Welcome to the

AEIC 2021 Spring Meeting – Day 2

AEIC Spring Meeting

April 13-14, 2021 – Virtual meeting

AEIC
ADVANCING BIOANALYTICAL TECHNOLOGIES

INDUSTRY STATEMENT FOR ANTITRUST COMPLIANCE

There shall be no discussion or activities for the purpose of arriving at any understanding or agreement regarding price, the terms or conditions of sale, distribution, volume of production, territories or customers. There shall be no discussion or activity for the purpose of preventing any person or persons from gaining access to any market or customer for goods or services, nor any agreement or understanding to refrain from purchasing or using any material, equipment, services or supplies. There shall be no discussion or activity that may be construed as forestalling or limiting research and development. We, of course, expect your consideration and full compliance with these guidelines, both while in attendance at this Industry meeting and at all times in your business.

AEIC
ADVANCING BIOANALYTICAL TECHNOLOGIES

Meeting Norms and MS Teams Controls

- Keep microphones muted when not presenting or asking questions so the host doesn’t need to mute you
- For presentations, hold questions until the end
- “Raise your hand” in the Teams and wait to be called on for verbal questions
- Use the Meeting Chat in Teams for typed questions
- Introduce yourself by name and affiliation when asking questions or providing comments

9:00 – 9:05	**AEIC Spring Meeting - Day 2 Agenda**	**Lucy Liu,** Bayer
9:05 – 9:15	**Updates on the publication on detection of genome edits**	**Ray Shillito**, BASF
9:15 – 9:45	**U.S.D.A Final Rule for Hemp Production – Review Updates and Discuss Key Insights**	**Marielle Weintraub** President of the U.S. Hemp Authority
9:45 – 10:15	**How to change public perceptions of GE crops by using the plants to fix agriculture's biggest pollution problem**	**Stuart Strand** Research Professor Univ. of Washington
10:15 – 10:20	**BREAK**	
10:20 – 10:50	**A novel quantitative method for determination of genetic trait purity**	**John Zheng** Indiana Crop Improvement Association
10:50 – 11:20	**InvictDetect Plus™: A Collaboration Between USDA and Private Industry**	**Chris Culkin** Agdia
11:20 - 12:10	**Ambiguous results – how do you score them?**	**Ray Shillito,** BASF **David Syme,** BASF
12:10 - 1:00	**Updates from Related Industry Associations (5-10 min each)** **1) Scott Bloomer: AOCS update** **2) Palmer Orlandi- AOAC** **3) Ray Shillito- ISO TC34/SC16** **Wrap UP**	

