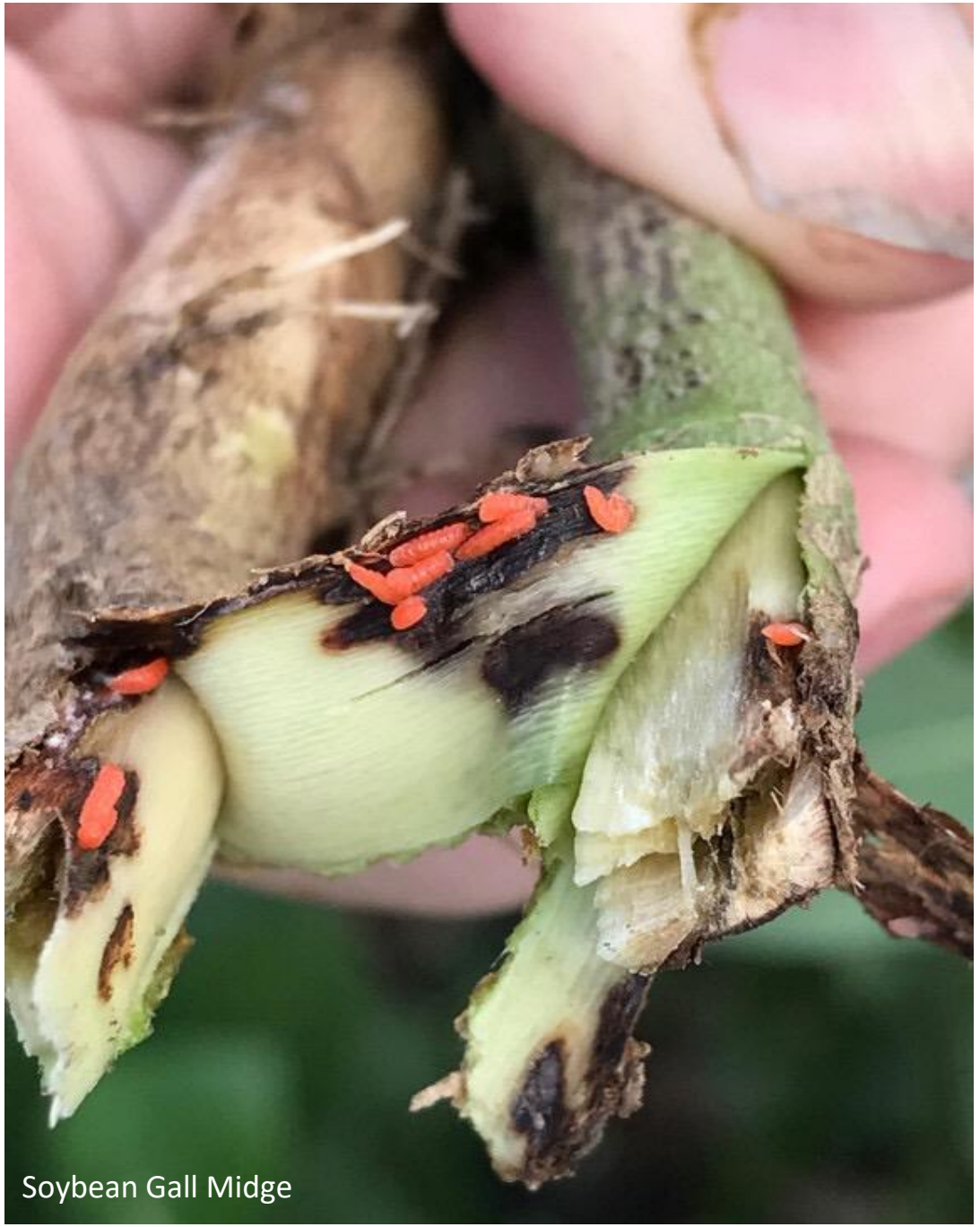
Identifying the Foundation of the IPM Network – Laying the Groundwork for Growth

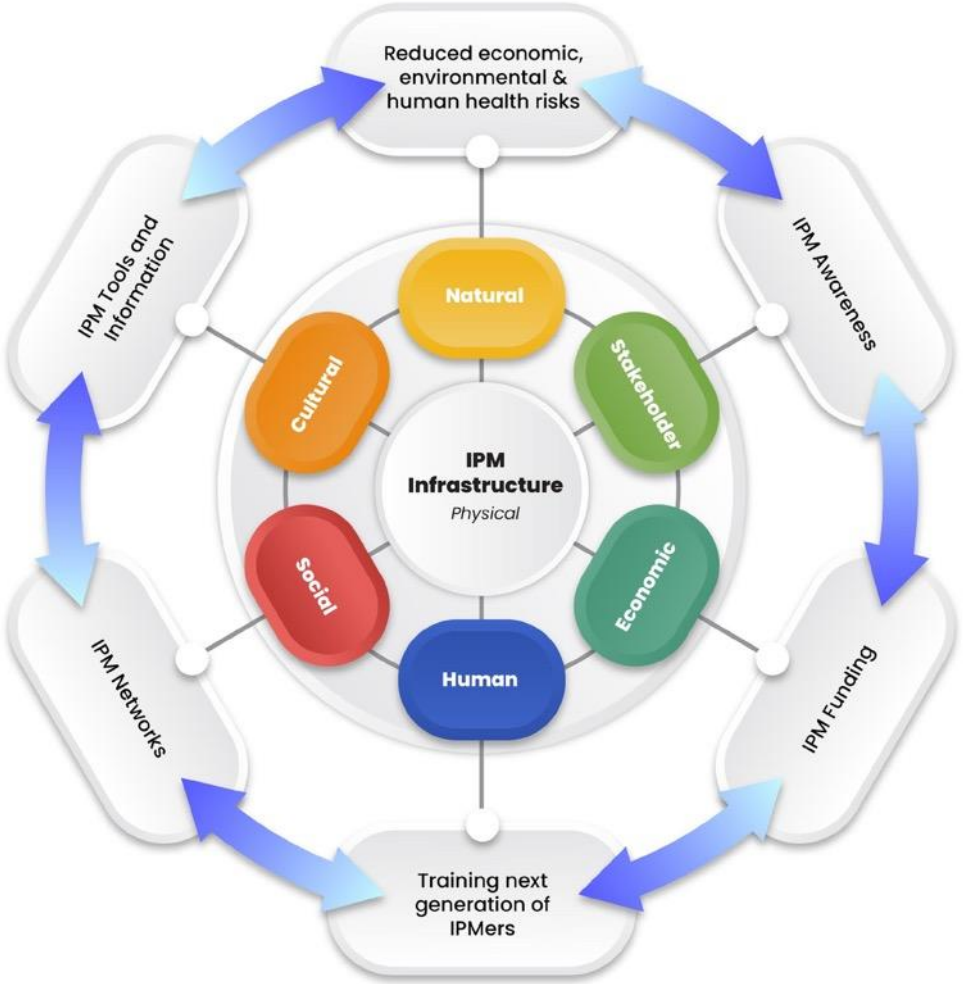
Daren Mueller, Laura Iles, Carol Pilcher, Roger Magarey and lots of other people



Soybean Gall Midge

Vision

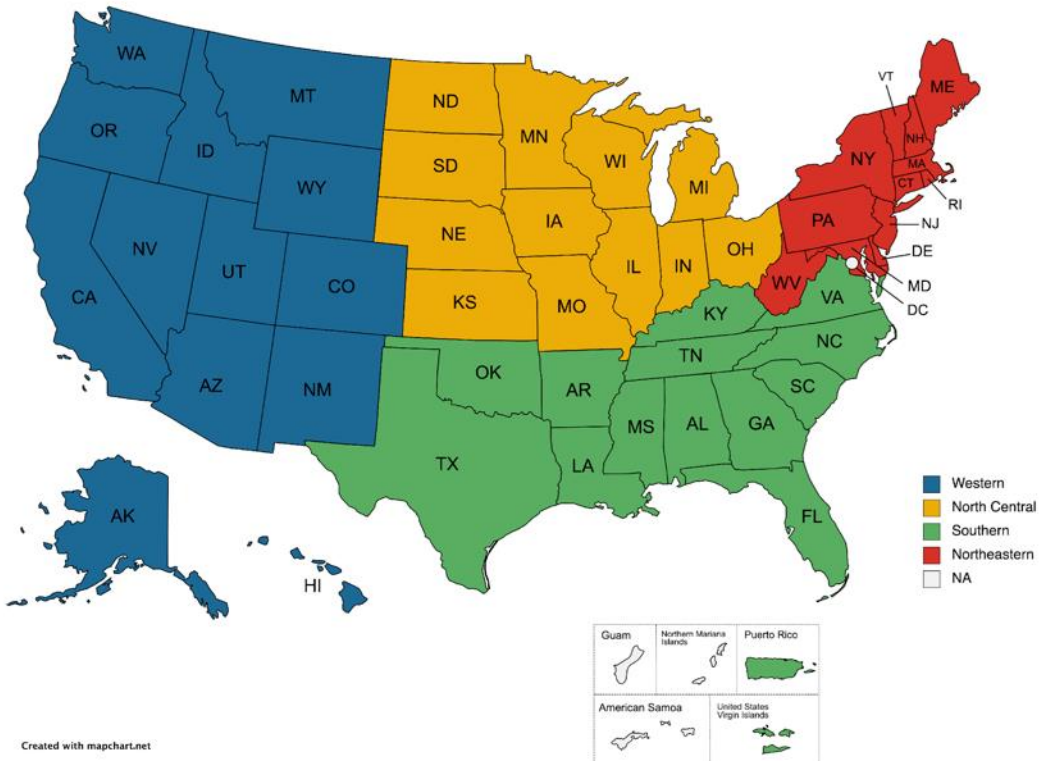
A nation where everyone can access the IPM information, tools and services they need to protect their health, home and livelihood.



IPM Network

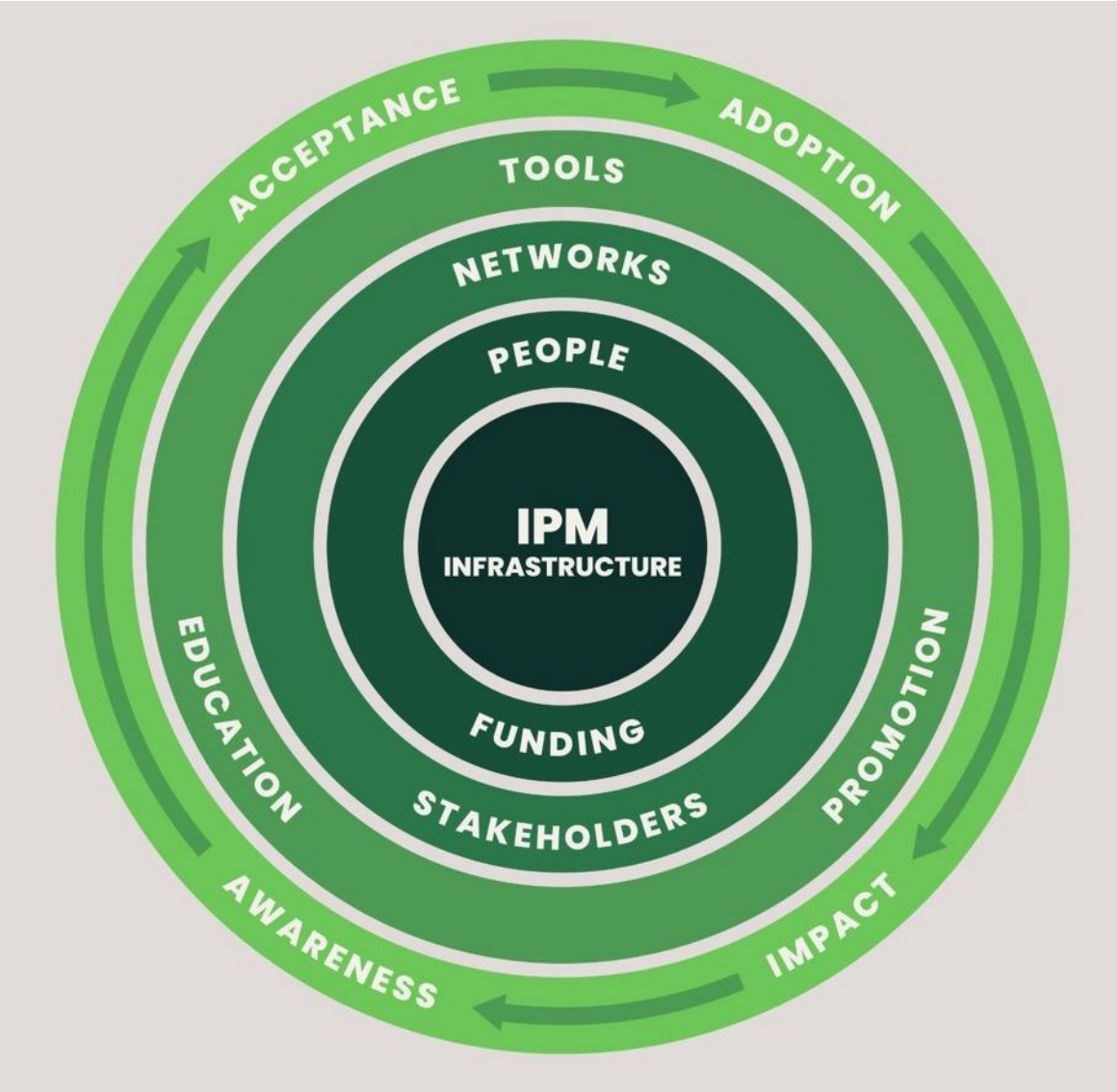
Existing IPM network

- 53 state IPM programs
- 4 regional IPM centers
- Primarily supported by USDA-NIFA (Crop Protection and Pest Management (CPPM) program)
- Funding is competitive with state programs applying every 3 years and centers every 4 years



