WEED RESISTANCE:
A 60-YEAR PERSPECTIVE

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An old broken down weed scientist
Some Things I believe
(based on 60 years of fighting weeds!!)

- Herbicide-resistant weeds: a game-changer for agriculture
- Particular concern about resistance to multiple classes of chemistry and metabolic resistance
- We have become complacent in our approach to weed management
- We must become better managers
- And, we will continue to need new technology
Where has our Focus Been Since the 1950s

- Main Focus has been on killing weeds (Control)
  - Weed control is chemically based - technology
    - Good reason for that
    - Efficiency, economics, etc.
    - Nothing else comes close for weed control
    - People left the farm in mass – farming was a hard life
    - Hand weeding is drudgery
      - Includes plowing with a mule
      - Life is simpler when you plow around the stumps
Weed Control Technology Expansion 1960 - 1995

- New chemical technologies allowed:
  - More acres per grower
  - Less time and labor involved in weed control
  - Economic incentives
  - Simplification of weed control
  - Much improved weed control
Weed Control Technology Expansion Post 1995

- Mostly about genetic engineering
- One chemical controls all weeds (mostly)
- Most of industry “gave up” on new chemistry
- 1975 – 30 companies involved in development
- 1999 – 6 companies remain
When Technology Fails

- Popular to blame the technology
When Technology Fails

- Popular to blame the technology
- It is NOT the fault of the technology
  - Overreliance on ANY technology is risky
  - Maybe the technology was too good?
  - Humans are inclined to look for simple solutions
  - The Pogo analogy
    - "We have met the enemy and he is us"
  - The “Tragedy of the Commons”
    - Use of common pool resources
Lack of Focus on Management

- Need more focus on weed management
  - Weed management is multi-strategy
    - Prevention
    - Avoidance
    - Monitoring
    - Suppression
  - Utilization of BMPs
  - Still need new technology
    - Not just chemicals
Some Things I believe

- Assume all fields have resistance
  - Resistance genes are present
  - May not have manifested in a weed yet
  - May not have been selected for yet
  - But it will happen without proper management
  - Cannot manage something you do not have –
    - But, you can manage to not have it!!!
Impediments to Management

- High cost of human capital
  - May take more of grower’s time
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- Short-term farming
  - High percentage of farmland rented
  - Short-term leases
  - Concentration on farming “a year at a time”
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- Short-term farming
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- Near term costs for longer term gains
- Resistance is an area wide issue
  - Neighbor effect
Potential Management Incentives

- Government incentives
  - Conservation programs?
  - Crop insurance rebates?
  - Regulation?
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- Market incentives
  - Tie land prices to occurrence of resistant weeds?
  - Promote longer-term rental leases to management?
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- Industry incentives
  - Tie rebate programs to BMP use?
So, Could we have Avoided Resistance?

- Probably not – it was in the populations – we just selected for it.
Could we have Managed it Better?

- Absolutely – by paying more attention to what was happening post treatment and following up to clean up escapes
So, Where are we Headed?

- It depends…
If we do not get smarter.....
So, What is Smarter?

- Learn from past mistakes
  - Cannot do same thing all the time in all fields
- Increase diversity of weed management tactics
- More critical observation of tactic outcomes
- All segments tell the same story
- Transparent product information
- Understand there is no “silver bullet”
- Translate impacts into $$$$$