Updates on the publication on detection of genome edits

Ray Shillito, BASF

U.S.D.A. Final Rule for Hemp Production- Review Updates and Discuss Key Insights

Presented by:
Marielle Weintraub, Ph.D.
U.S. Hemp Authority- President

CBD in the U.S. Marketplace

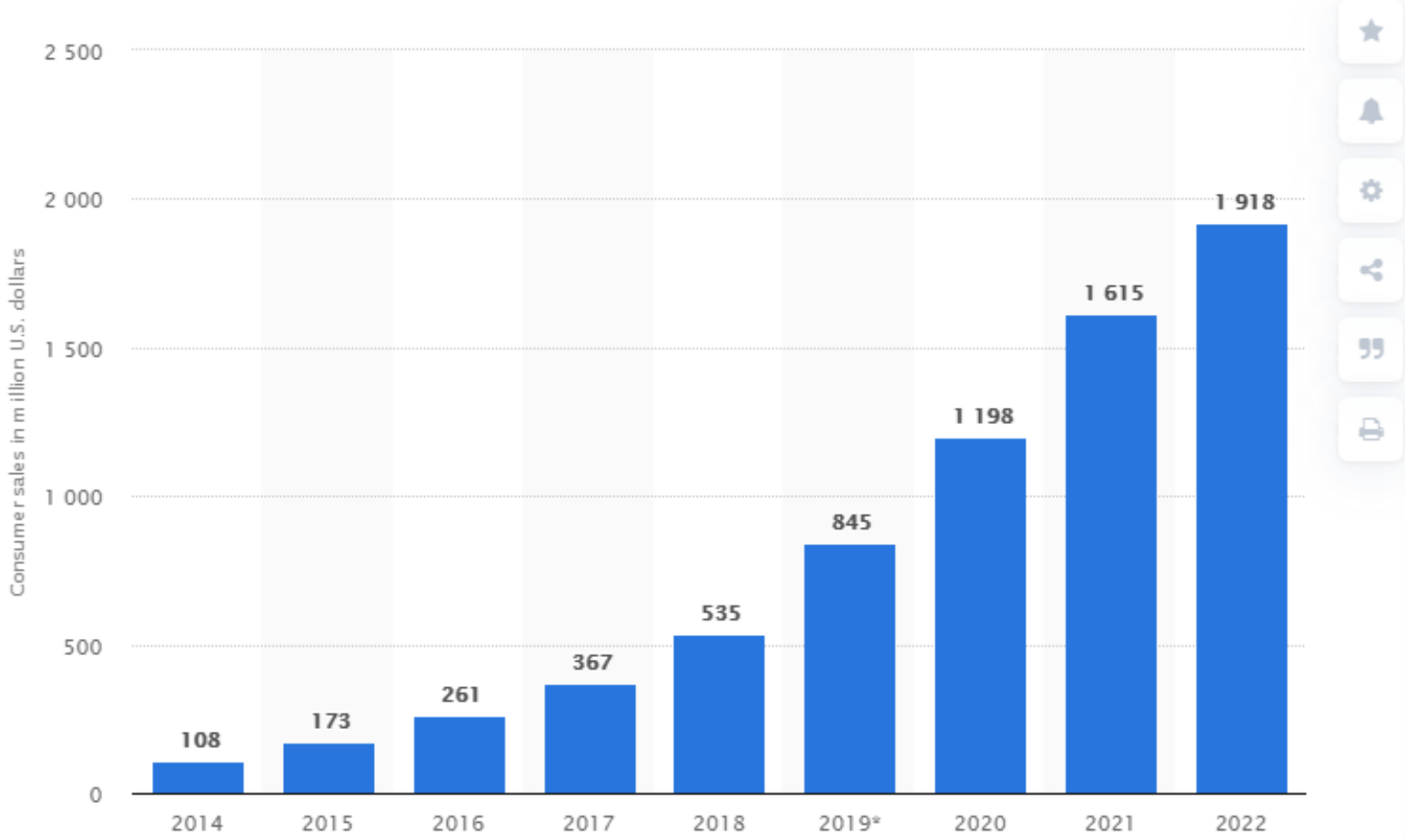
- CBD products are not yet approved by FDA but are in the marketplace
- Congress and some state governments are moving to make CBD in dietary supplements & ingestible products legal
  - Ex. New York, Colorado, Texas
- Patchwork of Testing and Labeling Regulations

RESTRICTED

Health, Pharma & Medtech › Pharmaceutical Products & Market

Total U.S. cannabidiol (CBD) product sales from 2014 to 2022

(in million U.S. dollars)