Surveyed state IPM programs

- Questionnaire sent out in November 2022, closed August 2023
- Received responses from 52 of 53 IPM programs
- Gathered complementary data



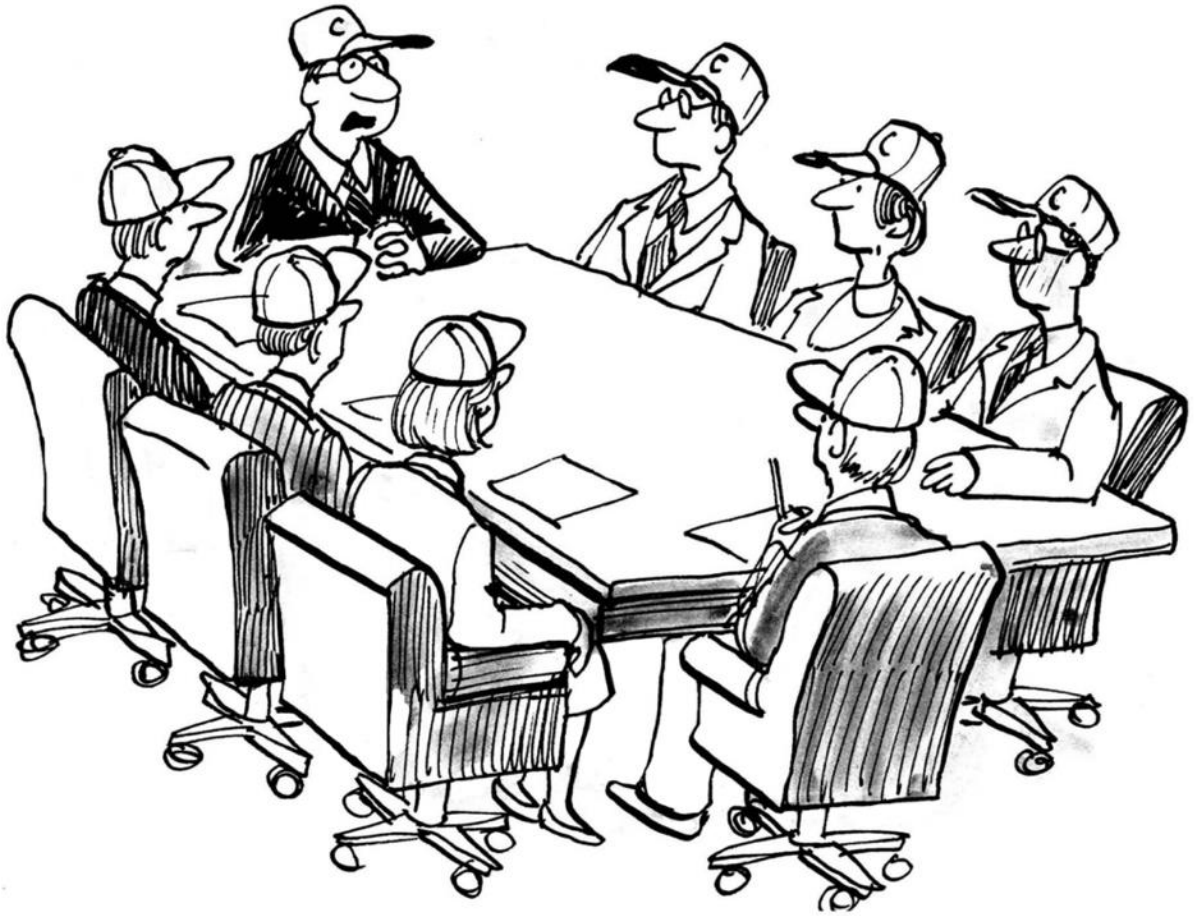
People and Funding

IPM Experts

- 1,050 IPM specialists across network
  - Average of 20 IPM specialists associated with each program
  - ~40% of specialists are listed as PI, Co-PI, or collaborator on EIP proposals

IPM Support

- Only 31 communication specialists and 18 evaluation specialists “with at least 25% of time designated towards IPM”
- 69% of IPM programs with NO dedicated communication specialist; 80% of IPM programs with NO evaluation specialist



“From now on all corporate communications will be dominated by sports metaphors.”

People and Funding

	# states	County Agents*	IPM Specialists
# Commodities		**per program**	**per program**
3 to 9	16	32.9	12.4
11 to 18	22	43.8	19.7
20 to 64	12	63.9	35.8
# Farm Operations			
565 to 12,400	15	8.5	9.7
17,900 to 47,300	23	48.9	27.7
52,700 to 247,000	14	80.8	20.5
$ in Farm Sales (1,000s)			
3,335 to 1,838,610	16	9.4	9.3
2,472,805 to 7,758,884	18	53.6	23.7
8,220,935 to 45,154,359	18	70.4	27.6

* 6% of county agents have specific IPM responsibilities; others cover IPM through broader agriculture or horticulture duties

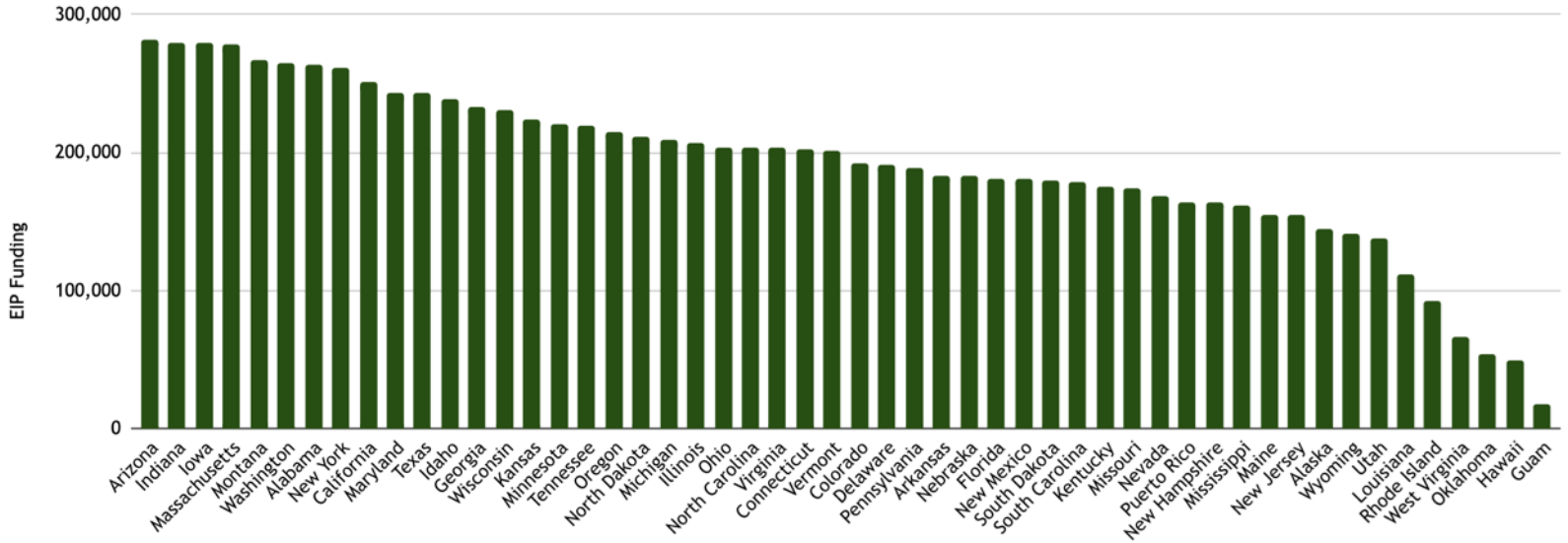
People and Funding

	# states	County Agents*	IPM Specialists
Farm Size (Acres)		**per program**	**per program**
55-191	17	42.5	16.0
204-372	16	51.9	29.2
410-2430	17	48.5	18.9
Land in Farms (millions)			
0.06-8.0	18	21.6	13.1
8.4-16.0	16	66.6	30.4
24.5-127.0	16	57.3	21.1
Region			
North Central	12	41.6	22.9
Northeastern	12	16.3	12.6
Southern	15	86.3	32.5
Western	13	29.3	12.2

* 6% of county agents have specific IPM responsibilities; others cover IPM through broader agriculture or horticulture duties

People and Funding

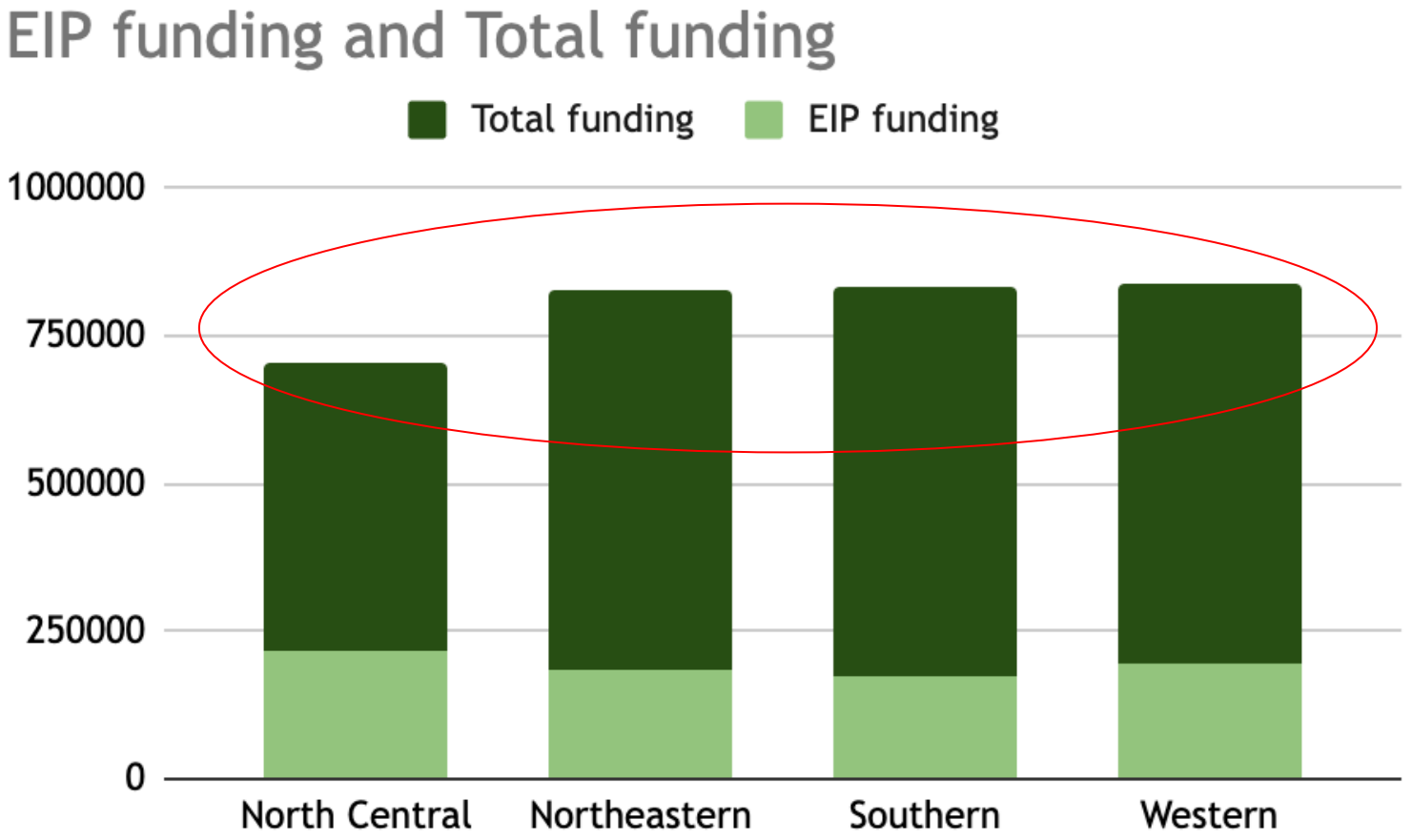
- EIP funds range from $17,500 to $281,500 per year
- Wide range of legislative support
- Programs with more external support tend to receive more EIP funds



