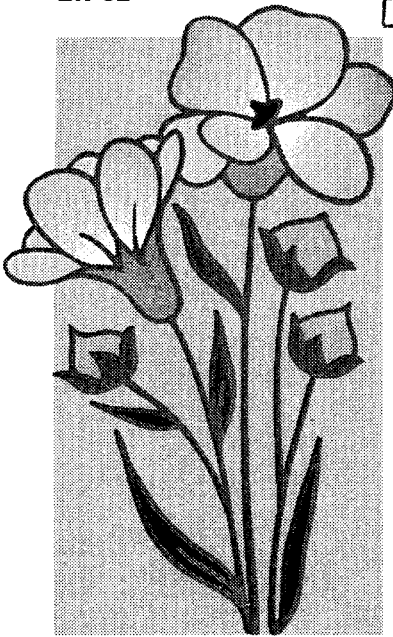


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NORTH DAKOTA
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2002 Flax Disease Survey in North Dakota

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Flax (*Linum usitatissimum*) has been grown as a minor crop in North Dakota for several years; however, acreage has been increasing since 1996. In 1996, 80,000 acres of flax were planted, compared to 2001 with 550,000 planted acres (North Dakota Agricultural Statistics Service, 2002). Recent reports indicate that North Dakota flax production in 2002 has grown to over 740,000 planted acres.

Two yield-limiting diseases of flax in Manitoba and Saskatchewan are pasmo and Fusarium wilt (3, 4, 5, 6, 7). Pasm, caused by *Septoria linicola*, is characterized by brown to black bands that alternate with green and healthy bands on the stem. Fusarium wilt, caused by *Fusarium oxysporum*, is characterized by yellowing and wilting of the leaves, followed by browning and death of the plant. Little information has been compiled recently regarding the prevalence of these diseases in North Dakota. The objective of this field survey was to determine the incidence of these two diseases in North Dakota.

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Materials and Methods

Seventy-four fields in 19 North Dakota counties were surveyed when plants were between growth stages 11 and 12 (brown capsule to seed ripe). The counties and number of fields within each county are listed in Table 1. At each field, 20 plants in a row from five different locations in the field (100 plants total per field) were examined for pasmo and Fusarium wilt symptoms. PasmO symptoms consisted of brown to black alternating bands on the stem, and Fusarium wilt symptoms consisted of wilting and dead plants. Field incidence of each disease was calculated by totaling the number of plants with symptoms and converting to percent. PasmO severity was calculated only for fields with pasmo incidence. The severity rating represents an average severity for the 100 plants examined in each field, and was determined by the percent of the stem covered with lesions. PasmO severity data was not collected for fields in Cavalier, Towner and Walsh counties.

Results

Incidence of pasmo ranged from 0 to 21% (Table 1 and Figure 1). Two counties, Divide and Williams, had no incidence of pasmo. Four counties with pasmo incidence greater than 10% were Foster (10.8%), McLean (14.7%), Rolette (15.0%) and Wells (21.0%). PasmO incidence in the other 13 counties ranged from 0.5 to 7.8%. The average pasmo incidence for the entire state was 5.5%. Severity of pasmo ranged from 1.0 to 38.8% (Table 1 and Figure 2). Severity of pasmo greater than 10% occurred in Foster (10.4%), McHenry (20.0%), Rolette (38.8%), Sheridan (14.4%) and Wells (20.4%) counties. The average pasmo severity for the entire state was 9.2%. Fusarium wilt was observed in Foster county only, with an incidence of 0.3%.

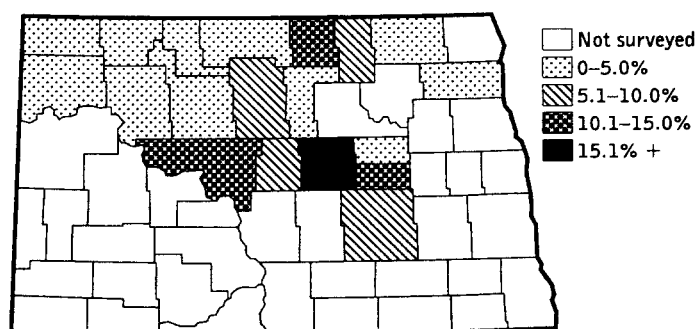


Figure 1. PasmO incidence on flax in 2002.

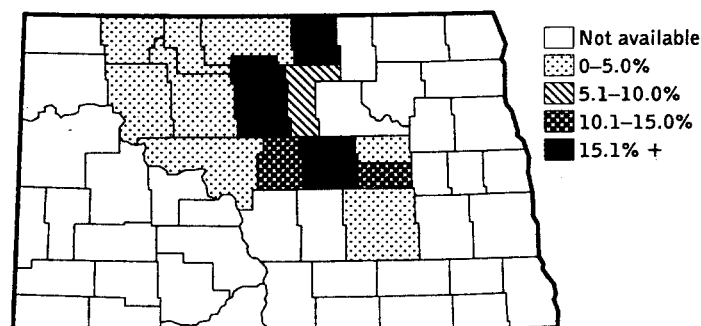


Figure 2. PasmO severity on flax in 2002.

Table 1. North Dakota flax fields surveyed, incidence and severity of pasmo disease in 2002.

County	No. of fields	Incidence (%) ^a	Severity (%) ^b
Bottineau	5	0.6	5.0
Burke	5	4.0	3.0
Cavalier	4	2.5	NA ^c
Divide	1	0.0	NA
Eddy	2	1.5	2.0
Foster	5	10.8	10.4
McHenry	5	7.8	20.0
McLean	6	14.7	1.0
Mountrail	5	1.6	1.0
Pierce	6	0.5	6.0
Renville	6	2.3	1.0
Rolette	6	15.0	38.8
Sheridan	1	6.0	14.4
Stutsman	4	5.3	4.9
Towner	2	6.0	NA
Walsh	2	3.0	NA
Ward	6	1.0	1.0
Wells	2	21.0	20.4
Williams	1	0.0	NA
Total fields/state avg.	74	5.5	9.2

^aIncidence is the percentage of plants displaying symptoms of pasmo disease.

^bSeverity is percent of stem area with lesions. Fields that did not have any incidence of pasmo were not used to calculate the county or state severity.

^cNot available due to data not collected or fields in county had no pasmo incidence.

Discussion

Pasmo was observed more frequently than Fusarium wilt in surveyed flax fields. The infrequent observations of Fusarium wilt may have been due to: (1) the availability of flax varieties that have resistance or moderate resistance to Fusarium wilt; and (2) the survey was conducted late in the season and some plants killed by Fusarium wilt may no longer have been present. It should be noted that in some counties, only one field was surveyed and may not be representative of the entire county. Even though incidence of Fusarium wilt was very low in the survey, growers should continue to use moderately resistant and resistant varieties along with crop rotation to manage the disease.

Pasmo has been reported to reduce yield, seed weight and seed number in flax grown in South Dakota (1). Rashid (2) reported that pasmo could cause up to a 70% yield reduction of flax in Manitoba. It is uncertain how great of a yield reduction pasmo causes to flax in North Dakota. Currently, field trials are being conducted at the Langdon Research Extension Center evaluating the impact of pasmo on flax yields and new methods of pasmo management. The current pasmo management recommendations are to seed early at the recommended rates to avoid high moisture conditions later in the season, use clean seed, treat seed with a fungicide, control weeds and follow a rotation of at least three years between flax crops.

Acknowledgements

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