© Statista 2021

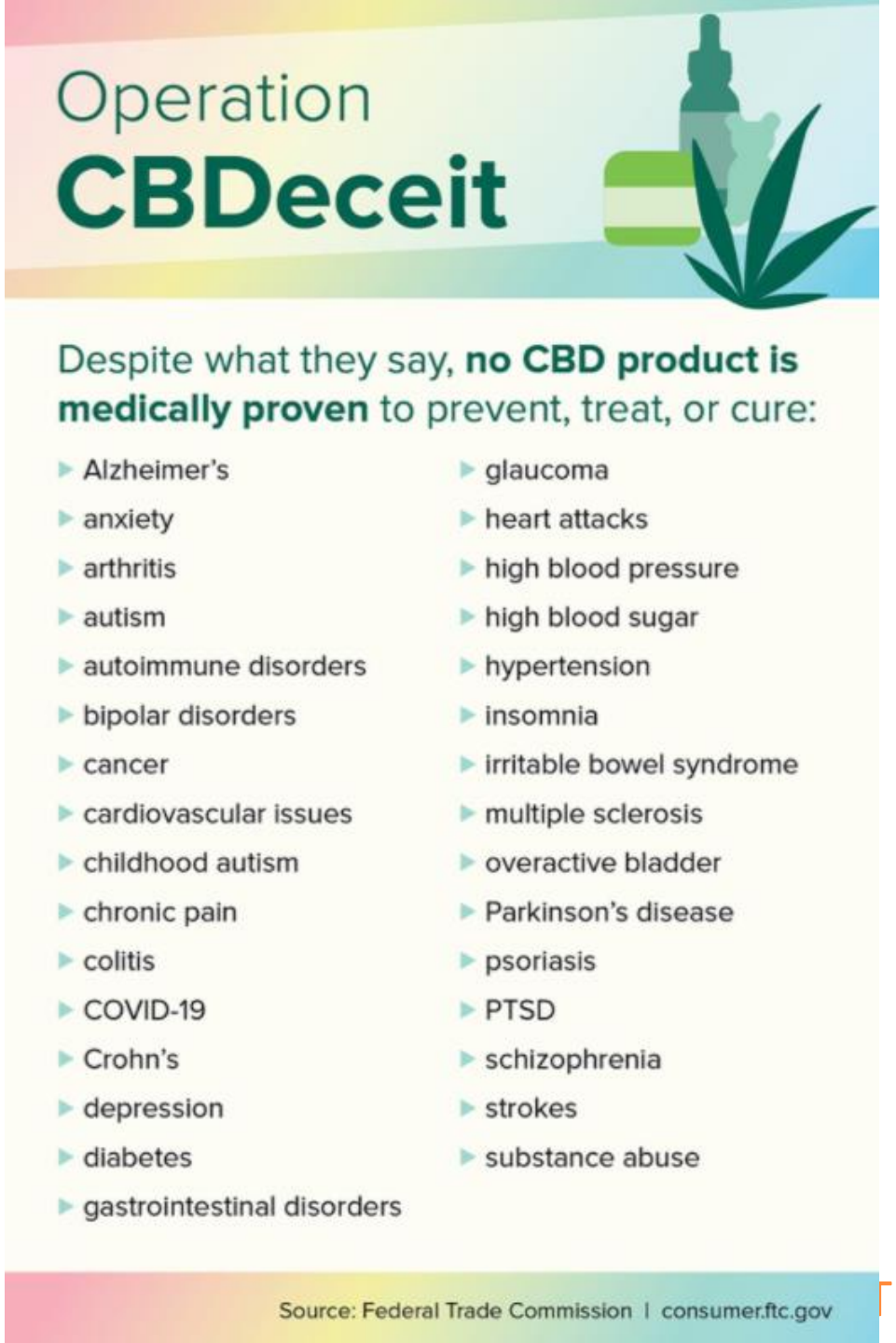
Additional Information

Show source

RESTRICTED

Regulating CBD

- FDA and FTC are especially watchful of "egregious claims," namely those that:
  - Make unsubstantiated health claims
  - Make unsubstantiated guarantees about product content in terms of active ingredients
  - Are on products that turn out to have unacceptable levels of contaminants such as heavy metals.
- FTC
  - CBDeceit
  - Announced a crackdown on deceptively marketed CBD products



TRICTED

USDA Domestic Hemp Production Program

- While FDA has yet to make clear guidance for the hemp industry, USDA has released its regulations for domestic hemp production
- Mandated in the Agriculture Improvement Act of 2018 (2018 Farm Bill)
- 7 CFR Part 990 (Domestic Hemp Production Program)