Average annual funds	Lower EIP funding levels (25 programs)	Higher EIP funding levels (26 programs)
EIP	$150,940	$236,036
Legislative	$164,435	$607,683
Other	$10,208	$68,194

People and Funding

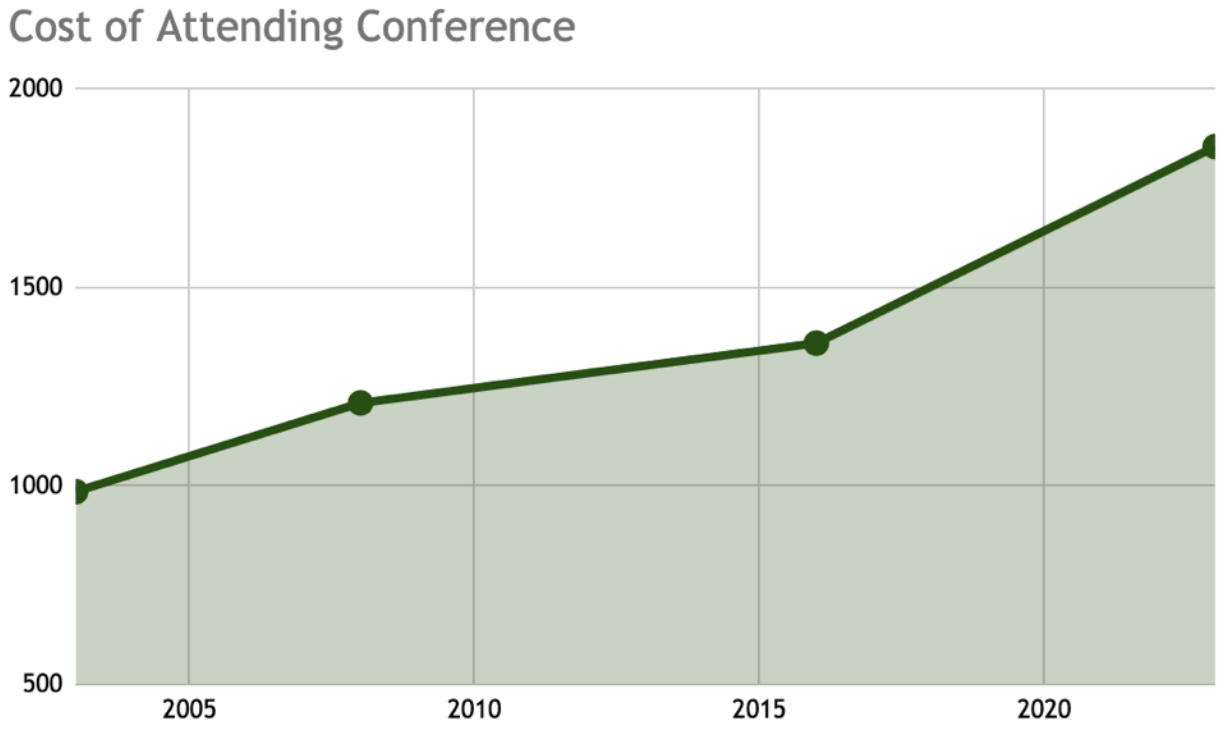
Average annual funding per program within each region

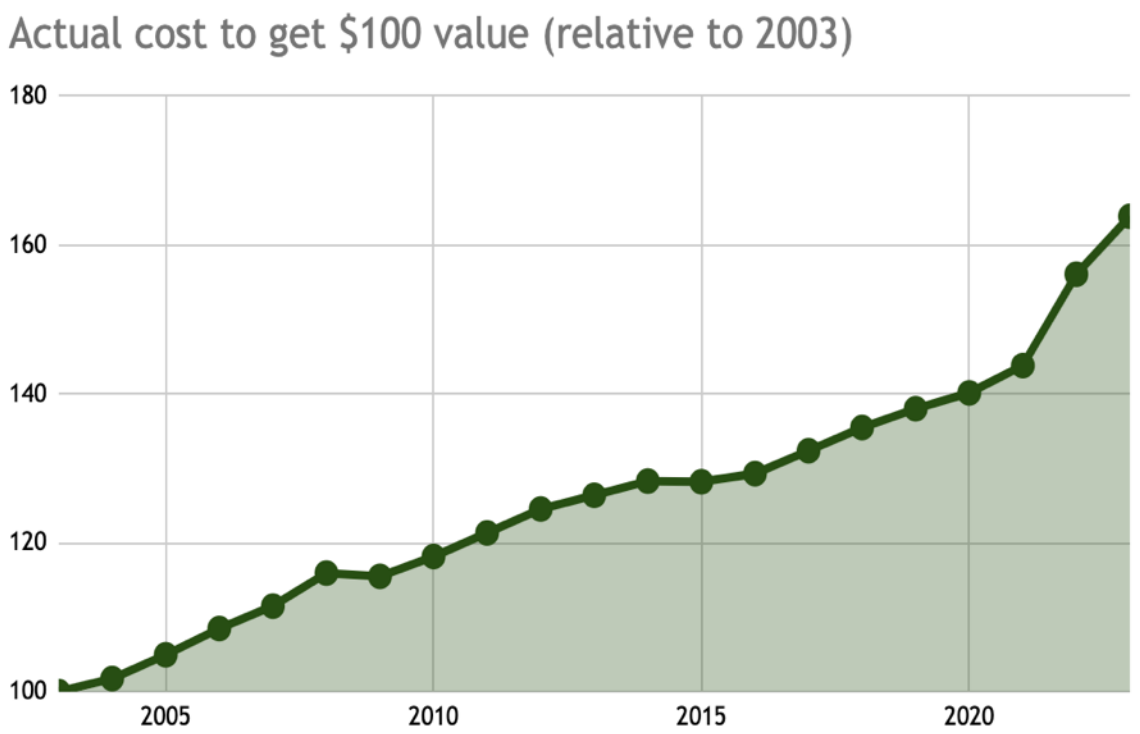


Discrepancy largely driven by a few programs (e.g., NY, GA, TX, CA, WA)

People and Funding

Funding is not keeping up with cost of doing business



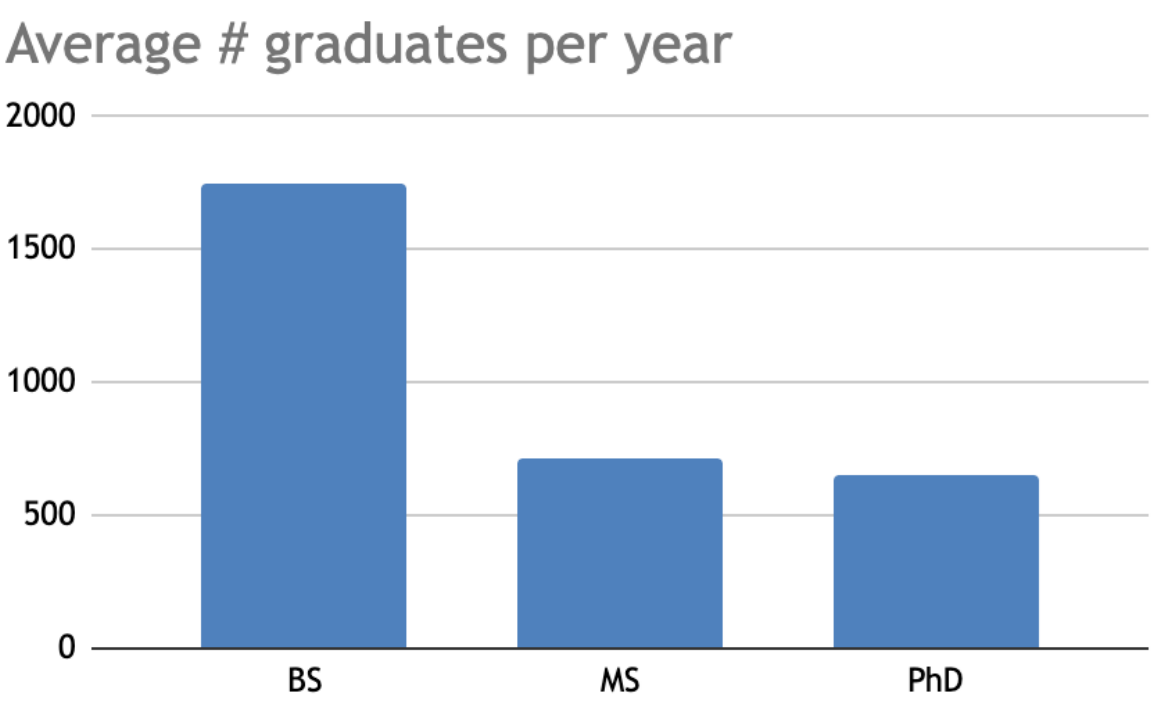


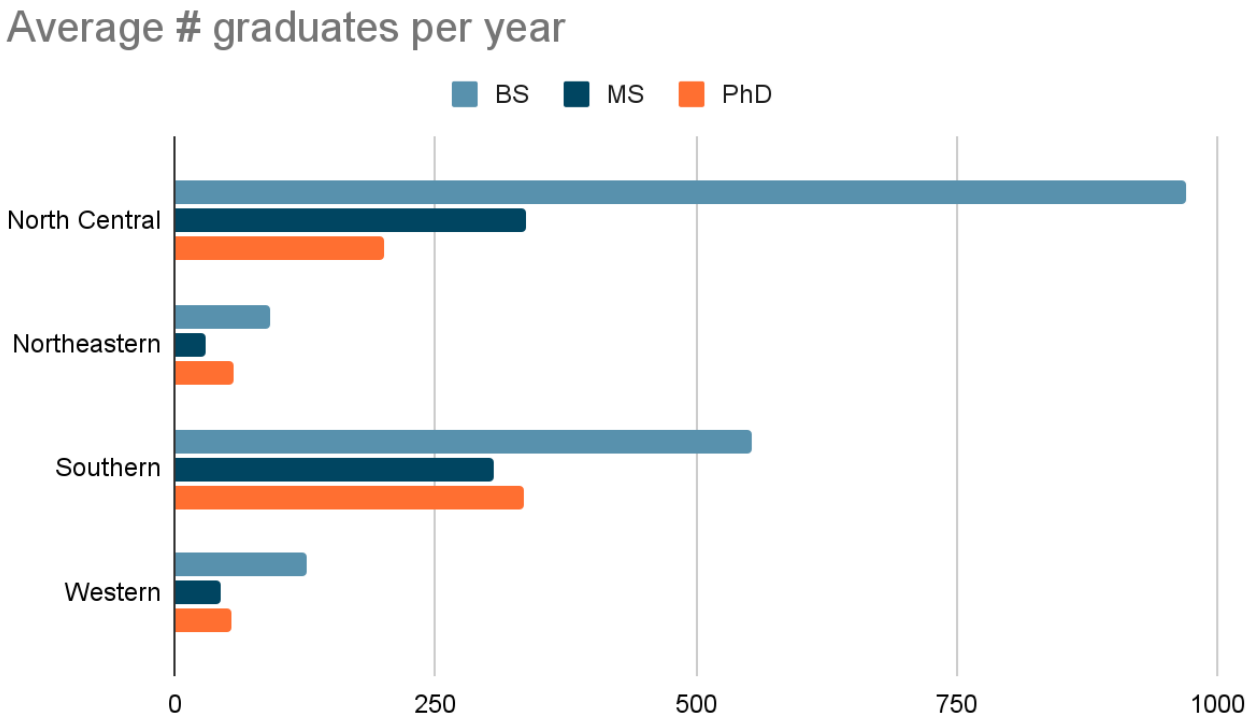
APS meeting, 4 nights in hotel with weekly car rental

https://www.bls.gov/data/inflation_calculator.htm

People and Funding

Training the next generation





Approximately 20% of programs did not fill out this information

People and Funding

Strengths
- 1000+ IPM specialists across the network
- Stable funding - at least it is not going down 😁

