Evaluation of Fungicides for Control of Orange Rust on Sugarcane

R. N. Raid[1], J. M. Shine[2], J. C. Comstock[3] and N. Glynn[3]

[1]University of Florida
[2]Sugar Cane Growers Cooperative
[3]USDA Sugar Cane Field Station

rnr@ifas.ufl.edu

Sugarcane Rusts



Orange Rust



Brown Rust

Sugarcane Rust Management



Sugarcane Rusts

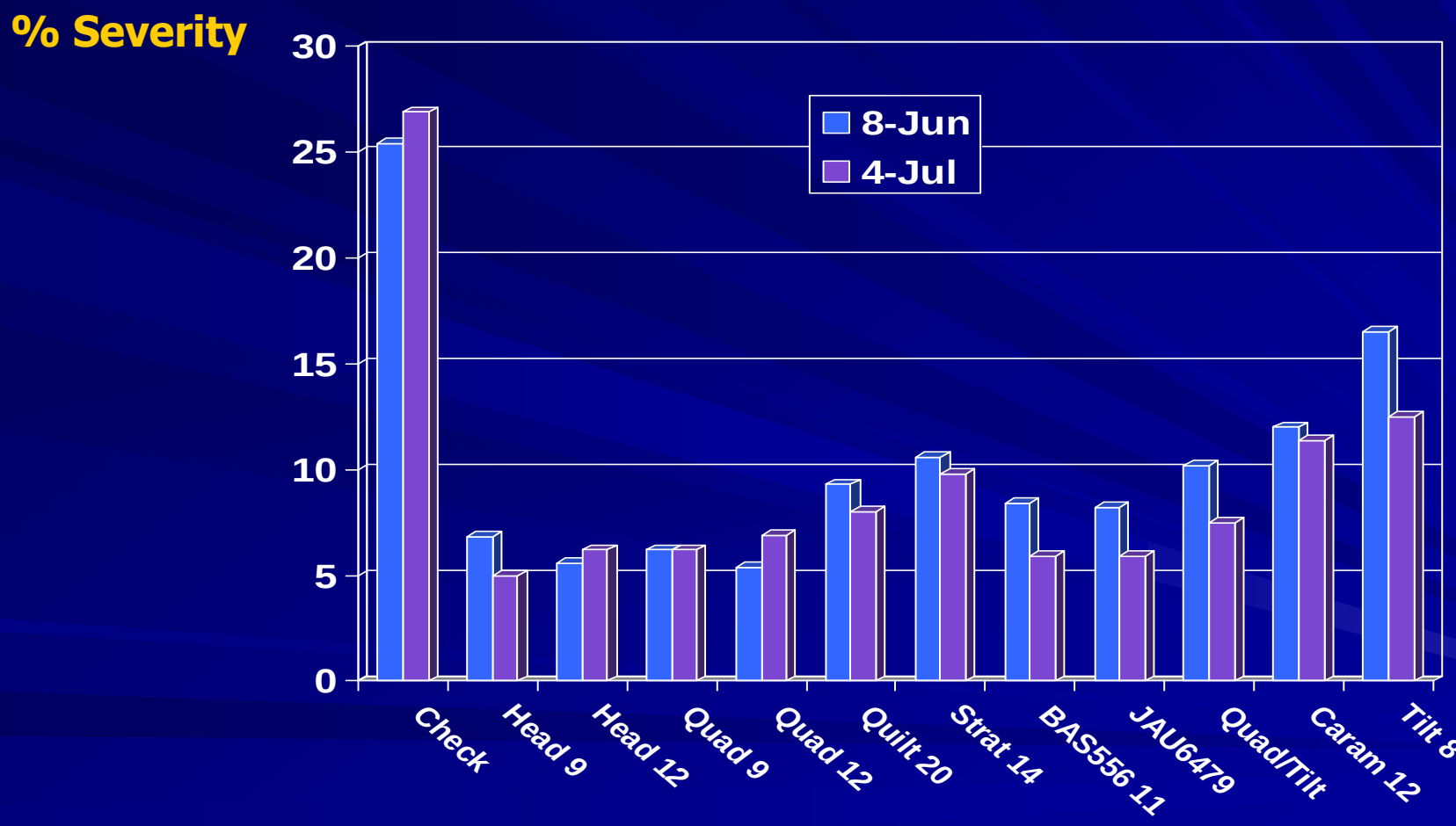
Brown Rust

- 1st observed in FL in 1978
- Aggressive for a relatively short period in late spring
- Most severe on plant-cane
- Significant yield losses on a number of major varieties
- Resistance has not been stable

Orange Rust

- 1st observed in Fl in 2007
- Less aggressive but present for a relatively long period, summer-fall
- Can be severe on plant-cane and stubble
- Significant yield losses noted on CP80-1743 and CP72-2086
- Resistance has not been stable

Orange Rust
2008 Fungicide Efficacy Trial



Orange rust severity following fungicide applications on CP80-1743 at 21-day intervals

Fungicide Trials
Cane vs Other Crops







Materials and Methods

- Time: 3 years (2008, 2009, 2010)
- Cultivars:
  - CP80-1743 (3 years, 5 sites)
  - CP89-2143 (2010)
  - CP88-1762 (2010)
  - CP96-1252 (2010, sand and muck)
  - CP78-1628 (2010)
- Comparisons: 10

Field Locations

- Size:
  - Split block (17.5 acres, same block)
  - Whole block (24-40 acres, side by side)
- Crop Age
  - Plant cane except for CP80-1743 in 2009 (1st stubble) and 2010 (2nd stubble)
- Soil Type
  - All on muck except CP96-1252 (sand & muck)