RESTRICTED

Hemp Final Rule: Background

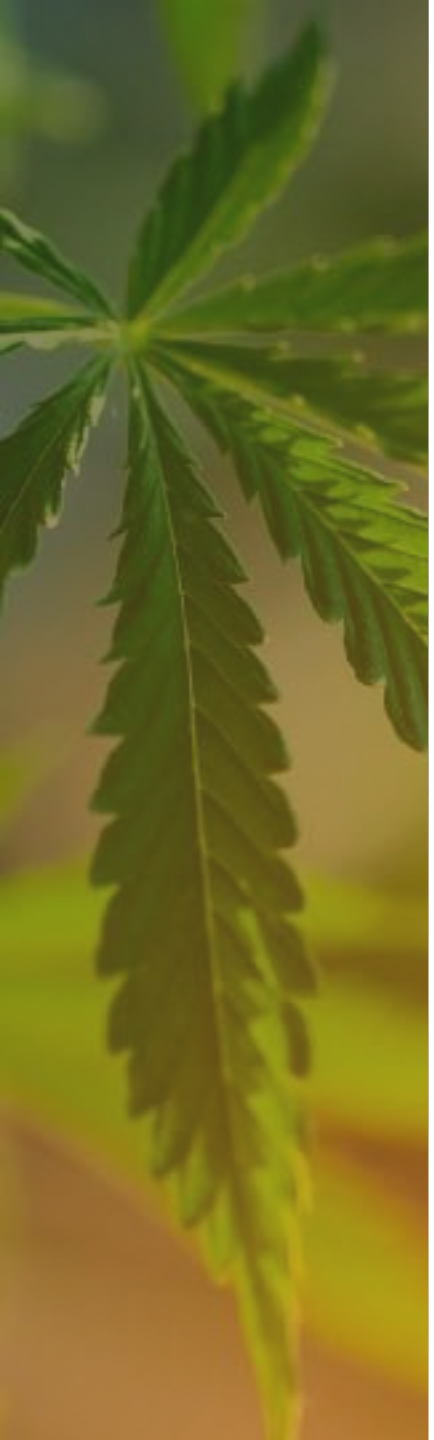
- The Agricultural Marketing Service (AMS), which has been delegated authority to administer the U.S. Domestic Hemp Production Program, provided multiple opportunities for public comment.
- AMS accepted comments during an initial comment period from October 31, 2019, through December 31, 2019.
  - This initial comment period was extended for an additional 30 days on December 18, 2019 (84 FR 69295), ending January 29, 2020.
  - AMS reopened the comment period for 30 additional days on September 8, 2020 (85 FR 55363), ending October 8, 2020.
- A total of approximately 5,900 comments were received during all comment periods from States; Indian Tribes; industry and agricultural organizations; private citizens; members of Congress, the scientific community; agencies; and individuals involved in the growing, processing, transporting and marketing of hemp.

RESTRICTED

USDA Final Rule: Key Provisions

- Licensing requirements
- Recordkeeping requirements for maintaining information about the land where hemp is produced
- Procedures for testing the THC concentration levels for hemp
- Procedures for disposing of non-compliant plants
- compliance provisions
- Procedures for handling violations.

- This final rule replaces the IFR at 7 CFR part 990, effective March 22, 2021.
- This rule includes regulations used by USDA to approve plans submitted by States and Indian Tribes for the domestic production of hemp
- This rule also includes regulations on the Federal hemp production plan for producers in States or territories of Indian Tribes that do not have their own USDA-approved plans.



Hemp Final Rule: Primary Observations

- Harvest Window Extended
- Improved Sampling Protocols
- Negligence Threshold Increased
- Disposal/Remediation of Hot Hemp
- Laboratory Registration With DEA
- THC Testing
- Exporting Hemp

Harvest Window Extended

IFR

Interim Final Rule

- Under the Interim Final Rule, hemp was to be harvested within 15 calendar days of sampling
- This short time period was viewed as a logistical challenge

Final Rule

- USDA reviewed the numerous industry comments requesting a larger window for harvest
- USDA expanded the time period to 30 calendar days

RESTRICTED

Sampling Protocols

IFR

Interim Final Rule

- Requirement that pre-harvest sampling come from the plant's flowers

Final Rule

- USDA kept the requirement that pre-harvest sampling come from the plant's flowers (as opposed to the request for samples to be taken from the whole plant)
- The Final Rule does provide some clarification regarding cutting procedures
- Samples are to be taken from 5 to 8 inches from the main stem, terminal bud, or central cola of the flowering top.

