



2003 Flax Disease Survey in North Dakota

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Two of the main yield-limiting diseases of flax present in North Dakota, Manitoba, and Saskatchewan are pasmo and *Fusarium* wilt (Bradley et al., 2003; Rashid et al., 2001).

Pasmo, 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.

Except for the 2002 flax disease survey (Bradley et al., 2003), 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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Methods

Eighty-seven fields in 23 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. In each field, 10 plants in a row from five different locations in the field (50 plants total per field) were examined for pasmo and Fusarium wilt symptoms. Pasm 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. Pasm severity rating represents an average severity for the 50 plants examined in each field, and was determined by the percent of the stem covered with lesions.

Results

Incidence of pasmo ranged from 0 to 84.5% (Table 1 and Figure 1). Five counties, Burke, Divide, Mountrail, Nelson, and Williams, had no incidence of pasmo. Eight counties with pasmo incidence of 20% or greater were Benson (32.5%), Eddy (21.2%), Foster (52.3%), Ramsey (20%), Sheridan (36.3%), Stutsman (84.5%), Towner (32.7%), and Wells (74.5%). Counties with pasmo incidence between 10 and 19% were Cavalier (12.5%), Rolette (10%),

Table 1. North Dakota flax fields surveyed, incidence and severity of pasmo disease in 2003.

County	No. of Fields	Pasm Incidence (% plants)	Pasm Severity (%)
Benson	2	32.5	22.5
Bottineau	6	1.0	0.8
Burke	10	0.0	0.0
Cavalier	4	12.5	8.8
Divide	2	0.0	0.0
Eddy	2	21.2	11.7
Foster	3	52.3	17.2
Kidder	1	5.0	22.0
McHenry	2	5.0	2.5
McLean	7	1.0	1.4
Mountrail	9	0.0	0.0
Nelson	1	0.0	0.0
Pierce	2	5.0	7.5
Ramsey	2	20.0	15.0
Renville	5	3.6	2.0
Rolette	2	10.0	7.5
Sheridan	3	36.3	12.7
Stutsman	2	84.5	29.3
Towner	3	32.7	20.0
Walsh	2	10.0	5.0
Ward	13	0.2	0.3
Wells	2	74.5	26.0
Williams	2	0.0	0.0
Total/State Avg.	87	17.7	9.2

and Walsh (10%). Pasm incidence in the other eight counties ranged from 0.2 to 5%. The average pasmo incidence for the entire state was 17.7%.

Severity of pasmo ranged from 0 to 29.3% (Table 1 and Figure 2). Five counties with pasmo severity of 20% or greater were Benson (22.5%), Kidder (22%), Stutsman (29.3%), Towner (20%), and Wells (26%). Four counties with pasmo severity of 10% or greater were Eddy (11.7%), Foster (17.2%), Ramsey (15%), and Sheridan (12.7%). Pasm severity in the nine other counties with pasmo ranged from 0.3 to 8.8%. The average pasmo severity for the entire

state was 9.2%. Fusarium wilt was observed so few times that the mean incidence for each county was less than 0.1%.

Discussion

Pasm 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 noticeable in the field.

