection	0	25	0	0	0
4 Sept. 1973	Percentage of fields with infection	62.5	25	0	37.5	12.5
	Range of percentage infection in sampling areas	0 – 2.5	0 – 1.0	–	0 – 3.0	–
	Mean percentage infection in sampling areas	0.7	0.2	–	0.8	–

* – = not applicable.

one field a slight infection of leaves by *B. cinerea* was also observed. Other buckwheat diseases (Table 1) were of relatively minor importance. Rhizoctonia root rot, observed in two fields in 1972, was not found at all in 1973 and had not been observed in surveys in 1970 and 1971 (5). Both sclerotinia stem rot and rhizoctonia root rot represent new Canadian records on buckwheat (1, 4, 5)

On sunflower in both 1972 and 1973, herbicide injury and rust not only occurred in a high percentage of fields but also affected appreciable mean percentages of plants (Table 2). Subjectively, it appeared that rust infections had not developed until late season and did not affect a large percentage of total leaf area. Sclerotinia stem rot, though found in a high percentage of fields in 1973, affected a very low percentage of the plants. Downy mildew, a common sunflower disease in adjacent Manitoba, was observed in trace amounts in one field in 1973, but verticillium leaf mottle, another common disease in Manitoba, has still not been reported from Saskatchewan (1, 5). As mentioned in a previous discussion (5), this undoubtedly relates to the infrequency of sunflower cultivation in Saskatchewan.

Discussion

The future of buckwheat and sunflower as crops in Saskatchewan seems very uncertain in view of the decline in acreage in the last three or four years (see above and (5)). However, even if only small acreages continue to be cultivated, some attention will have to be given to diseases. The greatest threat to buckwheat production seems to be from botrytis stem rot, since the

Table 2. Disorders of sunflower at the end of the growing season

Year	Variable	Disease: Herbicide injury	Rust	Fusarium root rot	Rhizoctonia root rot	Sclerotinia stem rot	Sclerotinia head blight	Rhizopus head rot	Downy mildew
1972	Percentage of fields with infection	100	80	20	40	60	20	40	0
	Range of percentage infection in sampling areas	0 –47.5	0 –21.0	0 – 1.0	0 – 2.0	—*	—	—	—
	Mean percentage infection in sampling areas	18.7	6.5	0.2	0.5	—	—	—	—
1973	Percentage of fields with infection	60	70	0	0	70	0	20	10
	Range of percentage infection in sampling areas	0 –22.0	0 –85.0	—	—	0 – 1.0	—	—	—
	Mean percentage infection in sampling areas	5.7	19.6	—	—	0.2	—	—	—

* — = not applicable.

causal organism is an almost ubiquitous fungus and has also been shown to be freely seedborne on buckwheat (4). However, any of the diseases listed in Table 1 could be quite destructive in individual fields depending on weather conditions and rotational practices. In sunflower, the only disorder that seems *to* have been generally destructive in Saskatchewan in the period 1970-73 (5) is herbicide injury, and such injury seems likely to recur when sunflower fields are surrounded by cereals. Several other diseases listed in Table 2 could become serious problems if sunflower cultivation in certain parts of the Province were to become as widespread as in Manitoba, and given appropriate meteorological conditions.

The weather in the west-central part of Saskatchewan in 1972, where the surveys were conducted, was considered to be abnormally dry, but in those areas surveyed in 1973, especially in the Nipawin area, it was exceptionally wet. Thus, it is paradoxical that higher levels of infection with botrytis stem rot were recorded on buckwheat in 1972 than in 1973. However, the relative levels of certain other diseases in the 2 years (Tables 1, 2) seem to be consistent with the weather conditions, at least as far as can be judged from the limited number of fields sampled.

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