RESTRICTED

Negligence Threshold Increased

IFR

Interim Final Rule

- Under the Interim Final Rule, the threshold for a “negligent” violation was 0.5%
- if a plant tested above a 0.5% THC level threshold, the crop would be considered a violation and would be subject to disposal
- Hemp producers were concerned that they would be forced to dispose of large portions of their crops due to the low threshold

Final Rule

- USDA took these concerns into account and raised the negligence threshold to 1%.
- However, the Final Rule limits the number of negligent violations a grower may receive in a growing season (one)

RESTRICTED

Disposal/Remediation of Hot Hemp

IFR

Interim Final Rule

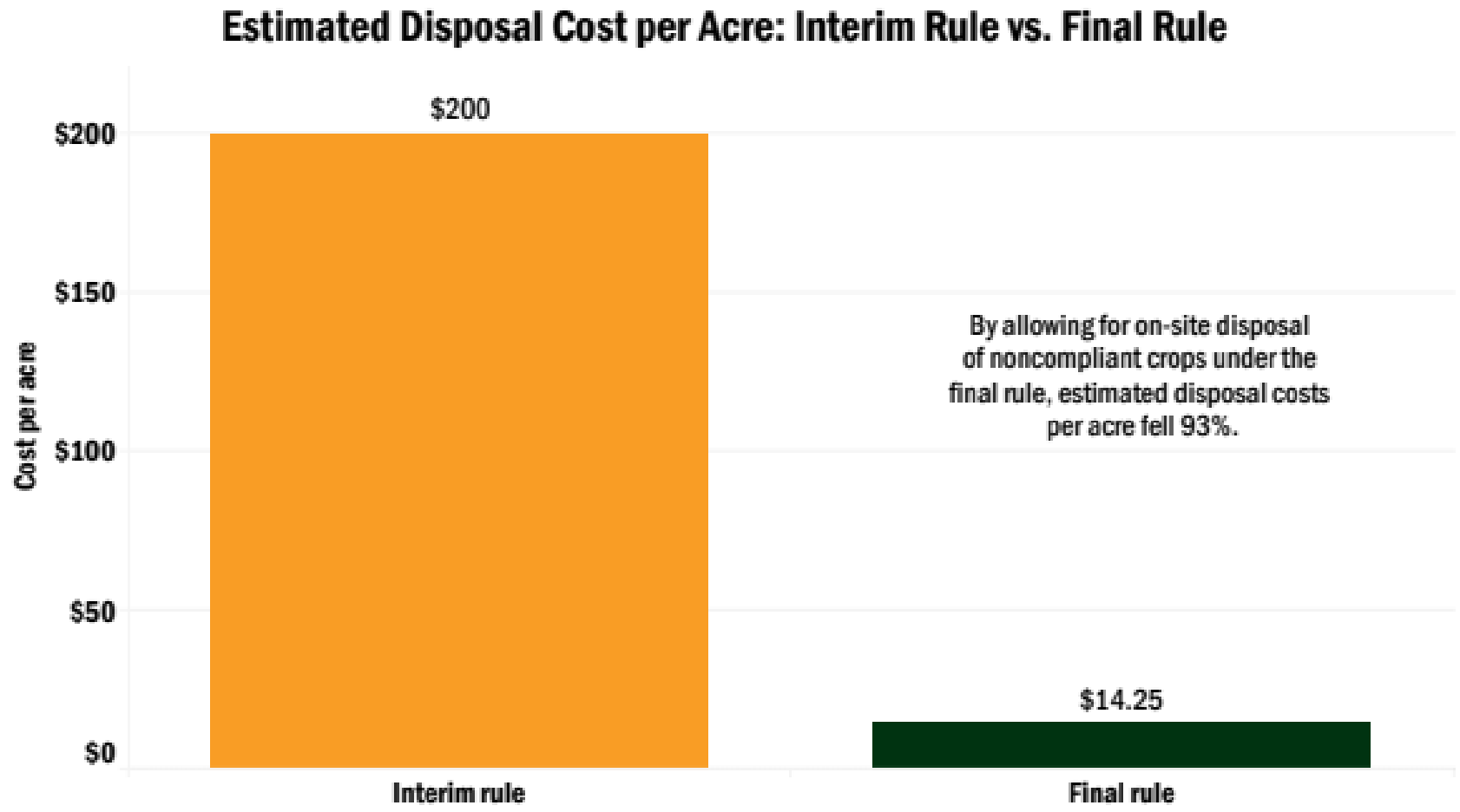
- USDA required legal hemp farmers to treat any hot plants as illegal drugs.
- Farmers had to enlist law enforcement officers (or federal agents licensed to destroy Schedule 1 substances) to exterminate those plants at an off-farm location.