Weaknesses
- Lack of support staff - communications, evaluation
- Flat-level funding does not account for inflation

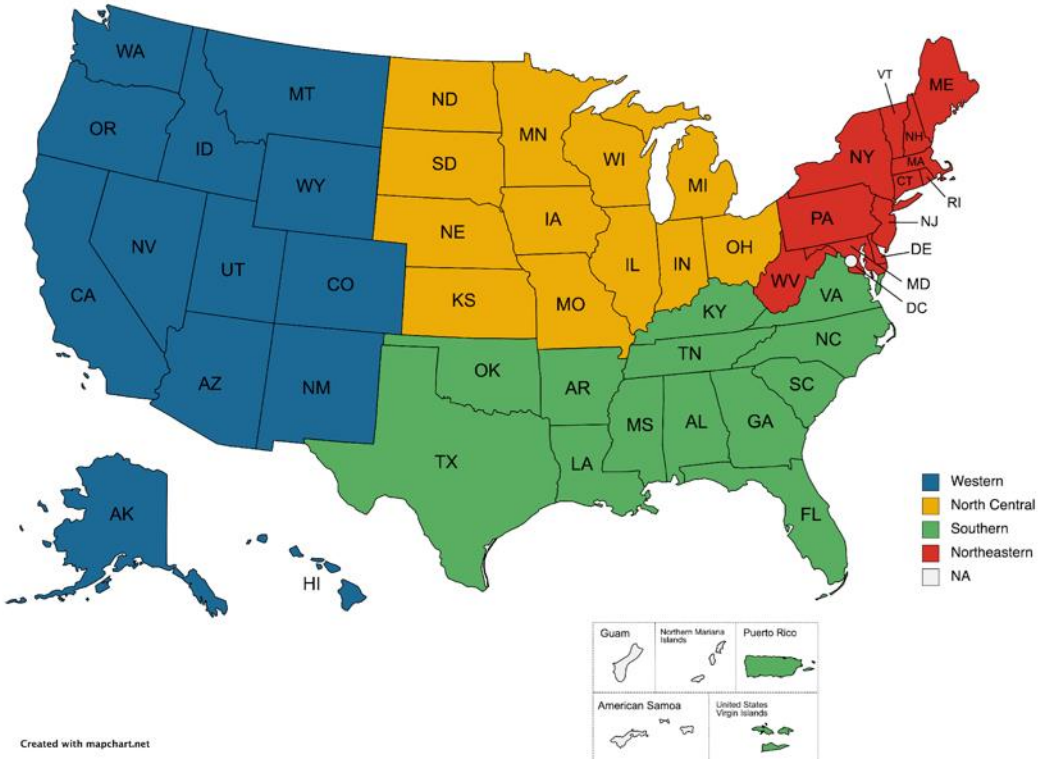
Opportunities
- Re-imagine what constitutes an “IPM specialist” - train the basics of IPM in new disciplines
- Better communicate need for support to university administration, commodity groups, and state legislature

Threats
- IPM specialists retiring or leaving quicker than being replaced
- With sparse staffing, relationships within the network, and with key partners and stakeholders are weakened

Networks and Stakeholders

IPM programs

- EIP funds competitively available through USDA-NIFA CPPM program starting in 2008
- Confusion still remails if IPM programs should apply for funds to support infrastructure vs. projects
- With flatlined budgets and significant inflation, IPM coordinators are often unwilling to share even basic information with one another to prevent any competition. Essentially, there exists a disincentive for information sharing as other IPM programs are seen as competitors.
- Each program identifies their own stakeholders and IPM needs



Networks and Stakeholders

University-based programs

- Pesticide Safety Education Programs (PSEP)
- Plant Diagnostic Clinics
- Master Gardeners
- Master Naturalists

Society-based programs

- Certified Crop Adviser

NIFA funded programs

- IR-4
- SARE

SARE
Sustainable Agriculture Research & Education

MASTER GARDENER

The IR-4 Project

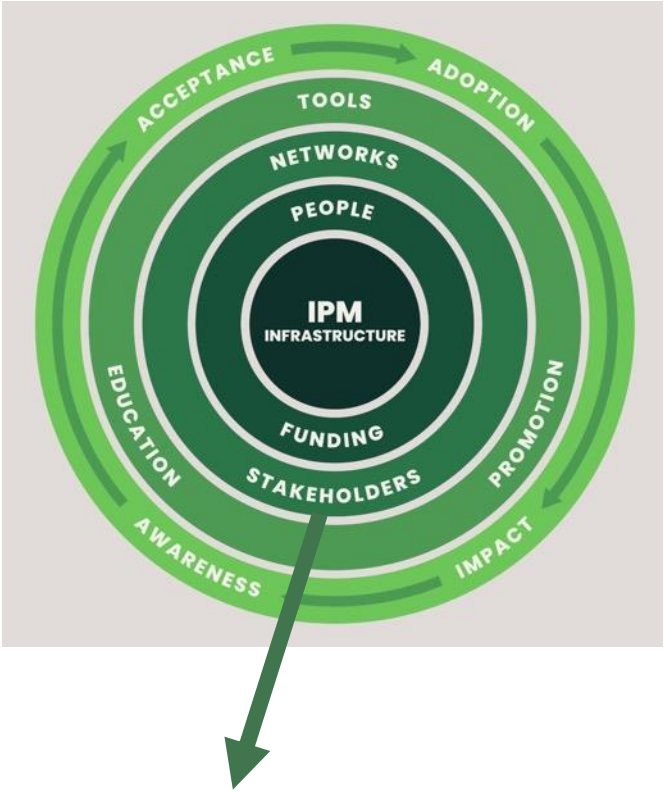
NPDN
NATIONAL PLANT DIAGNOSTIC NETWORK

CERTIFIED CROP ADVISER

Networks and Stakeholders

- **88 staff** work within Pesticide Safety Education Programs (PSEP)
- Some staff work in both IPM and PSEP programs
- Similar staffing across regions
  - North Central = 2.0
  - Northeastern = 1.5
  - Southern = 1.7
  - Western = 1.6

- **~3,500 events** per year with **142,000 participants**



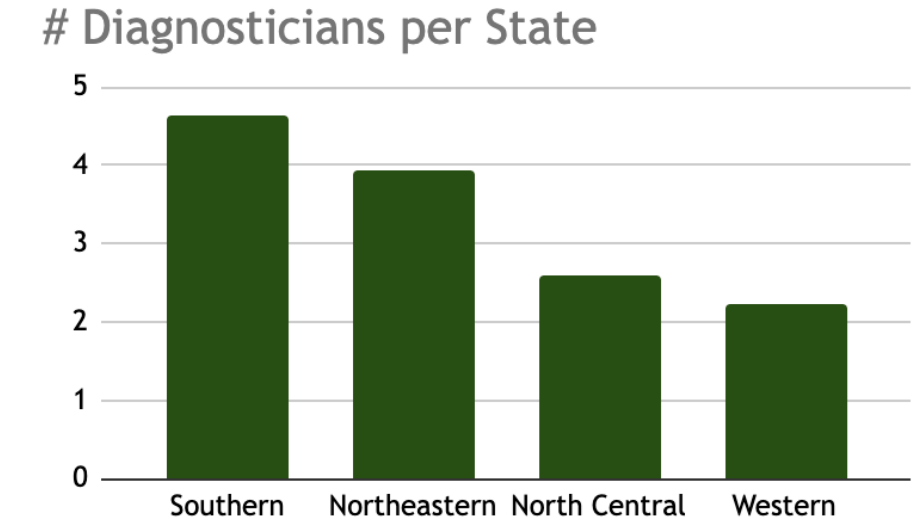
Help stakeholders handle and apply pesticides safely, help steward pesticide tools

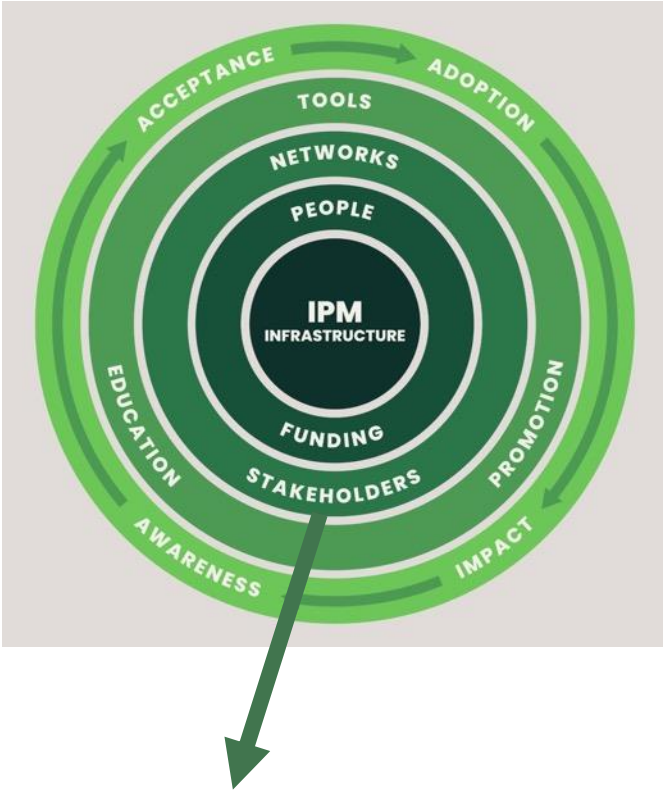
Plant Diagnostic Clinics

- **125 public clinics** associated with universities
  - North Central = 18
  - Northeastern = 19
  - Southern = 60
  - Western = 28*

*California diagnostic clinics handled by CA Department of Food and Agriculture (CDFA)

- **# of diagnosticians** per state differs across regions ranged from 2.23 (Western) to 4.64 (Southern)

