

A GROWER'S PERSPECTIVE ON SOIL-BORNE DISEASE MANAGEMENT

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ABSTRACT

Soil-borne diseases have taken a huge toll on the Texas sugarbeet industry. At Schlabs farm, yields averaged 29, 27, 23, and 17 tons/acre for first through fourth beet crops on a 4-year rotation. A comprehensive disease management program has brought yields back to 25.5 tons/acre when using Telone II and 22.1 tons/acre without Telone. The primary elements of this program are: an 8-year rotation, plant after summer fallow to minimize prior crop residues (primarily for *Rhizoctonia* control), thick stands in narrow rows planted early (double row 40-inch, 90,000 seed/acre, without thinning), one irrigation for emergence, never replant late, chisel Telone 14 inches deep under each row 2 wks before planting at 8 gal/acre, delay first seasonal irrigation until July 1, irrigate no closer than a 3-wk interval during July and August, and plant a disease resistant cultivar. Telone has returned a little less than two dollars for each dollar invested. The best cultivars appear to be *Fusarium* tolerant and seem to have a generalized tolerance to our soil-borne disease complex. Choosing the proper cultivar and avoiding over-irrigation are the primary components of profitable disease management.

Introduction

Sugarbeet growers in Texas have suffered severe soil-borne disease losses over the past 20 years. *Rhizoctonia* root rot was the only recognized soil-borne disease until *Fusarium* root rot was discovered in 1975. Severe losses at Schlabs farm and at research plots were first observed about 1980. Over the last 15 years, many farms with high yield potential have entirely ceased production due to disease pressure. *Fusarium*, *Rhizoctonia*, and *Aphanomyces* root rots, and *Rhizomania* are the primary disease problems. Problems with these diseases also seem to be increasing in other U.S. beet growing areas most of which are only slightly cooler than Texas. July mean temperature at Bushland is 76° compared to 70° to 75°F for most northern U.S. beet growing areas.

In Texas, a five year rotation of sugarbeet with other crops has been recommended since large scale production began in 1964. Mr. Schlabs began growing sugarbeets in 1964 and followed a four year rotation until the early 1980s. Over time he developed the disease control program which is described here. His primary problems appear to be *Fusarium*, *Rhizoctonia*, and *Rhizomania*.

Methods

Mr. Schlabs has conducted many on farm replicated tests. His tests have always been field scale plots with commercial harvest. Fumigation trials were conducted 5 years on at least 4 farms/yr with at least 2 reps/farm. Other on farm

trials included 10 years of irrigation interval testing, seed spacing, row width, thinning, and many cultivar and cultivar x fumigation trials. Replicated, small plot cultivar trials were conducted at Bushland and at Schlabs farm by TAES researchers.

Results and Discussion

Charles Schlabs disease management summary:

- I. **Rotation**
 - 8 years: one beet crop every 8 years
 - Follow summer fallow to reduce *Rhizoctonia*
- II. **Telone II**
 - 8 gals/acre (no difference between 8, 10 or 12 gal)
 - Apply 2 wks before planting
 - Chisel 14" deep under each row
 - Cultipack to seal the soil surface
- III. **Planting**
 - Double row 40-inch (narrow rows)
 - 90,000 seed/acre (high seeding rate)
 - Don't thin (thick stand)
 - Emergence water
 - Last wk March (plant early)
 - one time only (to limit seedling disease)
 - never replant (disease too severe on replants)
- IV. **Seasonal furrow irrigation**
 - Don't start before July 1
 - 3 wk minimum interval July & August (2 wks considered normal)
 - Usually 3-4 seasonal furrow irrigations
- V. **Plant disease resistant cultivars**
 - D2, (1970s); TX18, (1980s); and 9155 (1990s)

Mr. Schlabs records indicate that on his initial 4 yr rotation yields were about 29, 27, 23, and 17 tons/acre for the first through fourth crops on the same field. The disease management program outlined has returned yields to about 25.5 and 22.1 tons/acre with and without fumigation respectively (Table 1). The primary factors responsible for the yield improvement (compared to 17 ton/acre fourth crops) have been improved irrigation management, longer rotation, disease resistant cultivars, and fumigation. Improved yields have come despite less irrigation.

Table 1. Influence of Telone II on sugarbeet performance on Charles Schlabs farms. Average of 5 years on at least 4 fields/yr and at least 2 reps/field.

Telone II gal/acre	Root yield tons/acre	Sugar %	Gross return \$ acre
0	22.1	14.4	782
10	25.5	15.1	974

The differences between cultivars can be large (Table 2). The cultivar 9155 is Mr. Schlabs current standard. TX 18 was his previous standard. The Rhizoctonia resistant HH32 and Rhizomania resistant Rhizosen-CT are apparently too narrow in their resistance base to overcome the disease complex involved (Rhizoctonia, Fusarium, and Rhizomania in 1995).

Table 2. Sucrose yield on Charles Schlabs farm on non-fumigated ground with severe soil-borne disease in 1995.

Cultivar	Sucrose yield	
	lbs/acre	
TX 18(res. ck)	4850	
9355	7840	
9155	5870	
Ranger	4130	
HH 32	3310	
Rhizosen-Ct	2370	

A trial conducted at Bushland indicates the influence of irrigation interval and cultivar on disease severity and yield (Table 3). Resistant cultivars were more successful than limited irrigation at improving yields in this trial.

Table 3. Irrigation interval effect on percentage diseased plants of four cultivars as a mean of 2 years at Bushland, TX. Diseases were Aphanomyces, Fusarium, Rhizoctonia, and Rhizomania.

Cultivar	Irrigation interval		Root yield		Sugar	
	2 wk	4 wk	2 wk	4 wk	2 wk	4 wk
	% disease		tons/acre		----- % -----	
Rhizosen	86	65	4.8	5.7	13.6	13.6
Ranger	66	54	8.9	9.9	13.9	14.0
HH 67	71	46	7.9	9.9	13.8	13.5
9155	55	36	11.1	13.0	13.8	13.9