Final Rule

- The Final Rule provides alternative disposal methods that do not require the use of a DEA-registered reverse distributor or law enforcement.
- These methods include on-farm disposal options which were previously unavailable.

RESTRICTED

Chart: New Estimates for Disposal Cost per Acre



Source: U.S. Department of Agriculture

© 2021 Hemp Industry Daily, a division of Anne Holland Ventures Inc. All rights reserved.

Laboratory Registration with DEA

IFR

Interim Final Rule

- THC Testing must be conducted at a DEA-registered lab

Final Rule

- USDA acknowledged that the shortage of labs would create a bottleneck in hemp testing
- USDA worked with DEA to delay enforcement of this requirement until January 1, 2022.
- Starting Dec. 31, 2022, testing must be conducted at a DEA-registered lab. Until then, crop samples must be submitted to a “qualified testing laboratory” for THC concentration.

RESTRICTED

Testing Hemp

IFR

Interim Final Rule

- The 2018 Farm Bill placed a limit of 0.3% Delta 9 THC as the demarcation level for compliant hemp.
- The IFR listed testing limits as 0.3% delta-9 THC, fully decarboxylated
- (Delta-9 THC + THCA)* = Total THC
- However, method testing error was accounted for

Final Rule

- USDA's Final Rule maintains the total THC limit
- However, performance-based testing was added to the final ruleThis takes into consideration whether a particular cultivar has ever tested hot.
- States and tribes can develop guidelines for performance-based sampling, if the protocols ensure, with 95% confidence, that the crops will test under the 0.3% THC limit

