Recommendation Changes for Potato Leafhopper Management (in Alfalfa)

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Or, Are we there yet?

ACKNOWLEDGMENTS

- **Faculty & Staff**
  - **John Wedberg, Dan Undersander, Tom Bennett, Kevin Silveira, Craig Grau**
- **Graduate Students**
  - **George Hoffman, Mary Gullickson, Margaret Mackay, Tim Davis, Reid Durtschi**

POTATO LEAFHOPPER

POTATO LEAFHOPPER IMPACTS ON ALFALFA

- **Yield & Quality: immediate vs. carryover effects**
- **Stand persistence**
- **New seedings particularly vulnerable**

ECONOMIC IMPACT OF PLH ON ALFALFA IN WISCONSIN (WDATCP Estimates)

1984: $32.5 million

1985: $23.8 million

1986: $14.5 million

1989: $ 2.2 million

PLH Life History Characteristics

1. Long range migration/locally dispersive
2. Wide range of host plants
3. Explosive growth potential

Management Implications for Alfalfa:

- At the mercy of “regional” population
- Must monitor and spray when necessary

POTATO LEAFHOPPER "CONVENTIONAL" THRESHOLDS

Stem Ht. (in.)	PLH per sweep
> 3	0.2
6	0.5
8 - 10	1.0
12 - 14	2.0

Glandular Haired Alfalfa

- History
  - early development in public sector
  - commercial development & ultimate release (1997)
  - trait from “exotic” *Medicago*, but not GMO
- Mechanism of resistance?

Mechanisms of Plant Resistance to Insects

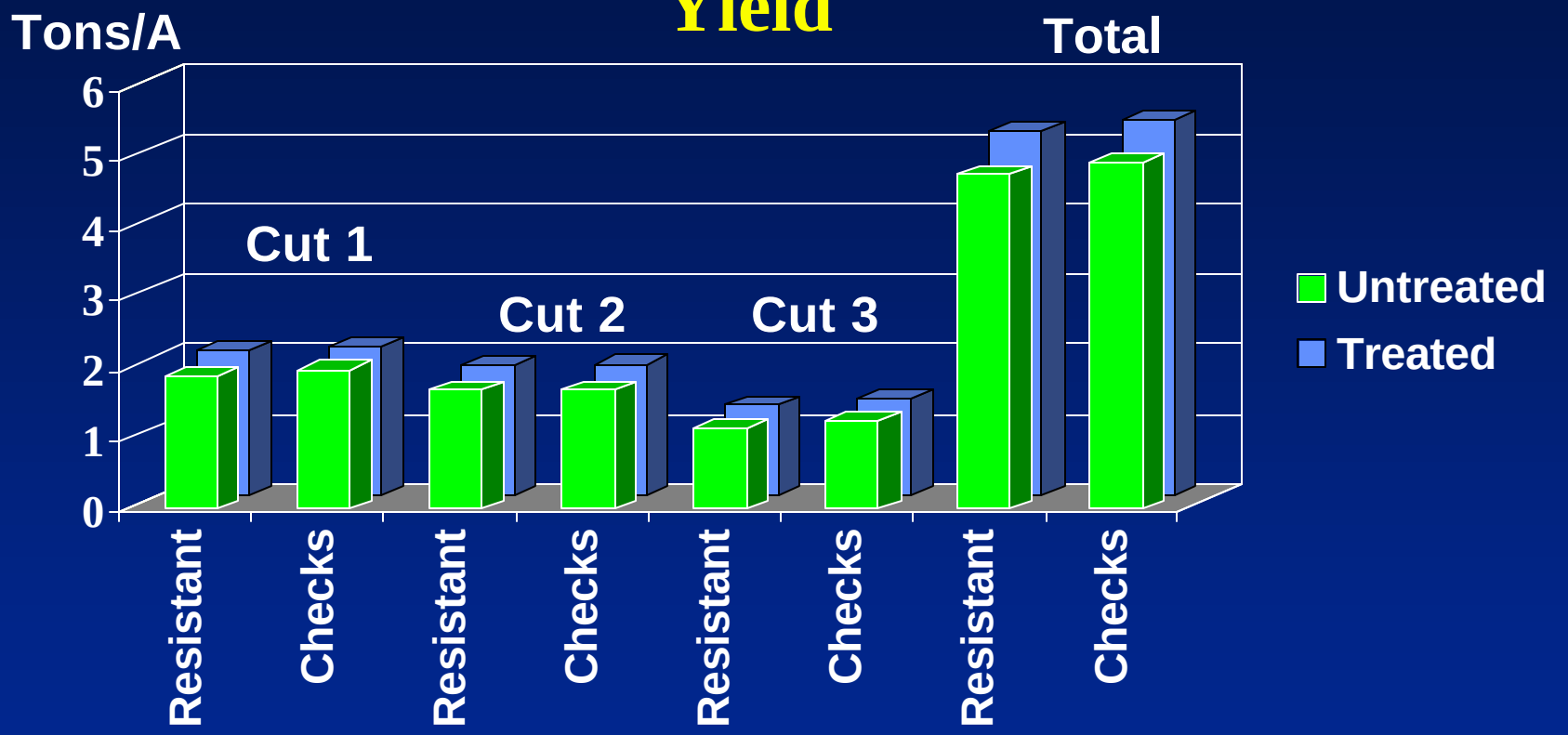
- **ANTIBIOSIS: plants are “toxic”**
- **NON-PREFERENCE: insect will go elsewhere when given choice**
- **TOLERANCE: plants can withstand more injury without yield loss**

