



537 - Root Disease Management: Fusarium

April 22, 2010

Fusarium was first identified about 20 years ago in the Red River Valley. At that time the disease was a novelty and caused no economic loss to sugarbeet producers. The disease increased in incidence throughout the 1990's. Disease severity increased to the point of causing economic losses early this century. Yield loss has become so severe that fields have had to be abandoned in each of the last four years. Storage losses of sugar are very severe with Fusarium infected roots in piles. Fusarium can affect the crop from right after emergence up until harvest.

Fusarium Symptoms

Fusarium Warning Signs



Vascular discoloration in root tissue



Leaf necrosis



Half leaf necrosis and chlorosis

Seedling Stage

Fusarium will exhibit symptoms on seedlings as early as the 2-4 leaf stage of growth. Seedlings may initially show a yellow - green leaf mottling effect. As disease gets more severe leaves become chlorotic, with leaf margin or whole leaf necrosis. In severe situations up to 50% stand loss may occur

Mature Root Symptoms

First observed symptoms in July, August and September maybe canopy wilting due to inability of the plant to efficiently transport water from roots to leaves. A cross section of the root will have distinct discoloration of the vascular rings. The discoloration may be dark grey to a rusty orange color. As disease severity progresses through the summer the leaf canopy will exhibit severe chlorosis or necrosis. Typical leaf symptoms exhibit discoloration, chlorosis or necrosis on only one half of the leaf. Roots may exhibit a tip rot that can be confused with Aphanomyces.

About Fusarium

- Fusarium is caused by a soil borne fungus
- It is spread by any means of infected soil transport from field to field
- Over-winters in soil and can survive for long periods of time.
- Hot conditions during summer increase disease severity
- Severely effected plants seldom recover
- Redroot pigweed may be an alternate host for some species

Economic Impact

Yield loss can range from 5-50 percent. Fields with severe seedling disease may have to be replanted. Fields with more than 50% of the roots infected are considered unfit for long term storage. They must be harvested during prepile or completely abandoned.

Geographic Distribution



Clay County has the most severe yield loss from Fusarium. Norman County has the second greatest incidence and severity of Fusarium. The disease has also been documented in Wilkin, Grand Forks, Polk, Walsh and Pembina counties. It's likely all counties have at least a low incidence of the disease.

Sugar Losses in Storage

Table 1. Respiration rate 120 days after harvest (DAH), sucrose and extractable sucrose concentration, daily sucrose loss during storage, and rot rating of seven adapted commercial sugar beet hybrids, Moorhead, MN 2004w. Campbell and Fugate, USDA

Respiration Rate (mg CO ₂ kg ⁻¹ h ⁻¹)		Sucrose (Lbs/Ton)	Extractable Sucrose (Lbs/Ton)		Rot ^z
Hybrid	120 DAH	120 DAH	120 DAH	Loss Day	(0-9)
A	9.47 c	272 a	222 a	0.32 d	1.2 c
B	11.48 c	222 bc	168 b	0.58 cd	1.4 c
C	18.94 b	192 c	134 bc	0.76 bc	2.8 b
D	20.11 b	238 ab	148 bc	0.96 a-c	3.0 b
E	18.97 b	192 c	122 c	1.00 ab	3.4 b
F	22.53 b	194 c	118 c	1.24 a	3.8 b
G	31.78 a	108 d	48 d	1.22 a	6.3 a
Mean	19.18	202	136	0.88	3.1

w Means within a column followed by the same letter are not significantly different (P = 0.10)

xDAH = days after harvest (29 September 2004).

z Rot rating 0 = no rot 9 = completely rotted

Fusarium Control Measures

- Choose resistant varieties
- No cost effective chemical control
- Lengthen crop rotations
- Early planting
- Control of weed hosts
- Good drainage
- Proper fertility