WeedSOFT Predictions of Corn and Soybean Yield Loss

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WeedSOFT

- Weed management decision support system
- ADVISOR predicts crop yield loss based on weed species and density
- Competitive index modifiers (CIM) are used to adjust weed competitiveness based on relative weed and crop growth stage

WeedSOFT crop and weed growth stages

Stage	Corn	Soybean	Weeds
			Inches
1	V1	V1	0-2
2	V2-V4	V2-V3	2-4
3	V5-V8	V4-V5	4-8
4	V9-V14	R1-R8	>8

WeedSOFT CIM values

	Crop Growth Stage			
Weed Growth Stage	1	2	3	4
1	1	0.6	0.3	0.1
2	1.25	0.75	0.35	0.15
3	2	1.25	0.65	0.25
4	2.5	1.5	0.75	0.35

Objectives

- **Determine corn and soybean yield loss associated with four cohorts of a multi-species weed community**

  Cohort: weeds that emerge at about the same time

- **Validate crop yield loss predictions made by WeedSOFT**

Target Species

Common Lambsquarters
Giant Ragweed
Velvetleaf
Redroot Pigweed
Tall Waterhemp

Woolly Cupgrass
Giant Foxtail
Yellow Foxtail
Barnyardgrass
Large Crabgrass

Experiment Sites

	Corn		Soybean	
	2004	2005	2004	2005
Arlington, WI	X	X	X	X
Waseca, MN	X		X	
Fargo, ND	X	X	X	X
East Lansing, MI			X	X
Concord, NE			X	
Manhattan, KS	X			

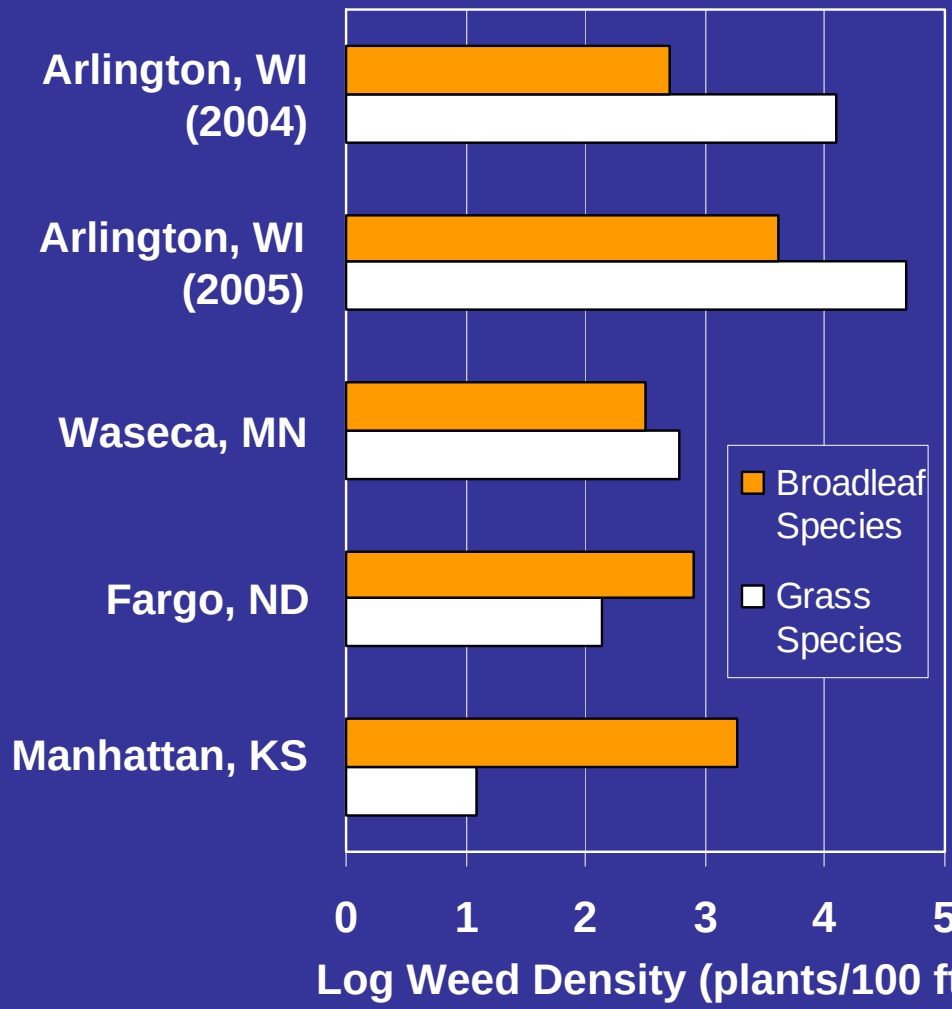
Methods

- 30-inch row spacing in corn
- 7.5-inch row spacing in soybean
- Glyphosate was applied to keep plots weed free until specified emergence time