Three "Snapshots" from Arlington, Wisconsin, in the Evolution of Glandular Haired Resistance

- 1997, 1st production year (part of 4 state trial)
- 2000, seeding year
- 2003, seeding year

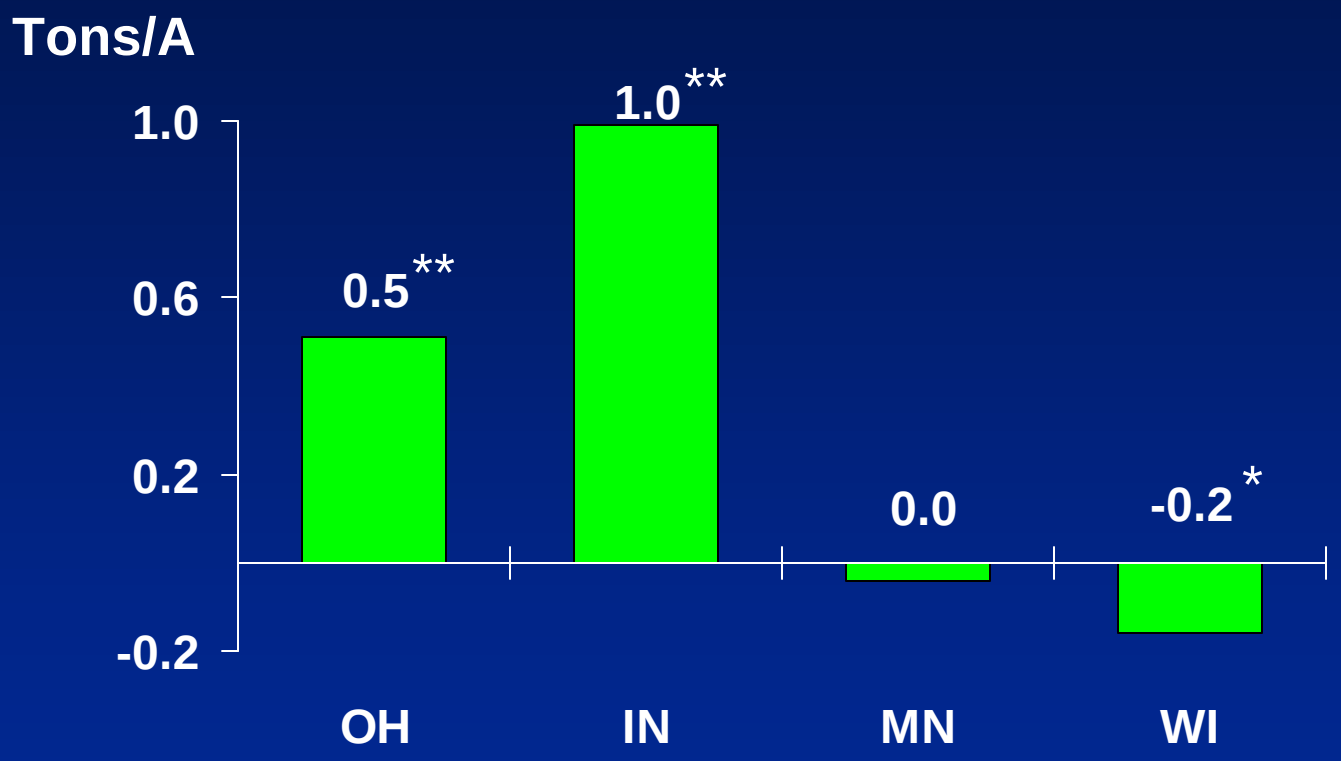
Arlington (4 State Trial) - 1997

Yield



Varieties:	NS	NS	* (-)	* (-)
Insecticide:	**	**	*	**

Yield Benefit of PLH Resistance
(1997, Untreated)