RESTRICTED

Exporting Hemp

IFR

Interim Final Rule

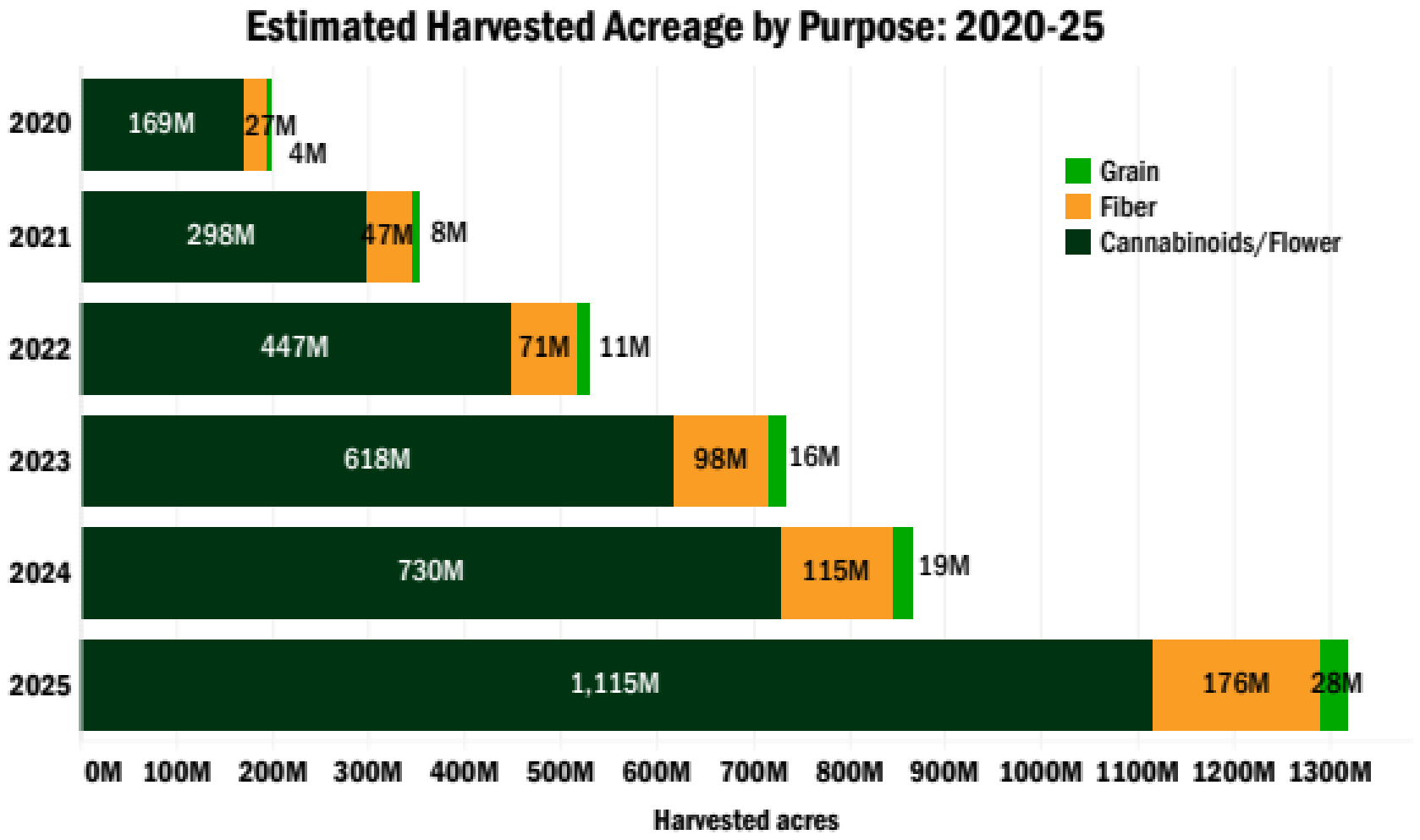
- The USDA's interim final rule does not directly address the exportation of hemp
- USDA states that if there is "sufficient interest" in exporting hemp in the future

Final Rule

- The USDA's final rules state that if there is "sufficient interest" in exporting hemp in the future
- USDA will work with the industry and other federal agencies to facilitate the process.
- Until that point, the agency has taken no position to advance hemp exports