Cohort Establishment Timings

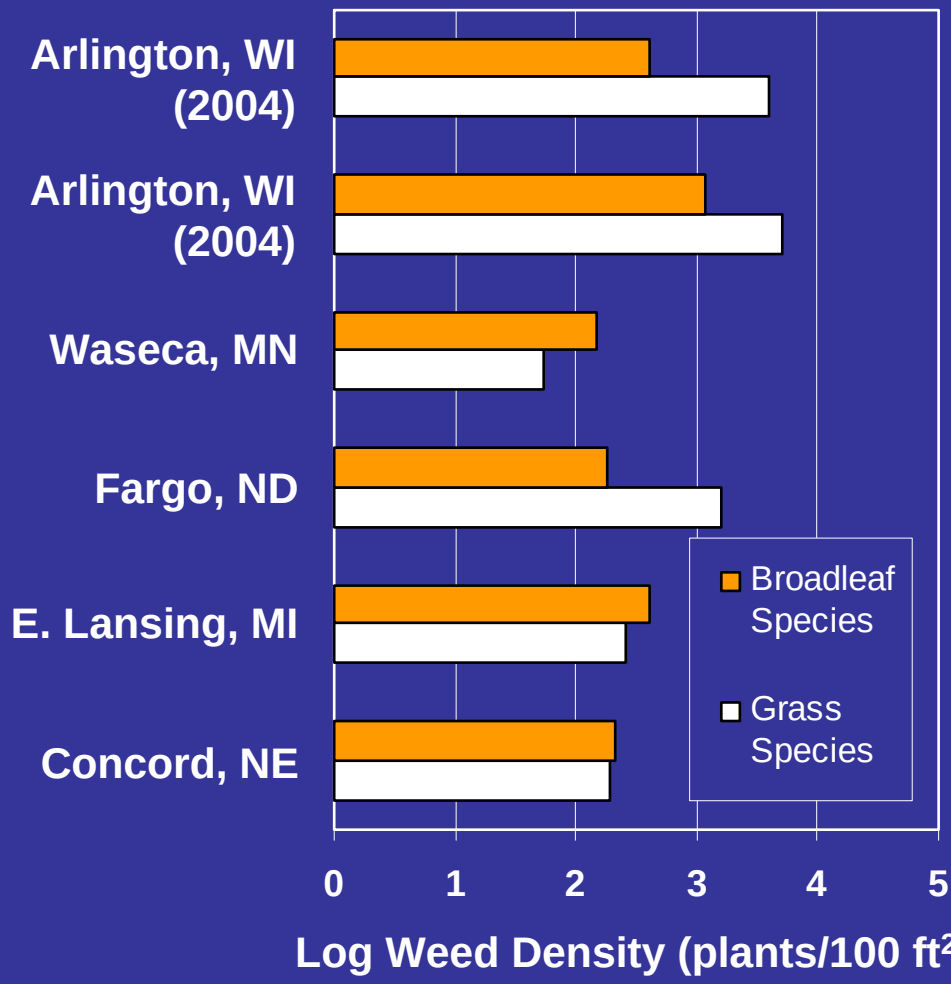
Cohort	Corn Growth Stage	Soybean Growth Stage
1	VE	VE
2	V2	VC
3	V4	V1
4	V6	V3