Conclusions from 1997

- **Overall performance of GH varieties in WI was disappointing (variable but "low" levels of resistance)**
- **Resistance to hopperburn was apparent, and GH varieties supported fewer PLH, but this did not translate into a yield advantage**
- **GH varieties also showed yield "lag" in absence of PLH**

PIONEER 5454
(no resistance)

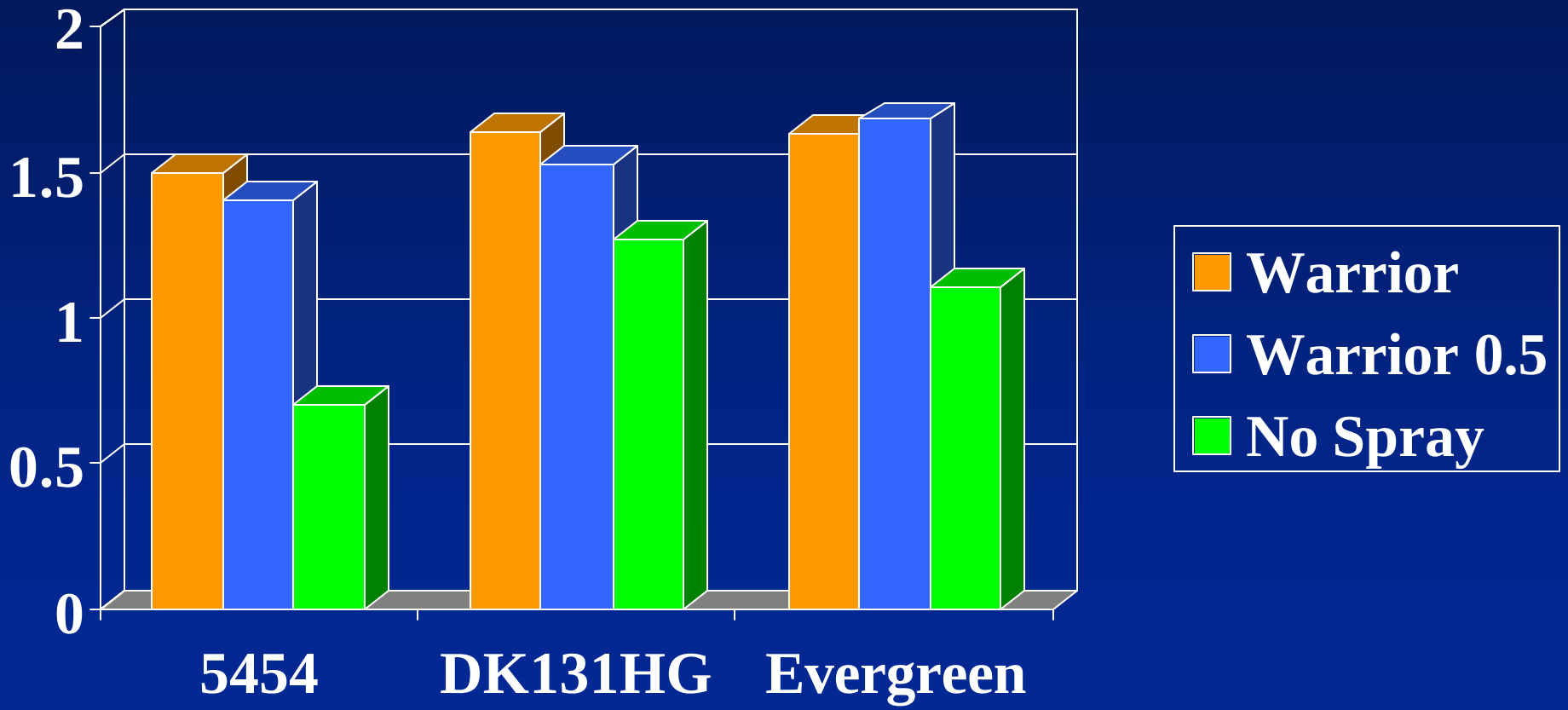
Arlington 2000

DK 131 HG
(53% resistance)

EVERGREEN
(79% resistance)

2000 YIELDS (Tons/acre)

[Plots cut July 19]

