

Combination of Variety, At-Planting Treatment, and Postemergence Fungicide for Control of Rhizoctonia Crown and Root Rot of Sugarbeet

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Integrated Disease Management

- Many definitions
- Use all the help you can get
 - Don't rely on one method of control
- Weigh the impact on your wallet and environment



Control methods available for *Rhizoctonia* on sugarbeet

- Rotation
 - Length
 - Crop choice & weed control
- Genetic resistance
- Early planting
- At-planting fungicides
 - Seed treatments (\$13+ per acre)
 - In-furrow (\$24+ per acre)
- Postemergence fungicides (\$24+ per acre plus application cost)



Control methods available for *Rhizoctonia* on sugarbeet

- Rotation
 - Length
 - Crop choice & weed control
- Genetic resistance
- Early planting
- At-planting fungicides
 - Seed treatments (\$12+ per acre)
 - In-furrow (\$24+ per acre)
- Postemergence fungicides (\$24+ per acre plus application cost)



Varieties

| Variety | Rhizoc rating (2-Yr mean) | Emerg. (2-Yr %) | Rev/Ton (2-Yr %) | Rev/Acre (2-Yr %) |
|----------------------------|------------------------------|--------------------|---------------------|----------------------|
| Resistant (HM 4302RR) | 3.5 | 58 | 105 | 100 |
| Susceptible (HM 4303RR) | 5.2 | 61 | 107 | 103 |

Data from American Crystal Sugar Company official variety trials (Niehaus, 2014)



At-planting treatments

| Application | Product | Active ingredient | Rate (g a.i./unit) |
|-------------|------------------|-------------------------|--------------------|
| Control | None | None | - |
| Seed | Metlock Suite | Metconazole + rizolex | 0.21 + 0.5 |
| Seed | Kabina ST | Penthiopyrad | 14 |
| Seed | Metlock + Kabina | Metcon + rizo + penthio | 0.21 + 0.5 + 7 |
| Seed | Sedaxane | Sedaxane | 2.5 |
| In-furrow | Quadris | Azoxystrobin | 9.5 fl oz prod/A |

Each variety with each at-planting treatment (2 x 6 = 12)



Postemergence treatments

- Each variety by at-planting treatment combination
 1. Stand-alone (no postemergence)
 2. Postemergence Quadris application
 - 14.3 fl oz product/A in a 7-inch band
 - Applied June 25 (5 weeks after planting)

(12 x 2 = 24)



Trial information

- Plots inoculated with *Rhizoctonia solani*-infested barley grain prior to planting
- Plot size: 6 rows by 30 ft long
- 4 replicates in RCB design
- Planted May 21 at 4.5-inch spacing
 - Starter fertilizer (10-34-0) applied at 3 GPA
 - Counter 20G applied at 9 lb/A
 - Glyphosate on June 4 & 23 and Sept. 3



Data collected

- Stand counts
- Rhizoctonia root rot ratings (0-7 scale)
- Number of harvested roots
- Yield
- Quality



Environment

- Late planting (May 21) into warm and wet soil
- Average 4-inch soil temp reached 60°F 4 days after planting

| Month | Rainfall (inches) |
|--------|-------------------|
| June | 6.8 |
| July | 2.2 |
| August | 1.7 |