Weed Communities: Corn



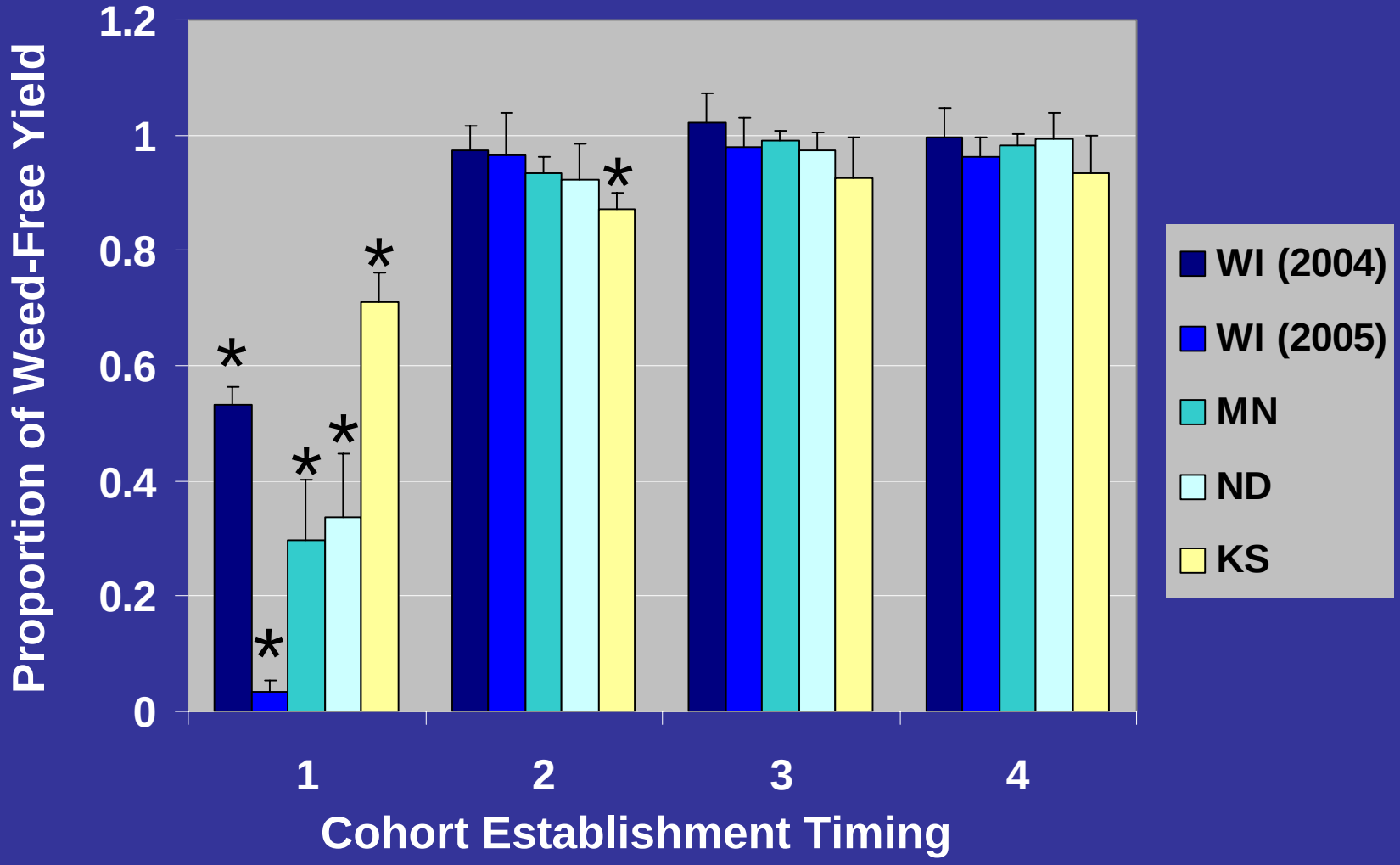
Giant foxtail	Yellow foxtail	Large crabgrass
Giant foxtail	Common lambsquarters	Yellow foxtail
Giant foxtail	Common ragweed	Redroot pigweed
Venice mallow	Yellow foxtail	Wild buckwheat
Tall waterhemp	Palmer amaranth	Smooth groundcherry