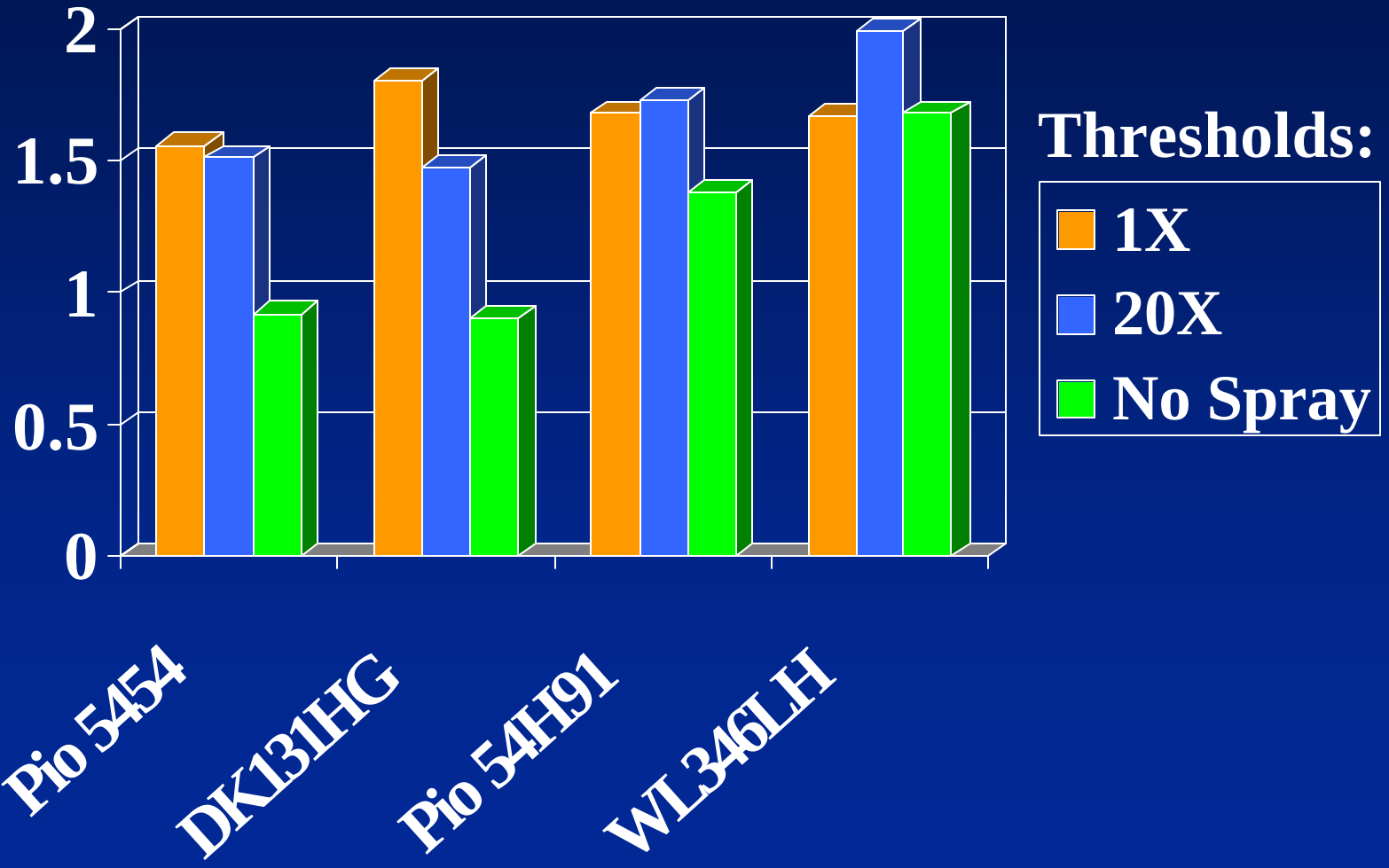


Conclusions from 2000

- **Performance of GH varieties definitely improved**
- **Clear yield advantage of GH varieties in untreated plots, and no yield lag in absence of PLH**
- **<u>But</u> GH varieties still lost yield when not protected**

2003 YIELDS (Tons/acre)

[Plots cut July 30]



Conclusions from 2003

- **Performance of GH varieties further improved**
- **Yield responses similar to 2000, but yield loss gap narrowing in unprotected plots***

  *** plus this was under the most extreme conditions – new seeding with heavy PLH pressure**

OVERALL CONCLUSIONS

- **GH-based PLH resistance has improved substantially since its (premature?) commercial release in 1997**
  - **% resistance has increased from 30's to > 80**
  - **agronomic traits, disease resistance also improved**
- **We may be to the point of stand-alone PLH control in established stands**
- **Monitoring still needed for PLH in new seedings**
  - **thresholds?**
  - **<u>timing</u> might be the more important issue**