Harvest

- Method
  - All fields mechanically harvested using commercial methods
  - Untreated fields and treated fields all harvested with 24 hrs of each other
- Yield Parameters
  - Tons of cane per acre
  - Recoverable sugar per acre (except CP78-1628 in 2010)

Fungicides

Headline

- Pyraclostrobin (strobilurin)
- Highly efficacious
- $345 per gallon
- 12 oz/A rate
- No more than 2 sequential applications

Caramba

- Metconazole (triazole)
- Not as efficacious as strobilurins
- $143 per gallon
- 12 oz/A rate
- Used for resistance management

Orange Rust
2008 Commercial Trials



CP80-1743 on June 11
Two Headline applications
(10 oz on May 10, 12 oz on June 6)

Photo courtesy of J. Shine and Wedgworth Farms

Orange Rust Commercial Trials



Fungicide Applications

- Method:
  - Early by ground (John Deere high clearance sprayer at 20GPA)
  - Subsequent by aerial (fixed-wing aircraft at 5 GPA)
- Number:

  2008: Four (H, H, C, H) - $104

  2009: Five (H, H, C, H, H) - $139

  2010: Four (H, H, C, H) - $108
- Timing:

  Monthly intervals, initiated in May or June

Orange Rust
Commercial Trials 2008



2008 Results

Variety	Site	Treat	TPA	RSPA	RETURN	NET/A (NET/ha)
CP80-1743	Split	Check	44.31	8062 lb	$2015	
		Fungicide	50.48	9126 lb	$2282	
						$137 ($338/ha)
	Side/Side	Check	50.88	10620 lb	$2655	
		Fungicide	56.23	12540 lb	$3135	
						$351 ($887/ha)

Return estimated using a sugar price of 25 cents/lb.
Net/A calculated by subtracting the cost for fungicide and application.

2009 Results

Variety	Site	Treat	TPA	RSPA	RETURN	NET/A
CP80-1743	Split	Check	49.96	11600 lb	$2900	
		Fungicide	54.41	13160 lb	$3290	
						$209 ($516/ha)
	Side/Side	Check	54.84	12360	$3090	
		Fungicide	59.09	13740	$3435	
						$164 ($405/ha)

Return estimated using a sugar price of 25 cents/lb.
Net/A calculated by subtracting the cost for fungicide and application.

2010 Results

Variety	Site	Treat	TPA	RSPA	RETURN	NET/A (NET/ha)
CP80-1743	Side/Side	Check	39.83	8380 lb	$2095	
		Fungicide	42.63	9980 lb	$2495	
						$271 ($669/ha)
CP96-1252	Muck	Check	51.44	11200 lb	$2800	
		Fungicide	53.94	11860 lb	$2965	
						$38 ($94/ha)
	Sand	Check	44.11	9500 lb	$2375	
		Fungicide	48.72	10420 lb	$2605	
						$101 ($249/ha)

Return estimated using a sugar price of 25 cents/lb.
Net/A calculated by subtracting the cost for fungicide and application.

2010 Cont.

Variety	Site	Treat	TPA	RSPA	RETURN	NET/A (NET/ha)
CP89-2143	Side/Side	Check	47.43	11060 lb	$2765	
		Fungicide	49.23	11900 lb	$2975	
						$81 ($200/ha)
CP88-1762	Side/Side	Check	40.81	8520 lb	$2130	
		Fungicide	42.25	9220 lb	$2305	
						$46 ($114/ha)
CP78-1628	Split	Check	46.81	*		
		Fungicide	48.83	*		

Return estimated using a sugar price of 25 cents/lb.
Net/A calculated by subtracting the cost for fungicide and application.
** Yield was not separated at the mill.*

Influence of Fungicides

Variety	Year	Site	TPA (%)	RSPA (%)	$ RETURN Per HA
CP80-1743	2008	Split	+13.92	+13.19	$338
		Side/Side	+10.51	+18.08	$887
	2009	Split	+8.91	+13.45	$516
		Side/Side	+7.75	+11.16	$405
	2010	Side/side	+6.57	+19.09	$669
CP89-2143	2010	Side/Side	+3.80	+7.59	$94
CP88-1762	2010	Side/Side	+3.53	+8.21	$249
CP96-1252	2010	Side/Side (muck)	+4.86	+5.90	$200
		Side/Side (sand)	+10.45	+9.68	$114
CP78-1628	2010	Split	+4.31		

Conclusions

- Fields receiving fungicide applications produced higher tonnage and gave higher sucrose recoveries 100% of the time.
- Overall, tonnage was increased by an average of 7.46%.
- Overall, recoverable sugar yields were increased by an average of 11.84%
- Fungicides provided a net profit of $159.78 per acre ($386/ha) averaged across all sites.

Considerations

- These trials were conducted on rust susceptible varieties. Returns on resistant varieties would likely be less.
- The more susceptible the variety, the higher the return.
- Improved timing, particularly on CP96-1252 for brown rust, would likely provide far greater returns.

In Summary

- Given current economics, fungicides appear to be a viable option for limiting losses due to rust.
- While host plant resistance should remain the primary means of rust management, fungicides may prove helpful in softening the transition to resistant varieties.
- More research should be conducted to forecast rust buildup and to refine application timing, allowing for optimum returns on fungicide investments.

Acknowledgments

We wish to express our deep appreciation to BASF Corporation, the Sugar Cane Growers Cooperative of Florida, Wedgworth Farms, and A. Duda & Sons for their invaluable assistance in conducting these trials.

Questions?