Weed Communities: Soybean



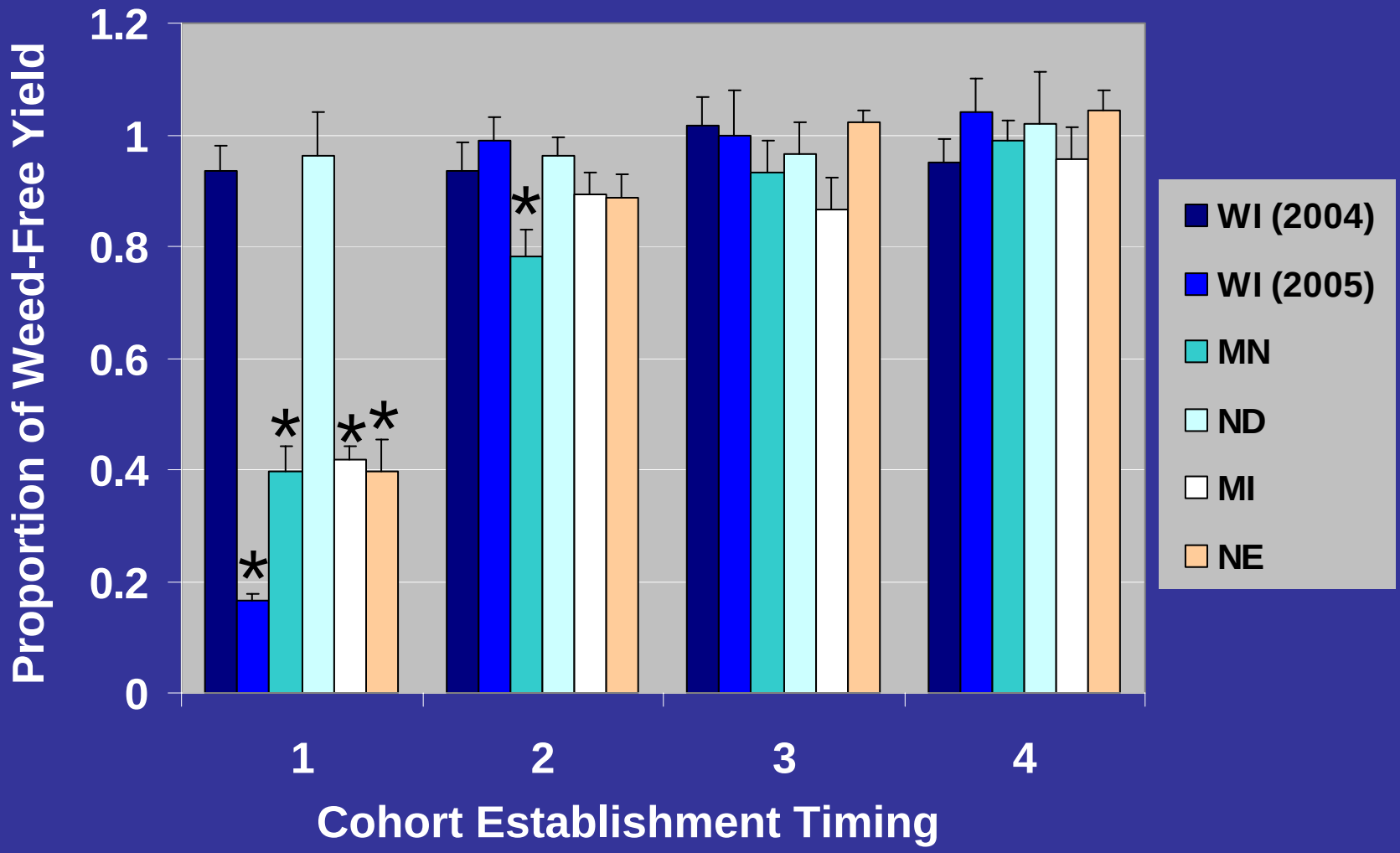
Yellow foxtail	Giant foxtail	Pennsylvania smartweed
Giant foxtail	Common lambsquarters	Yellow foxtail
Common ragweed	Common lambsquarters	Giant foxtail
Yellow foxtail	Common mallow	Venice mallow
Giant foxtail	Common ragweed	Wild mustard
Tall waterhemp	Giant foxtail	Velvetleaf

Corn Yields


Proportion of Weed-Free Yield
1.2
1
0.8
0.6
0.4
0.2
0
1
2
3
4
Cohort Establishment Timing
WI (2004)
WI (2005)
MN
ND
KS