- High early-season disease pressure
- Low mid- to late-season disease pressure

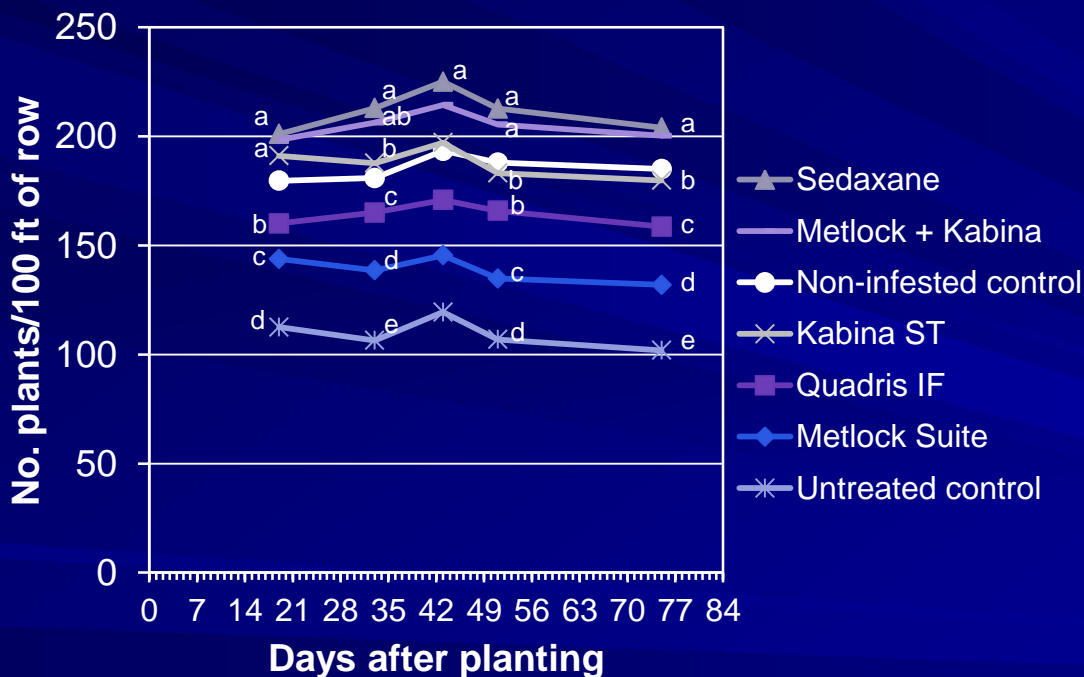
Stand

- Significant variety by at-planting treatment interactions
 - Relative efficacy of treatments was not the same on resistant and susceptible varieties
 - Significant difference between varieties

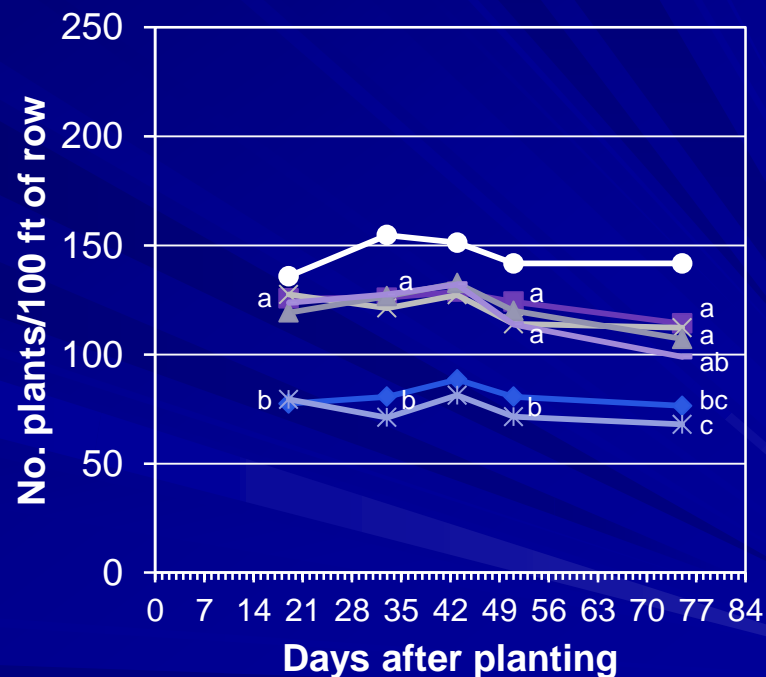


Variety x at-planting treatment

Resistant variety



Susceptible variety



Untreated Control



Resistant



Kabina ST



Susceptible



Harvest data

- No significant interactions
 - Relative efficacy of treatments was similar on resistant and susceptible varieties
- Significant difference between varieties
- Significant differences among treatments
- No effect of postemergence Quadris



Variety matters

| Variety | No. harv. roots | RCRR (0-7) | Yield ton/A | Sucrose | | |
|-------------|--------------------|---------------|----------------|---------|--------|------|
| | | | | % | lb/ton | lb/A |
| Resistant | 133 | 2.7 | 24.5 | 17.1 | 316 | 7747 |
| Susceptible | 77 | 4.2 | 20.3 | 17.1 | 314 | 6426 |
| ANOVA | *** | *** | *** | NS | NS | *** |

