How Did We Get Here?: Agriculture, Scientific Knowledge and Societal Needs

Day 2: Pest Management
March 25, 2022
New York Farm Viability Institute Webinar
Understanding how we got here...

...Moving forward with intentionality.
Understanding history (and changes within it):

- Catalyst
- Context
- Contingency
- Continuity
Applying history with intention:

• Identifying the hierarchy of priorities (WHO is benefitting from a given focus, how do we maximize share of benefits?)

• Balancing risks (reactive v. proactive scientific and policymaking approaches)
Pest Management
Example: Agricultural College

- Established with Morrill Act of 1862: “in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.”
- Civil War (political leverage)
- Fertilizer fraud (response to global market)
- Hatch Act of 1887
- New framework for expertise met with skepticism (farmer-expert to scientist-expert)
Example: Cooperative Extension

• Federal funding established with Smith-Lever Act of 1914

• Structure formed by Seaman Knapp (1833 – 1911)
  • Second president of Iowa Agricultural College
  • Adamant believer in demonstrations – foundation for cooperative extension work

• 1904 – Over 7,000 demonstrations to cotton farmers in pest management
  • Selecting cotton varieties that matured early
  • Soil preparation
Question of Labor

- World War II
  - Bracero Program – inform short-term worker contracts and immigration policy
- Post-war suburban appeal + scholarships
Broad Spectrum Approach

- DDT becomes a popular chemical approach in postwar period
- Concerns and consequences
  - "Good" insects also affected
  - Mammals affected
  - Cost-benefit analysis – EPA Policy (reactive scientific → proactive, precautionary approach)
Moving to a Precision Approach

- Glyphosate + genetically engineered crops
- Neonic-treated seeds
  ^^^more precise, with challenges
- CRISPR, RNAi, nanopesticides
  ^^^emerging tech

Roundup Ready

What are genetically modified crops?
Crops that have been engineered to be resistant to herbicides and insecticides

How much of all crops planted in the U.S. are genetically engineered?
- 94% Cotton
- 94% Soybeans
- 92% Corn

The most common herbicide-tolerant crops: Roundup Ready

THE PROBLEM
Glyphosate inactivates an essential enzyme in plants to prevent them from growing-killing weeds and crops alike

THE SOLUTION
Roundup Ready seeds produce a resistant form of the enzyme, protecting crops from the effects of glyphosate

THE EFFECT
Farmers can spray herbicide in their fields to kill weeds without fear of harming crops

Source: United States Department of Agriculture (USDA) data and Colorado State University Extension
Change in Boll Weevil Approaches

- Synthetic attractant pheromone traps (1960s)
- Research into reproductive cycle (1970s)
- Aerial infrared imaging (track and trap)
Reimagining Larvicides with Animals
Reactive Science / Precautionary Policy

- Pest management and the challenge of resistance/resilience
- Challenge of labor-intensive methods
- System in place and hierarchy of priorities
- Short term needs, long term consequences
Takeaways

1) Societal needs/crises DO inform how agricultural science develops – but priorities are identified differently by different people (scientist v. farmer v. popular consumer)
   • Hierarchy of priorities are created – need to continue to be discussed and debated

2) Adoption of new ideas/practices/products comes with clear narrative + trust
   • Narrative and trust linked to how risks and benefits are discussed and described