Arlington, WI 2005

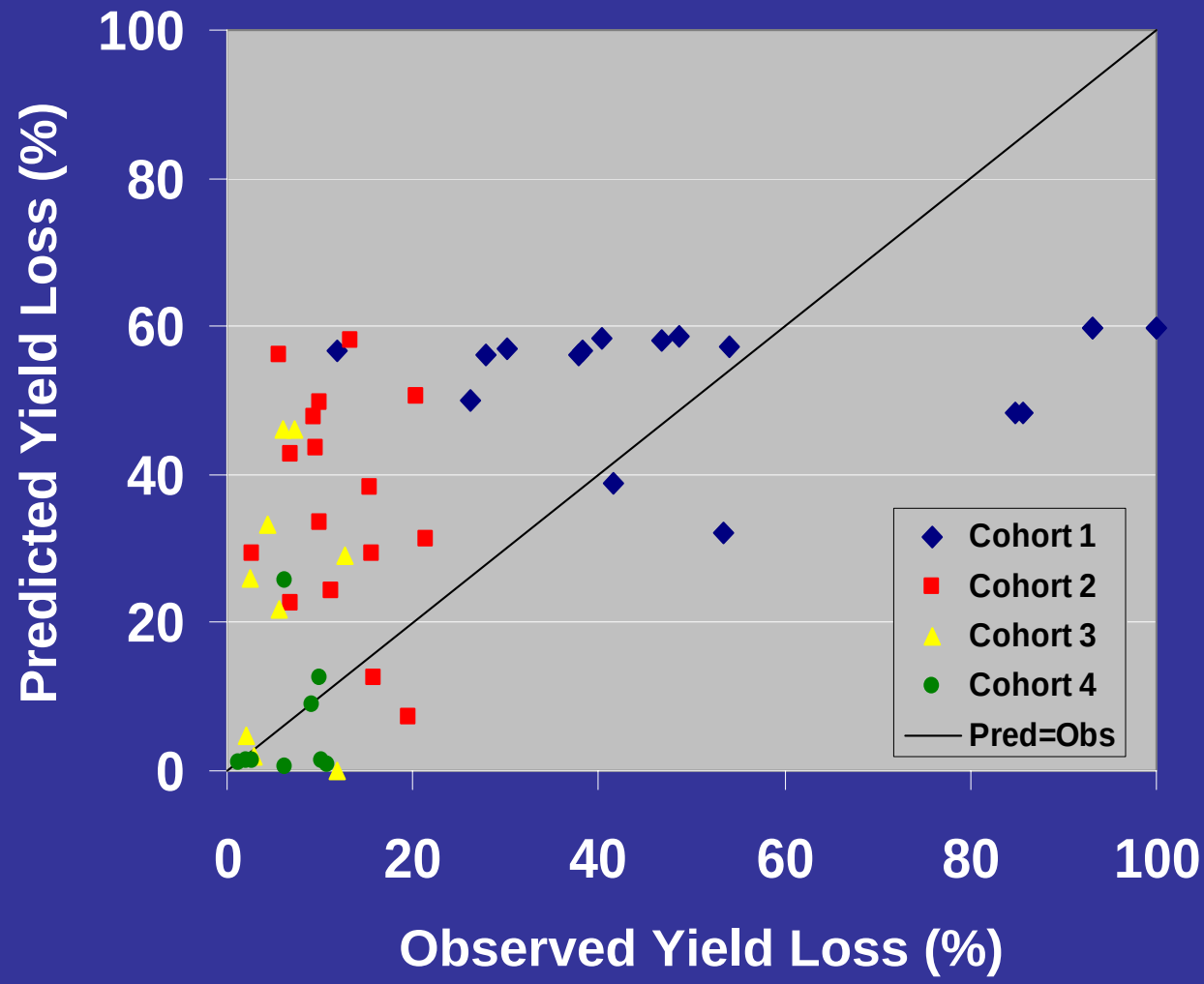
Soybean Yields



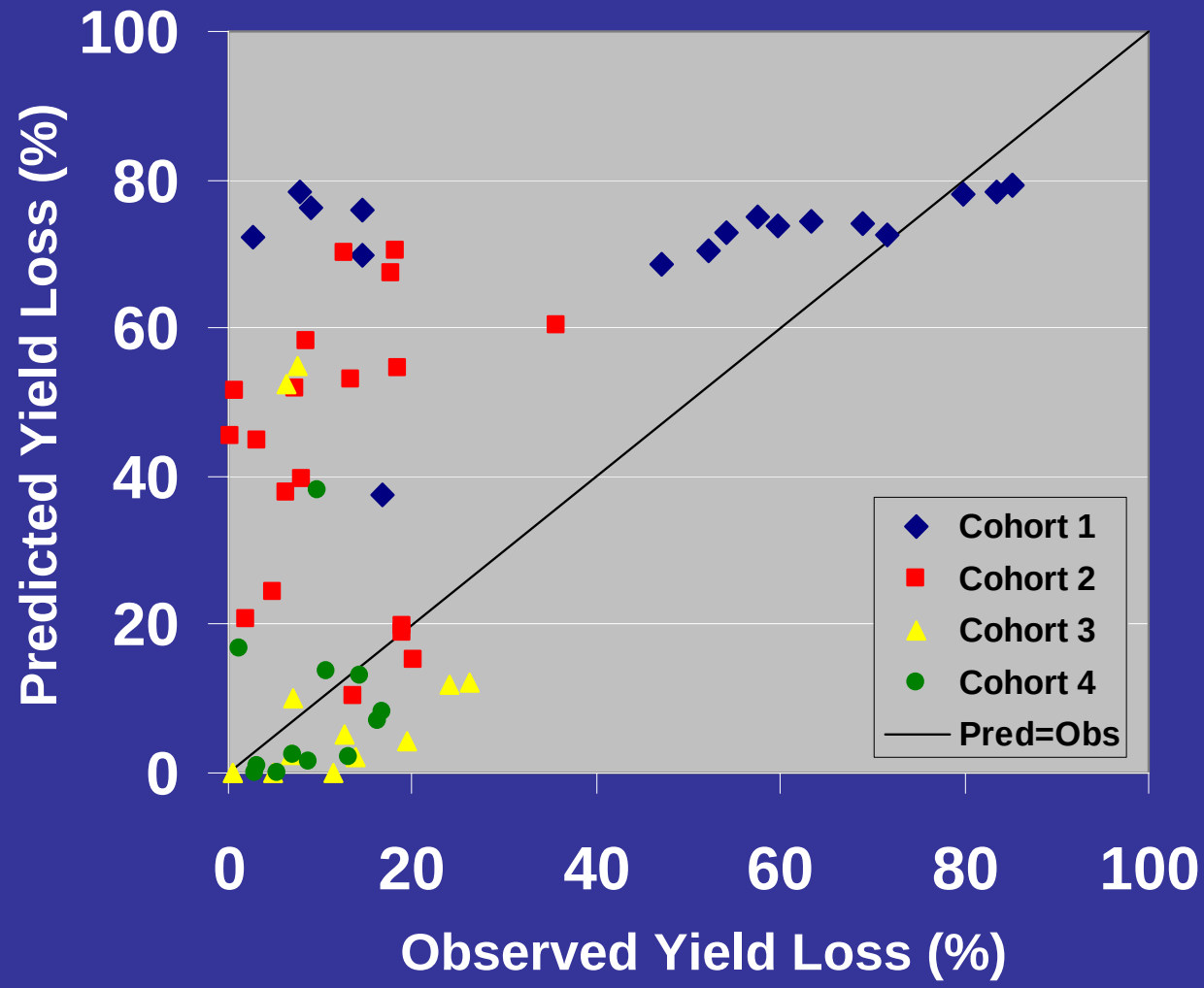
WeedSOFT Yield Loss Predictions

- Based on weed density two weeks after cohort establishment
- Crop yield from season-long weed-free treatment used to determine yield loss

