Effect of Soybean Row Spacing on Weed Competition

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Benefit of Narrow Row Soybean
The Soybean Row Spacing Effect

- Greater weed suppression due to shading
  - See proceedings

- Lower inputs needed for weed control

- Little research on actual effect of row spacing on weed competitive ability
The Soybean Row Spacing Effect

- Incorporation into bioeconomic weed management models
  - WeedSOFT

![Graph showing yield loss vs. competitive load](Image)
Objectives

- Determine if soybean row spacing affects weed competitive abilities
- Quantify the magnitude that soybean row spacing has on weed competitive ability
WeedSOFT Validations

- Several Midwest states participated in validating yield loss predictions
- WeedSOFT versions were developed for individual states
- Several sites were established that included both narrow and wide row soybean
Location of Experiments

- 5 experiments established
  - Arlington, WI (2000) – 7.5 and 30 in
  - Columbia, MO (2000, 2001) – 15 and 30 in
  - East Lansing, MI (2000) – 7.5 and 30 in
  - Lancaster, WI (2000) – 7.5 and 30 in
Treatments

- Treatments chosen from WeedSOFT, based on yield loss predictions

  - Narrow rows
    - #1 recommendation (PMY)
    - 10% yield reduction
    - 20% yield reduction
    - Dealer recommendation
    - Weed free
    - Nontreated

  - Wide rows
    - #1 recommendation (PMY)
    - 10% yield reduction
    - 20% yield reduction
    - Dealer recommendation
    - Weed free
    - Nontreated

- Herbicide treatments were site specific
Data Collection

- Weed biomass
  - Dry weight sampled prior to soybean harvest

- Soybean yield
  - Combine harvested
Data Analysis

- Direct effect of soybean row spacing on weed biomass
  - Compared weed biomass between row spacings averaged across herbicide treatments
- Indirect effect of soybean row spacing on soybean yield
  - Yield expressed as percent of weed free yield
  - Compared relative soybean yield between row spacings averaged across herbicide treatments
Direct Effect: Weed Biomass

- Weed biomass in narrow rows was less than wide rows at 3 of 5 sites (P=0.1)
  - Arlington
  - Columbia 2000
  - Columbia 2001
  - East Lansing – NS
  - Lancaster – NS

- Weed biomass in narrow rows was 12 – 37% less than biomass in wide rows
Direct Effect: Weed Biomass

Narrow row biomass (% of wide row biomass)

- Arlington: 78%
- Columbia 00: 63%
- Columbia 01: 87%
- Lancaster: NS
Indirect Effect: Soybean Yield

Soybean yield (% of weed free yield)

- Arlington: NS
- Columbia 00: NS
- Columbia 01: P=0.09
- Lancaster: NS
- East Lansing: NS
Prior Research

- Young et.al (2001) studied weed management in narrow (7.5 and 15 in) and wide row soybean (30 in)
- Recorded yields of weed free, treated, and nontreated plots at 3 locations in Illinois over 3 years
- Analyzed data to determine if narrow row spacing had less yield loss than wide row
Indirect Effect: Soybean Yield

Soybean Yield (% of weed free yield)

- Herbicide Treated
- Nontreated

Herbicide Treatments: 7.5 in, 15 in, 30 in
Summary of Results

- Soybean row spacing had a direct effect on weed biomass at 3 of 5 sites.
- The effect of weed competition on soybean yield between row spacings occurred at 1 of 5 sites.
- Data suggests that narrowing soybean row spacing can reduce weed competitive ability.
WeedSOFT

- Current WeedSOFT row spacing modifiers
  - 7.5 in – 0.8
  - 15 in – 0.9
  - 30 in – 1

- Experimental results (weed biomass)
  - WI 7.5 in - 80%
    - Mean of Arlington (78%) and Lancaster (82%)
  - MO 15 in - 75%
    - Mean of Columbia 00 (63%) and Columbia 01 (87%)
Effect of Row Spacing Modifier as Influenced By Weed Density

Yield loss reduction (%) vs. Soybean row spacing modifier

- 10/100 ft
- 100/100 ft
- 500/100 ft
Conclusions

- Current soybean row spacing modifiers in WeedSOFT are reasonable estimates.
- At low weed densities, the row spacing effect is important because it will affect economic thresholds.
- At high weed densities, the row spacing effect has little effect on the treatment decisions, but narrow row soybeans will still provide greater shading of late emerging weeds.