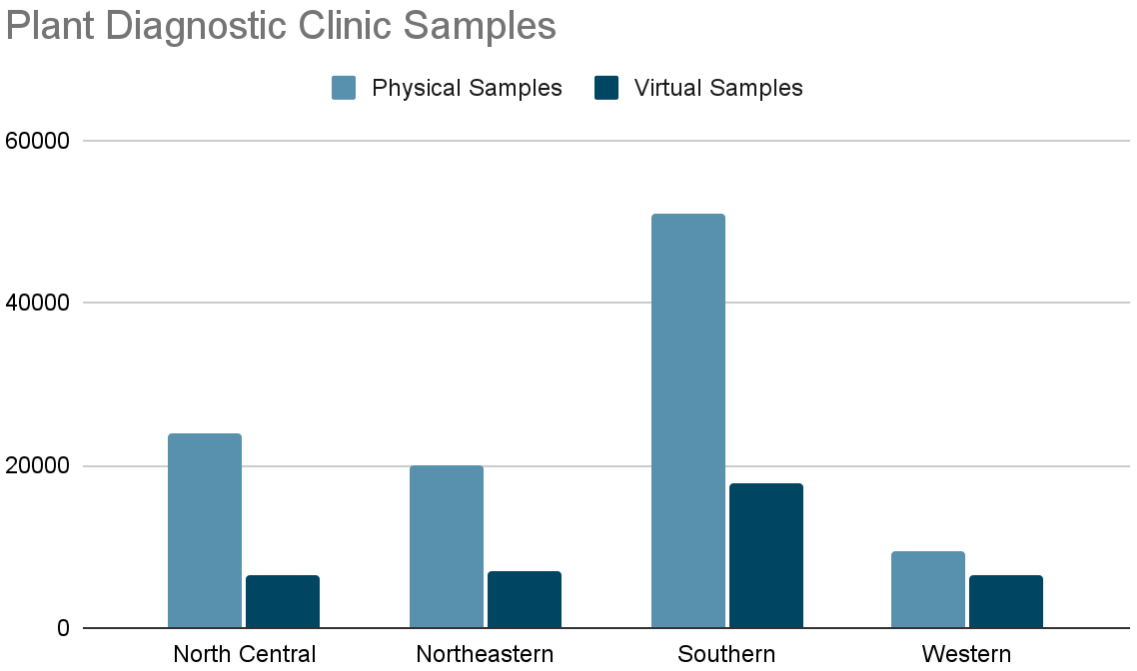


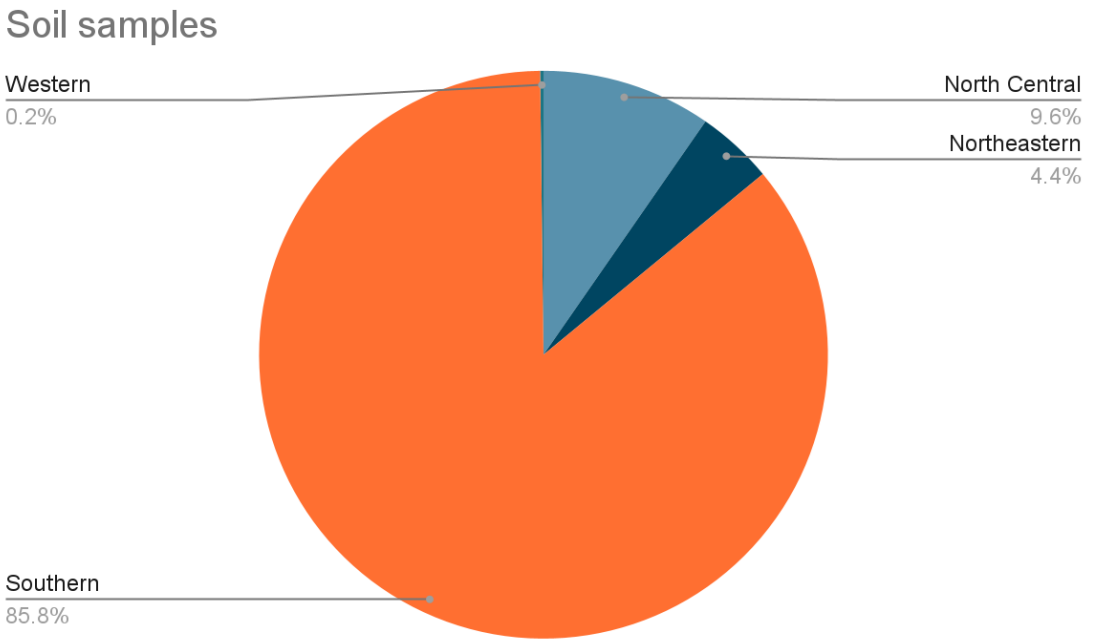


Connect diagnoses with science-based management information

Plant Diagnostic Clinics

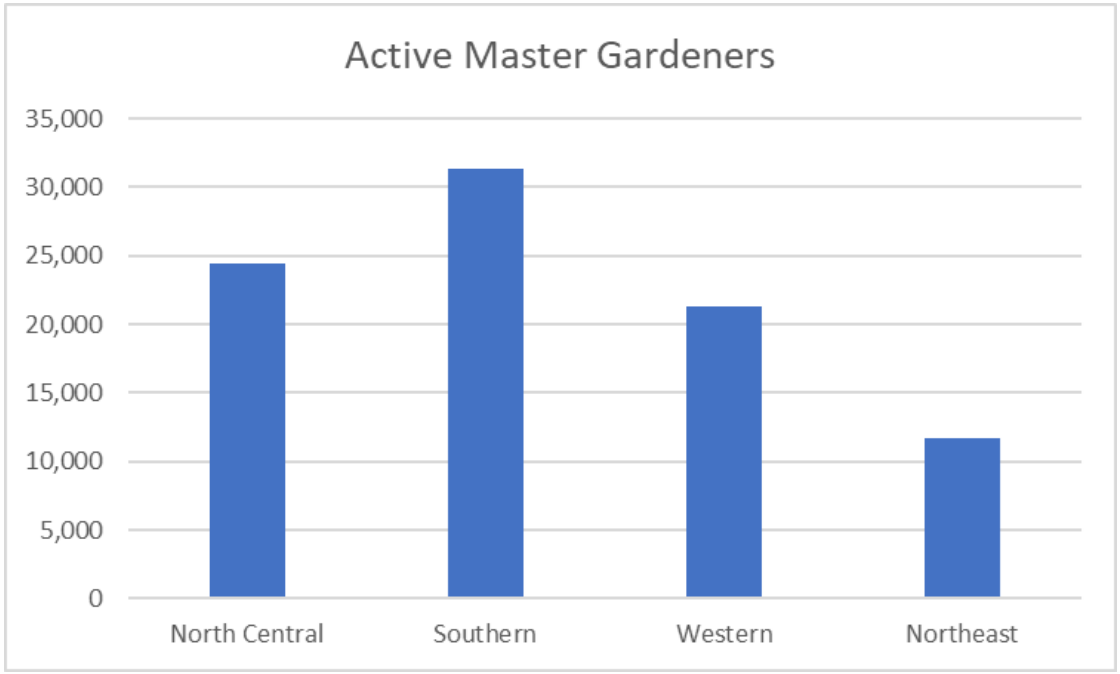
- **Diagnostic Samples:** Varies across states and regions; virtual samples ranged from 21.5 to 40.3% of total samples across regions
- **Soil Samples:** Southern region processed 85.6% of the total soil samples
- Some states collaborate (e.g., Indiana sends all soil samples to Missouri)

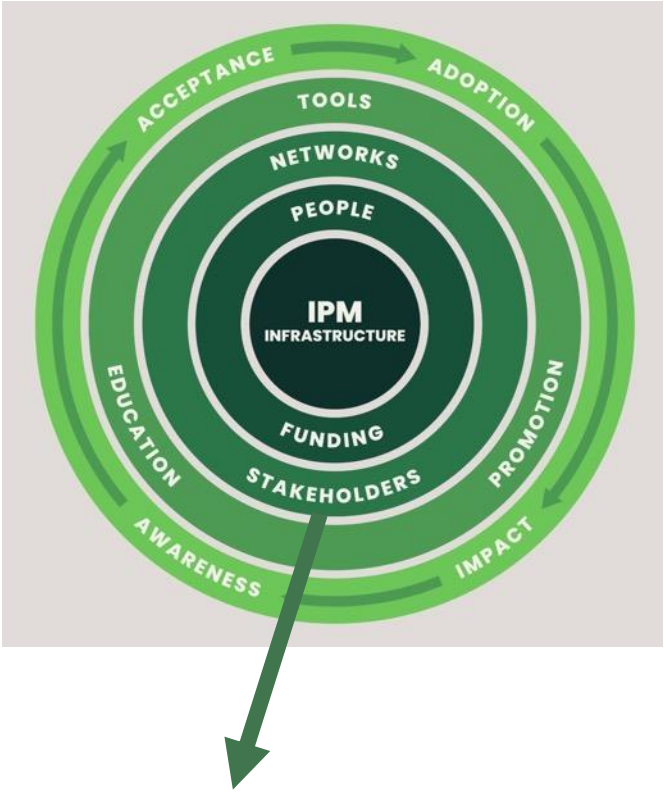




Master Gardeners (MGs)

- **~82,500 active MGs**
- Southern has most volunteers; Northeastern least number of MGs
- States with higher population densities tend to have more MGs (e.g., California, Texas, and Florida)
- States with a strong horticultural interest and a gardening culture tend to have more MGs (e.g., Michigan, California)

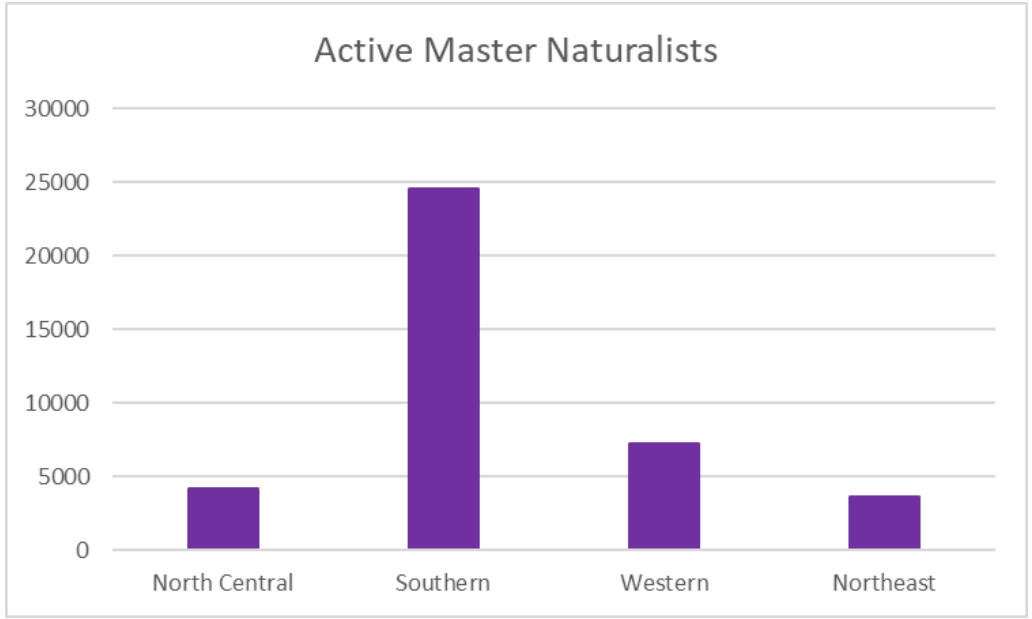


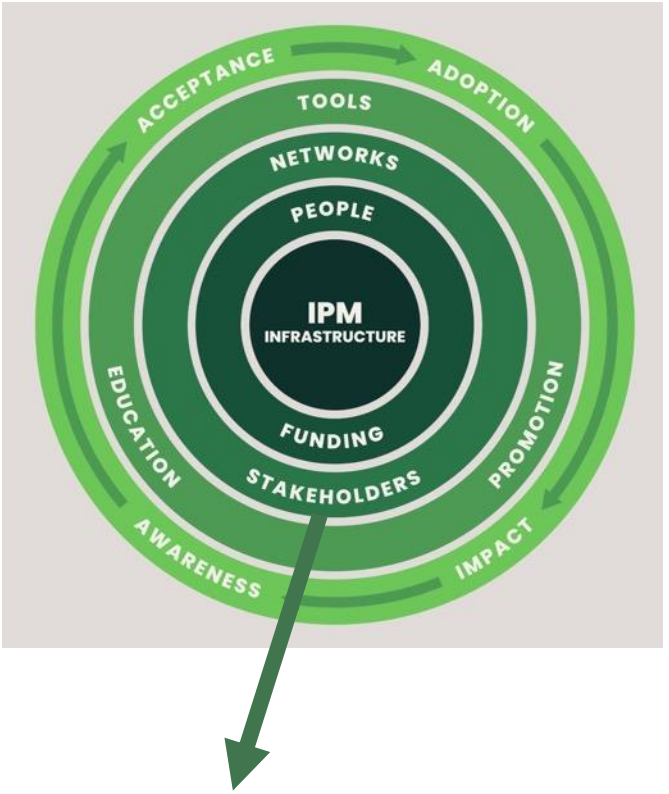


Educating and working with MGs is important to ensure they can provide appropriate education and outreach related to various gardening topics.