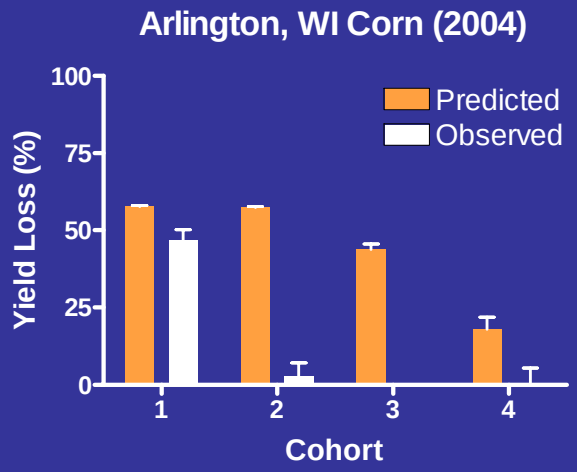
Predicted vs. Observed: Corn

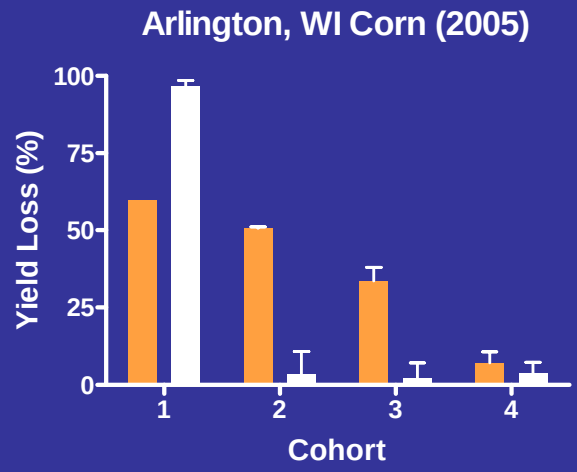


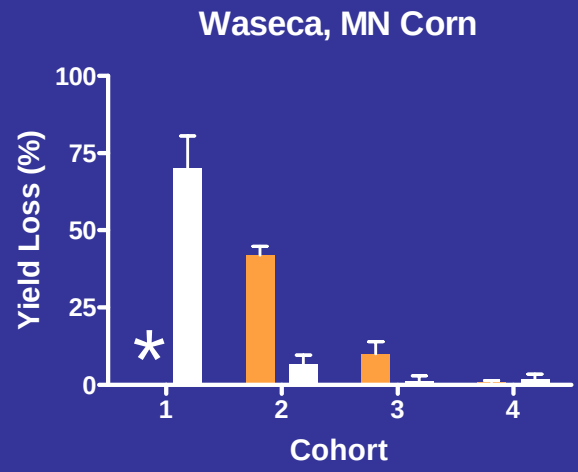
Predicted vs. Observed: Soybean

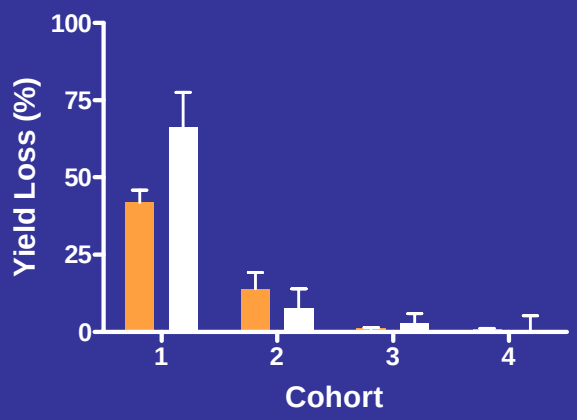


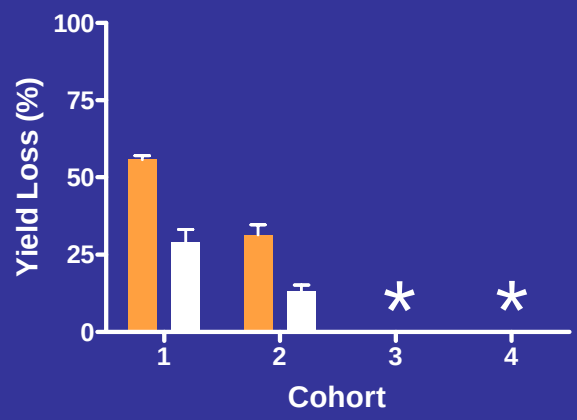
Predicted vs. Observed: Corn



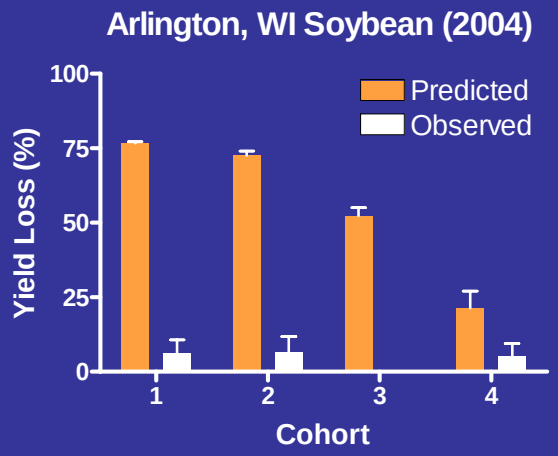


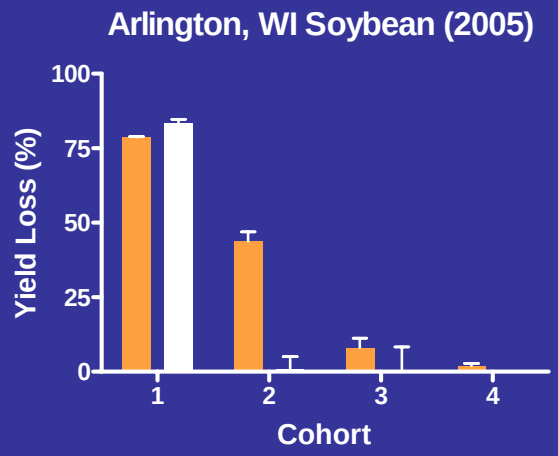


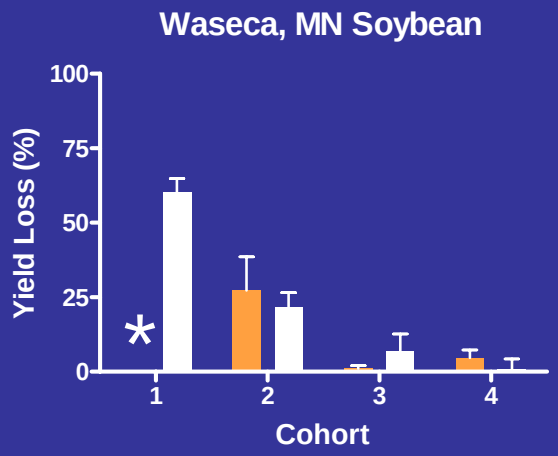


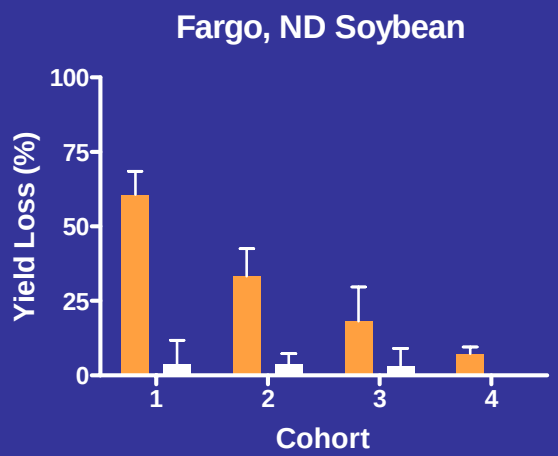


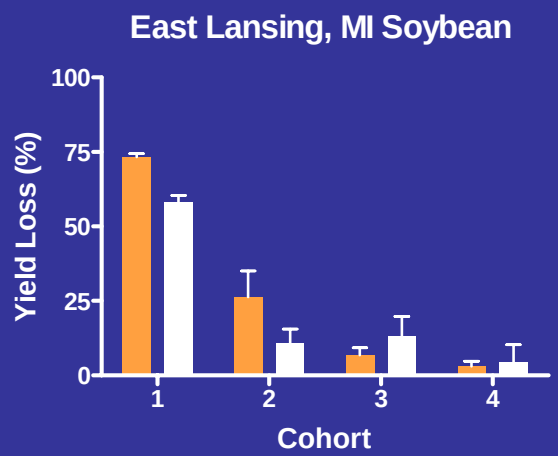
Predicted vs. Observed: Soybean

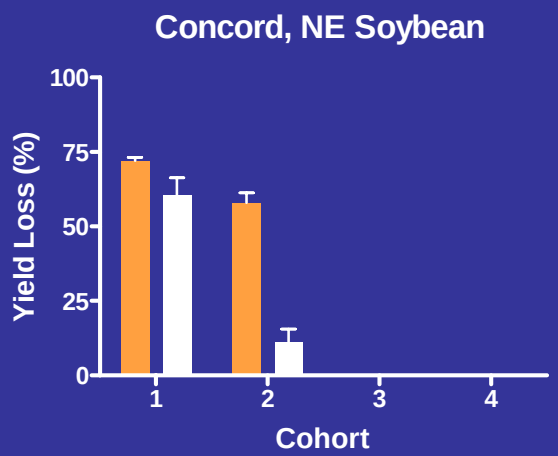












Summary

- Weed communities typically consisted of grass species and a few moderately competitive broadleaf species
- Large yield losses were observed for cohort 1 in corn and soybean
- WeedSOFT over-predicted crop yield loss, particularly in cohort 2
  - V2 in corn, VC in soybean
- Greatest over-prediction of crop yield loss was in grass-dominated weed communities

Conclusions

- Differential cohort effect among weed species
- Accuracy of WeedSOFT predictions would likely be improved by adjusting competitive index modifier values to account for this cohort effect