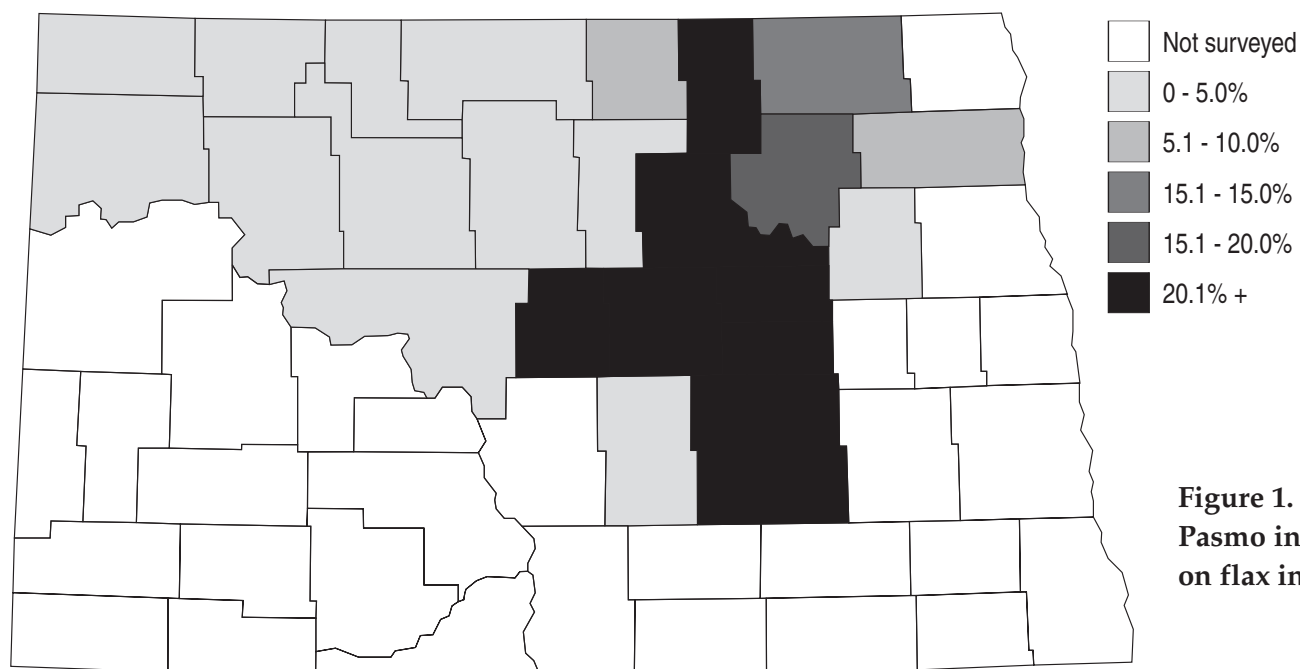


Figure 1.
Pasmo incidence
on flax in 2003.

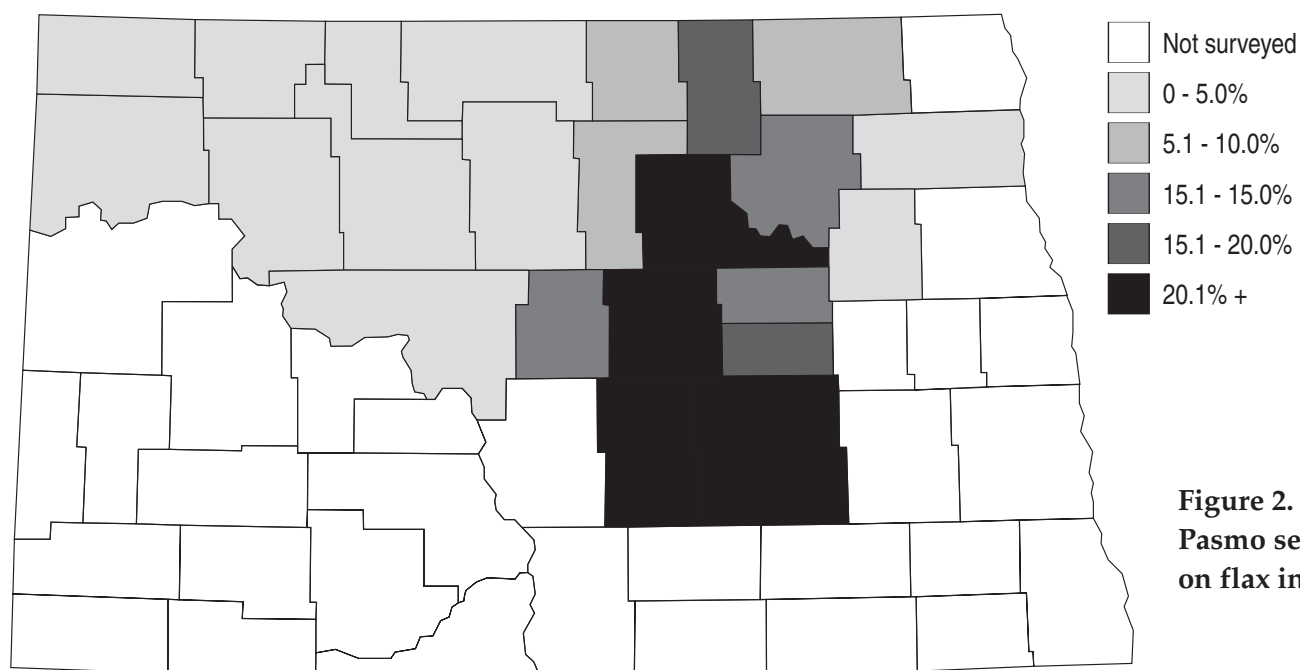


Figure 2.
Pasmo severity
on flax in 2003.

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.

The state average of pasmo incidence in 2003 (17.7%) is greater than that found in the

2002 survey (5.5%) (Bradley et al., 2003). Rashid (2001) reported that pasmo could cause up to a 70% yield reduction of flax in Manitoba. Pasmo has been reported to reduce yield, seed weight, and seed number in

flax grown in South Dakota (Ferguson et al., 1987). Based on the studies in South Dakota by Ferguson et al. (1987), flax yield is reduced by pasmo approximately 1.4% for every 1% severity. Based on this formula and the 2003 survey results, the average statewide yield reduction caused by pasmo in 2003 would be 12.9%. 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.

Literature Cited

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