Master Naturalists

- **~34,000 active Master Naturalists**; 30% did not respond to this question (no program in state or unaware of program)
- Southern most volunteers; Northeastern and North Central least
- Example: Spongy moth survey led by the Oregon Department of Agriculture - volunteers set and monitor traps contributing to essential pest population data.

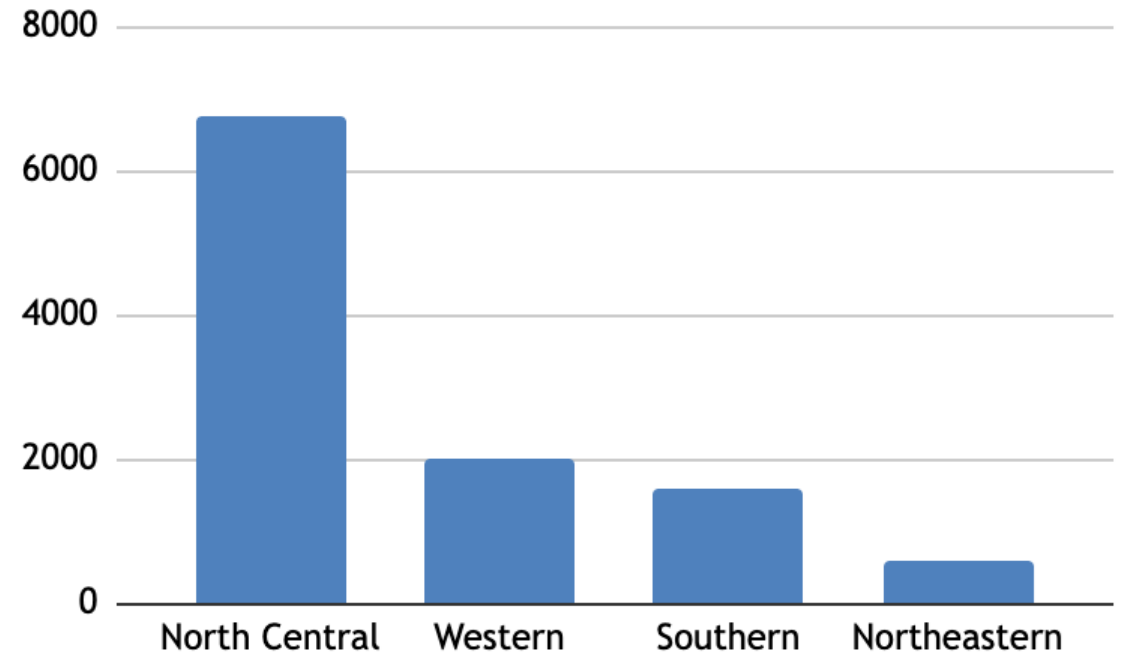


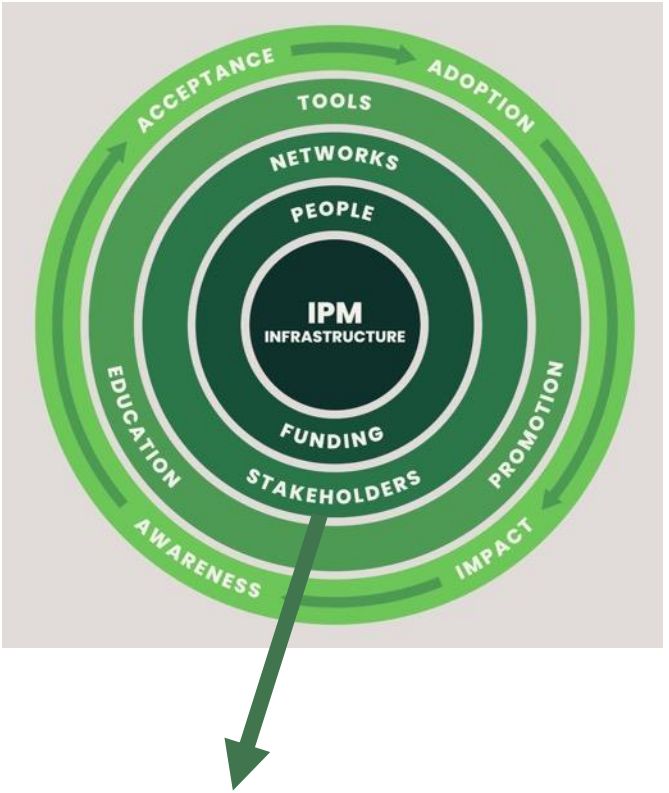


Educating and partnering with Master Naturalists could extend IPM programs' reach

Certified Crop Advisers

- **~ 11,000 CCAs** across U.S. and Canada; several companies actively encourage their employees to become CCAs
- Committed to continuously learn and stay up-to-date with the latest research and developments in crop management and pest control to provide the best advice to their clients.
- Dedicated to promoting sustainable agricultural practices that minimize environmental impact, conserve resources





CCAs self identify as wanting to be more engaged and aligning with similar IPM goals, making them an important stakeholder and feedback loop

Networks and Stakeholders

Strengths
- There is an active IPM program with an IPM coordinator in all 50 states and Guam, Puerto Rico and Virgin Islands
- IPM expertise is important to several stakeholders

Weaknesses
- Minimal IPM staff to build and maintain relationships with IPM stakeholders
- No national direction for IPM network; individual programs not all moving towards the same direction

Opportunities
- Better engage volunteers (e.g., Master Gardeners, Master Naturalists)
- Better engage with CCAs
- Develop partnerships with newer organizations in which IPM is important (e.g., NIAMRRE, GROW, etc.)

Threats
- People, organizations, or movements not acknowledging the importance of IPM
- Newer efforts (e.g., One Health) do not clearly incorporate plant health into their mission

Tools, Education, Promotion

IPM is a multidisciplinary science-based decision making process to manage pests

- **Tools:** Science-based research **develops** the tools for pest management (i.e., surveillance/monitoring, forecasting, scouting and decision thresholds)
- **Education:** IPM programs **coordinate** multidisciplinary information and **transfer** this knowledge to the end user (e.g., farmers)
- **Promotion: Dissemination** of information uses effective delivery methods to encourage adoption of IPM

Tools, Education, Promotion

Tools

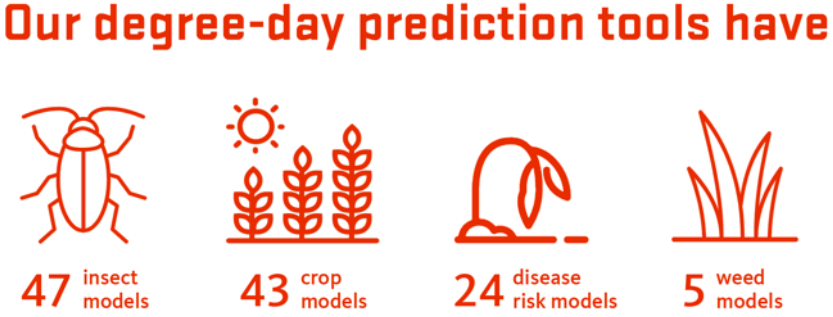
Pest Surveillance Programs

- 40 states reported they have a pest surveillance program
- Examples: Cucumber downy mildew, Mexican rice borer, Bt resistance fall armyworm and corn earworm, Roseau cane borer, Southern pine beetle

EDDMapS
find · map · track

Pest Forecast Systems

- 39 states reported they have a pest forecasting system
- Examples: Insect pest models, crop models, TarSpotter, Sporecaster