*** = significant at $P = 0.001$

NS = not significantly different



There are effective at-planting treatment options

| At-planting treatment | No. harv. roots | RCRR (0-7) | Yield ton/A | Sucrose | | |
|--------------------------|--------------------|---------------|----------------|---------|--------|------|
| | | | | % | lb/ton | lb/A |
| Control | 73 b | 4.6 a | | | | |
| Metlock Suite | 80 b | 4.2 a | | | | |
| Kabina ST | 117 a | 2.9 b | | | | |
| Met + Kab | 116 a | 3.2 b | | | | |
| Sedaxane | 125 a | 2.9 b | | | | |
| Quadris IF | 120 a | 2.6 b | | | | |
| LSD ($P=.05$) | 16.8 | 0.7 | | | | |

LSD = Fisher's protected least significant difference

NS = not significantly different



There are effective at-planting treatment options

| At-planting treatment | No. harv. roots | RCRR (0-7) | Yield ton/A | Sucrose | | |
|--------------------------|--------------------|---------------|----------------|---------|--------|------|
| | | | | % | lb/ton | lb/A |
| Control | 73 b | 4.6 a | 18.3 c | 17.2 | | |
| Metlock Suite | 80 b | 4.2 a | 21.4 b | 17.0 | | |
| Kabina ST | 117 a | 2.9 b | 23.9 a | 17.5 | | |
| Met + Kab | 116 a | 3.2 b | 23.0 ab | 16.8 | | |
| Sedaxane | 125 a | 2.9 b | 23.1 ab | 17.2 | | |
| Quadris IF | 120 a | 2.6 b | 24.5 a | 17.2 | | |
| LSD ($P=.05$) | 16.8 | 0.7 | 2.3 | NS | | |

LSD = Fisher's protected least significant difference

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There are effective at-planting treatment options

| At-planting treatment | No. harv. roots | RCRR (0-7) | Yield ton/A | Sucrose | | |
|-----------------------|-----------------|------------|-------------|---------|--------|---------|
| | | | | % | lb/ton | lb/A |
| Control | 73 b | 4.6 a | 18.3 c | 17.2 | 315 | 5795 c |
| Metlock Suite | 80 b | 4.2 a | 21.4 b | 17.0 | 312 | 6713 b |
| Kabina ST | 117 a | 2.9 b | 23.9 a | 17.5 | 324 | 7746 a |
| Met + Kab | 116 a | 3.2 b | 23.0 ab | 16.8 | 309 | 7153 ab |
| Sedaxane | 125 a | 2.9 b | 23.1 ab | 17.2 | 317 | 7353 ab |
| Quadris IF | 120 a | 2.6 b | 24.5 a | 17.2 | 316 | 7757 a |
| LSD ($P=.05$) | 16.8 | 0.7 | 2.3 | NS | NS | 845 |

LSD = Fisher's protected least significant difference

NS = not significantly different



Postemergence not effective when late-season environment is not favorable for disease

| Postemerg. treatment | No. harv. roots | RCRR (0-7) | Yield ton/A | Sucrose | | |
|-------------------------|--------------------|---------------|----------------|---------|--------|------|
| | | | | % | lb/ton | lb/A |
| None | 105 | 3.4 | 22.3 | 17.1 | 316 | 7058 |
| Quadris | 106 | 3.4 | 22.5 | 17.1 | 314 | 7115 |
| ANOVA | NS | NS | NS | NS | NS | NS |

NS = not significantly different



Choosing a resistant variety is better than protecting a susceptible variety

| At-planting treatment | No. harvested/100 ft of row | | Recov. Sucrose (lb/A) | |
|-----------------------|-----------------------------|-------------|-----------------------|-------------|
| | Resistant | Susceptible | Resistant | Susceptible |
| Control | 94 | 52 | | |
| Kabina ST | 143 | 91 | | |
| Quadris IF | 140 | 101 | | |



Choosing a resistant variety is better than protecting a susceptible variety

| At-planting treatment | No. harvested/100 ft of row | | Recov. Sucrose (lb/A) | |
|-----------------------|-----------------------------|-------------|-----------------------|-------------|
| | Resistant | Susceptible | Resistant | Susceptible |
| Control | 94 | 52 | 6616 | 4974 |
| Kabina ST | 143 | 91 | 8189 | 7304 |
| Quadris IF | 140 | 101 | 7980 | 7534 |



Summary

- Varietal resistance made a big difference
- Newer seed treatments provided excellent early-season control of *Rhizoctonia*
- Postemergence fungicide application did not provide a benefit due to lack of late-season disease pressure



One final thought

Good disease control is a good
disease control practice



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