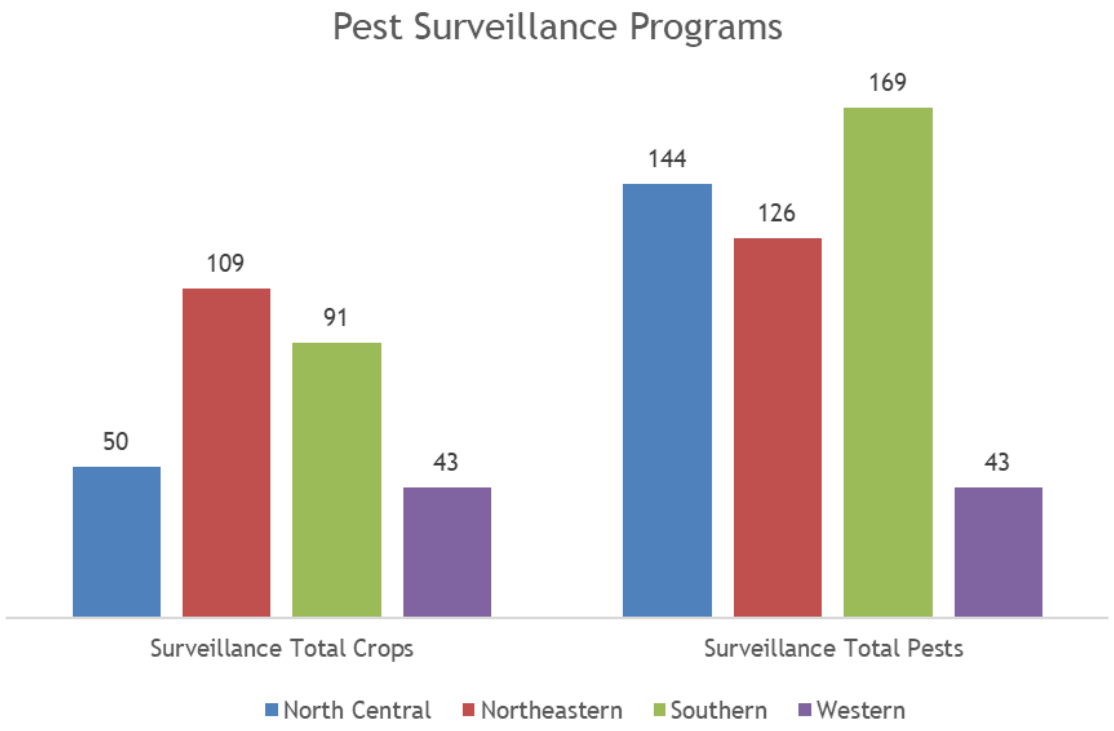


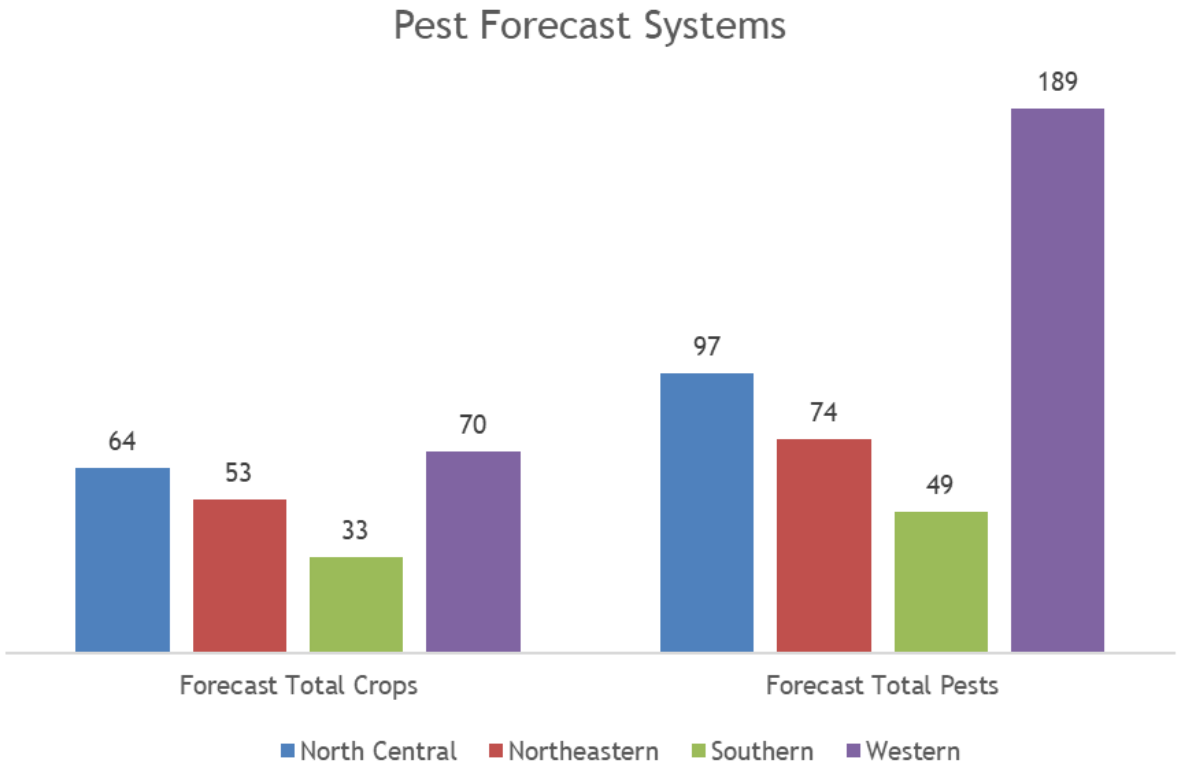
Oregon IPM Center

Univ. Wisconsin-Madison

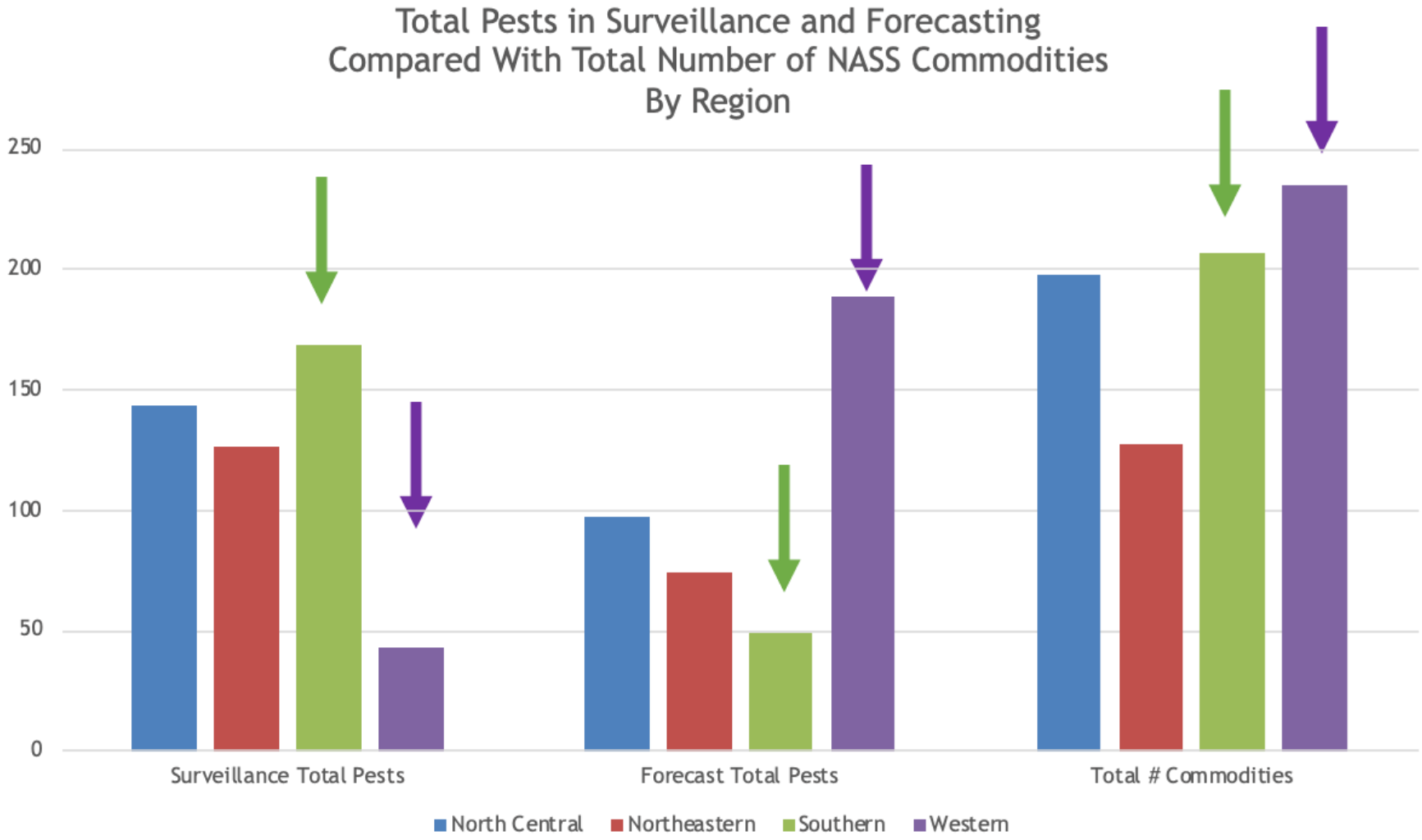
Tools, Education, Promotion

Total number of crops and pests involved in Pest **Surveillance** Programs and Pest **Forecasting** Systems in each region





Tools, Education, Promotion



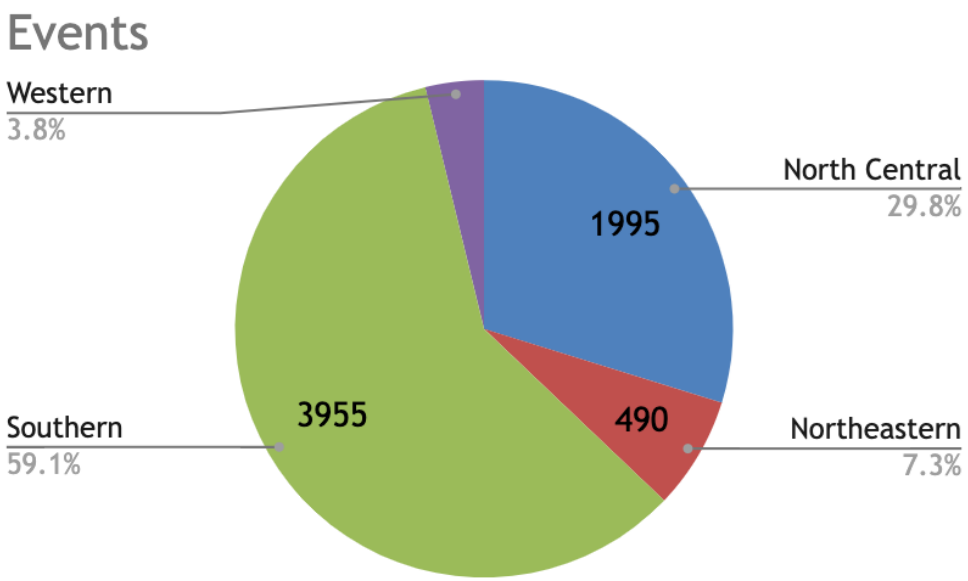
The **Western Region** reported the most forecasting systems, least amount of pests in surveillance programs, and has the most commodities.

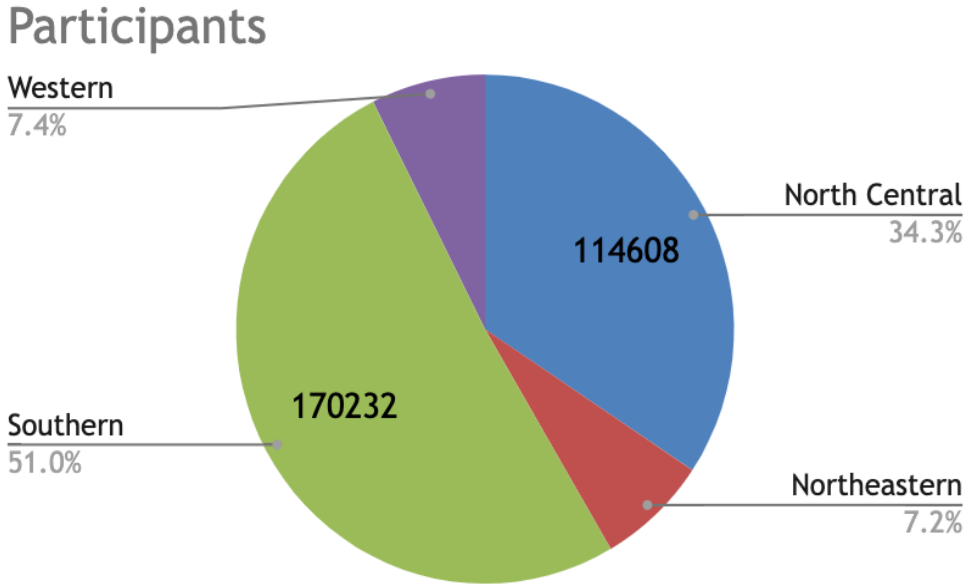
The **Southern Region** reported the most pests in surveillance programs, the least amount of pests in forecasting systems, and has the second most commodities.

Tools, Education, Promotion

Education

- IPM has traditionally relied on face-to-face meetings and other traditional modes of communication.
- 6,676 in person or virtual meetings with 333,396 participants



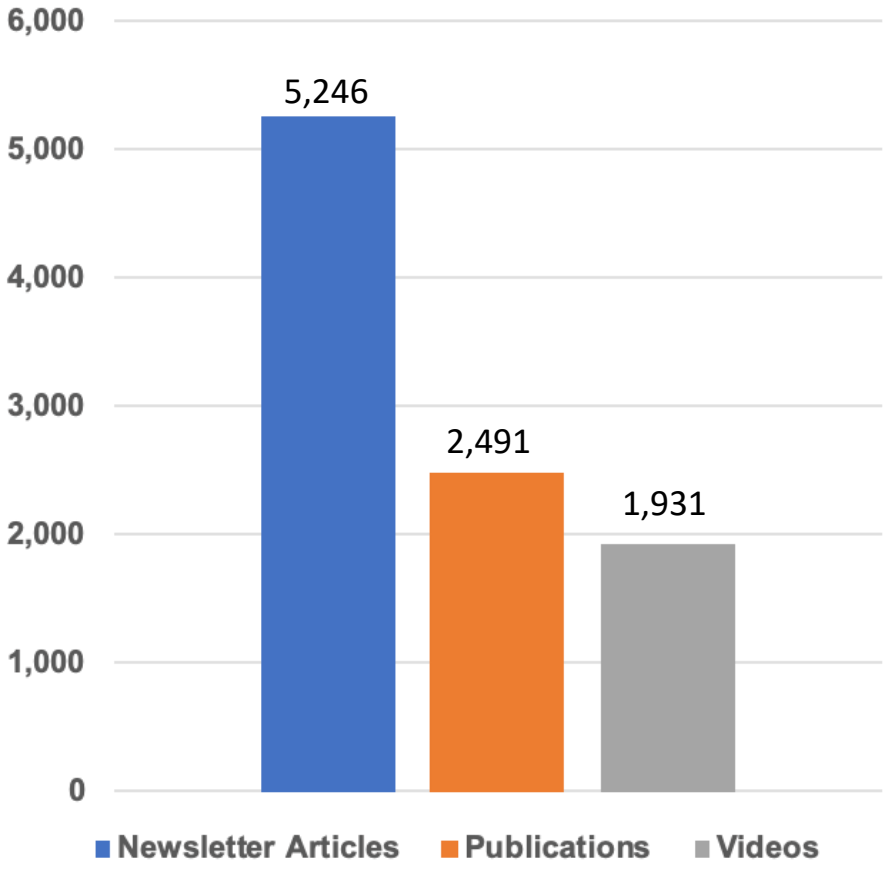


Tools, Education, Promotion

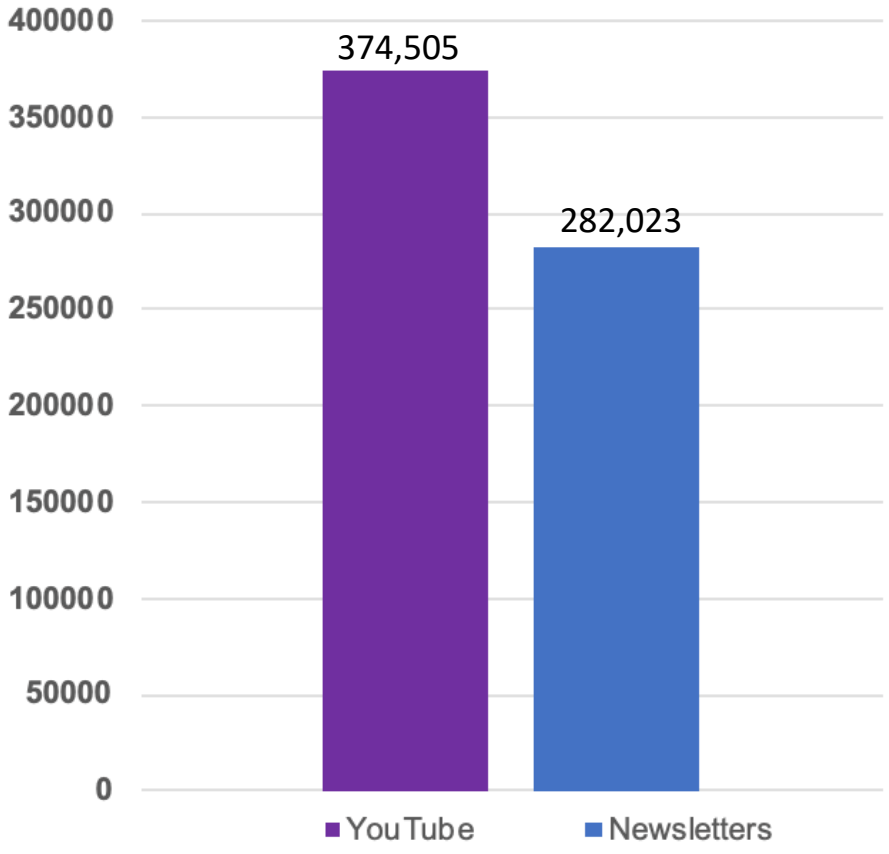
* IPM programs contribute to 138 newsletters

* 9 IPM programs have their own YouTube page; 33 contribute videos to a more general YouTube page

Number of Educational Products*



Number of Subscribers*



* Similar distribution for subscribers; <10 of programs have ~80% of subscribers; UT, IA, PA on both lists.

Tools, Education, Promotion

Promotion

- Many Extension systems have a reduced or decentralized communications team
  - Only 31 communication specialists with at least 0.25FTE across the entire system
  - Are IPM programs (or Extension more broadly) staffed to do videos, podcasts, etc. well?
- All IPM programs have their own webpage
  - Some are updated, some are not
  - Some have broken links
- Food and Farm Narrative and Design Thinking project (2022 meeting) challenge us to think more creatively about IPM messaging

Tools, Education, Promotion

Strengths
- Surveillance programs used in ~80% of IPM programs
- More predictive models being released recently
- IPM educators are creative because of the complexity of the subject
- Passionate educators dedicated to protecting human and environmental health

Weaknesses
- Where are the videos?
- Complexity of IPM
- Complexity of IPM vs. shortening attention spans
- No catchy phrases or names
- IPM educators frequently reinvent the wheel due to turnover and limited networking

Opportunities
- Engaged volunteers
- World of technology used for educational purposes is rapidly changing; platforms such as YouTube and podcasts provide new levels of access to IPM information
- AI can revolutionize IPM education
- Recognition of need for sociologists and others to improve education

Threats
- People will not acknowledge role of IPM
- Lack of resources prevents IPM educators from utilizing new tools
- Lack of coordination of IPM information across network makes finding information difficult
- Maintaining old tools/information while adding new
- Negative view of term pesticide impedes education

Challenges

- **Increased Funding:** Many states mention the need for more funding to support IPM programs, research, education, and outreach. Adequate funding is crucial for maintaining and expanding IPM initiatives, developing new strategies, and addressing emerging challenges.
- **Personnel and Expertise:** Several states highlight the need for more personnel, experts, and specialists in IPM. Replacement of retired or lost staff, as well as hiring experts in different pest-related fields, is essential to maintain and enhance the effectiveness of IPM programs.

- **Training and Education:** IPM personnel, extension agents, and growers need proper training and education on the latest pest management techniques, strategies, and technologies. Training efforts should encompass both traditional and emerging approaches to effectively address pest-related issues.

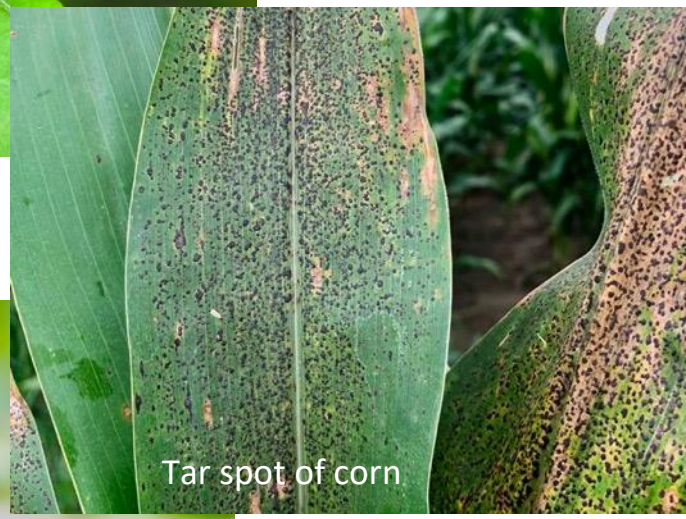
Challenges

- **Resistance Management:** Addressing pest resistance, whether to pesticides or other control methods, is a significant concern. Developing strategies to combat resistance and promoting alternative pest management techniques that minimize the risk of resistance is a priority.
- **Communication and Collaboration:** Improving communication and collaboration within the IPM community is crucial. Enhancing coordination between extension agents, researchers, stakeholders, and growers can lead to better knowledge sharing, increased adoption of IPM practices, and improved overall pest management outcomes.

Invasive and Emerging Pests

- **North Central Region:** Sudden oak death, boxwood blight, spotted wing drosophila, brown marmorated stink bug, jumping worms, emerald ash borer, spotted lanternfly, tar spot of corn, bacterial leaf streak of corn, soybean gall midge, kochia, sorghum aphid, hemp dogbane, and more.
- **Northeastern Region:** Spotted lanternfly, sorghum aphid, Japanese beetles, brown marmorated stink bug, allium leafminer, herbicide-resistant weeds, beech leaf disease, European cherry fruit fly, box tree moth, and more.


Emerald ash borer


Tar spot of corn


European cherry fruit fly

Invasive and Emerging Pests

- **Southern Region:** Red banded stink bug, Asian longhorned tick, Asian longhorned beetle, box tree moth, Laurel wilt disease, spotted lanternfly, herbicide-resistant pests, citrus canker, cotton leafroll dwarf virus, soybean rust, tar spot of corn, invasive aquatic species, and various pathogens.
- **Western Region:** Herbicide-resistant weeds, emerald ash borer, spotted lanternfly, orange hawkweed, Asian citrus psyllid, nutria, brown marmorated stink bug, invasive aquatic species, tomato brown rugose fruit virus, yellow starthistle, and more.


Red banded stink bug


Yellow starthistle


Cotton leafroll dwarf


Spotted lanternfly

DEIA Barriers

Several factors were identified as barriers for DEIA

- Language barriers
- Limited resources (funding, personnel)
- Access to technology (including internet)
- Engagement and connection with underserved audiences
- Cultural relevance (lack of research and resources to tailor IPM information to culturally relevant crops and practices)
- Program accessibility (e.g., costs, transportation)
- Awareness and outreach (some are not aware of IPM programs or resources)
- Adaptation to changing needs


Asian longhorned beetle

D E I A

Diversity | Equity | Inclusion | Accessibility

Our Conclusions

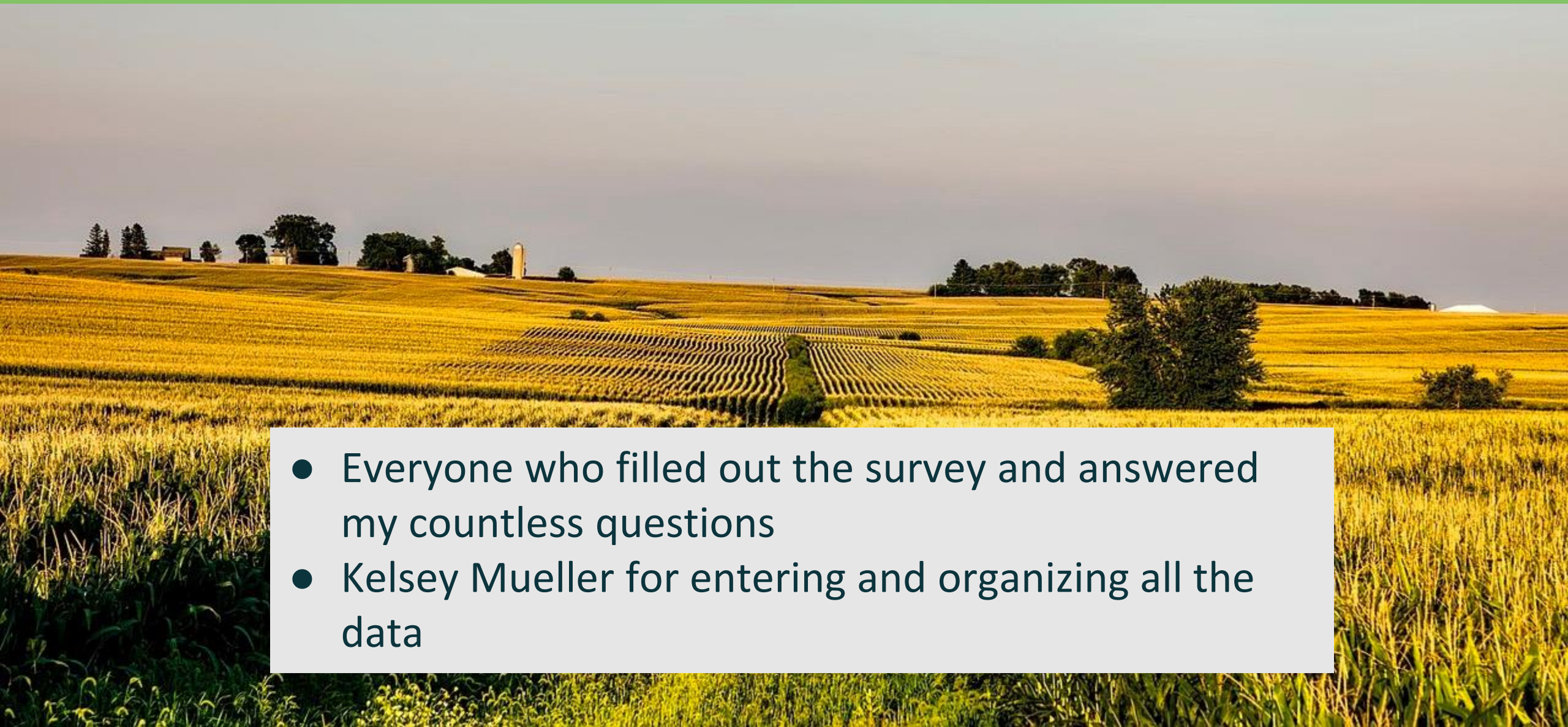
- We have been talking about these challenges for quite some time, they should not surprise anyone
- IPM Network is still needed (YAY!)
  - Existential IPM threats such as climate change and microbial resistance
  - Endangered Species Act and regulatory changes are here
  - Fast moving technological changes need a strong foundation

Endangered species of the U.S. (by Alexander Vidal, licensed under CC BY-NC-ND 4.0

Our Conclusions

- Are we at an inflection point?
  - Diminished funding
  - Weakening network; IPM programs are 15 years into the competitive funding model, but not all programs moving in the same direction
  - Lack of cohesive guidance or strategic plan
  - Challenges in promoting IPM
- There is more of a need for IPM now
- Next steps
  - Journal article highlighting these results
  - Develop strategic plan

THANKS!



- Everyone who filled out the survey and answered my countless questions
- Kelsey Mueller for entering and organizing all the data