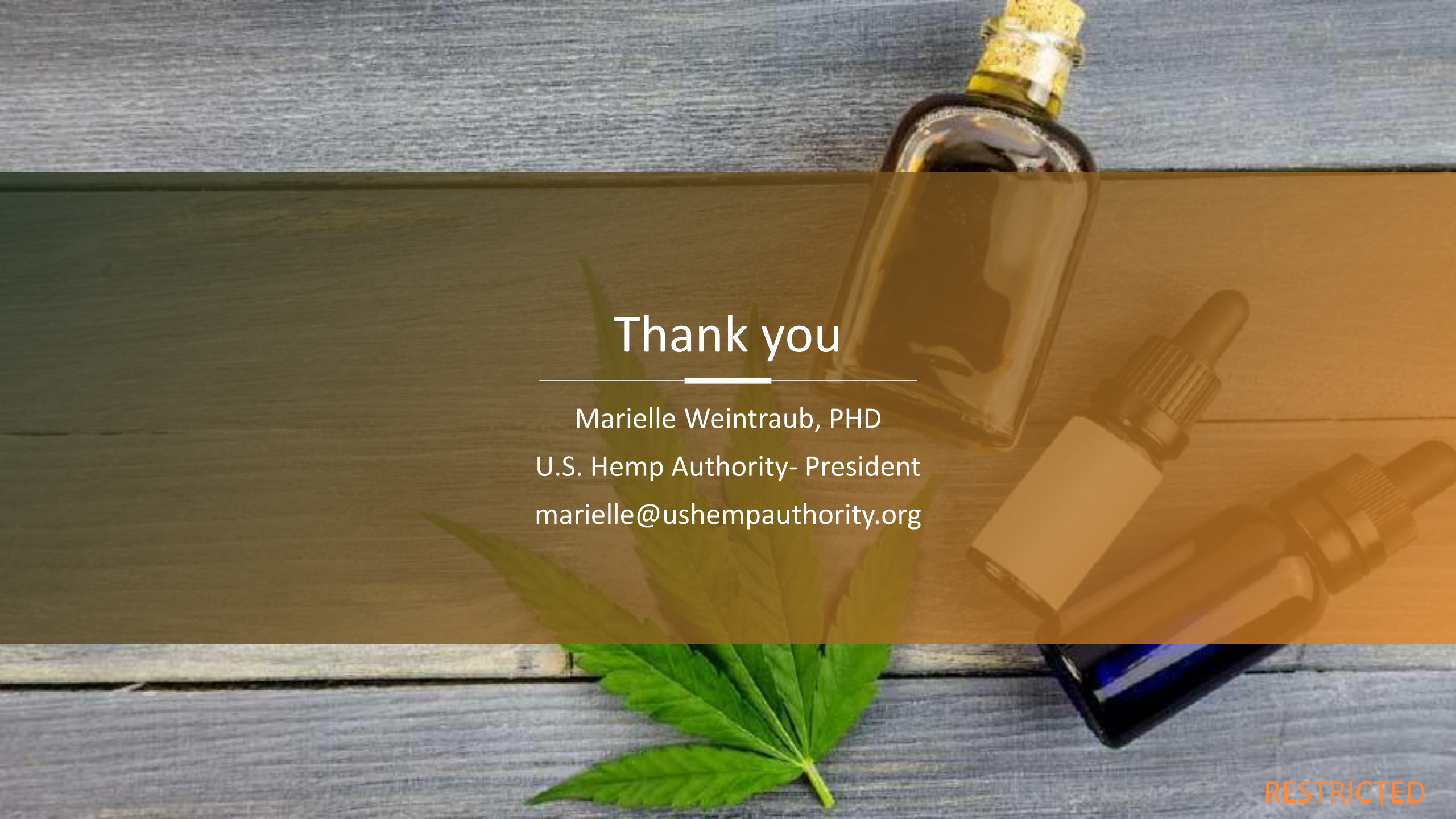
RESTRICTED

Chart: Estimated Harvested Acreage by Purpose: 2020-25



Source: U.S. Department of Agriculture

© 2021 Hemp Industry Daily, a division of Anne Holland Ventures Inc. All rights reserved.



Thank you

Marielle Weintraub, PHD

U.S. Hemp Authority- President

marielle@ushempauthority.org

RESTRICTED

How to change public perceptions of GE crops by using the plants to fix agriculture's biggest pollution problem

Stuart Strand
Research Professor
Univ. of Washington

Increase the Market for Transgenic Plants Ten-Fold while Decreasing the Rate of Global Warming

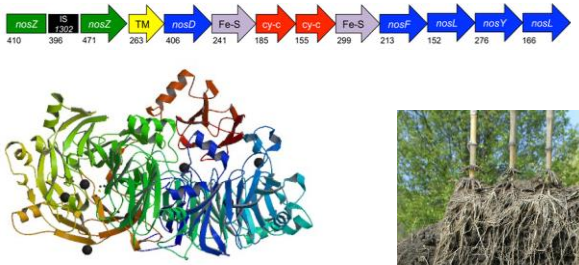
Stuart Strand
Dept Civil and Environmental Engineering
University of Washington

AEIC Spring meeting April 13-14, 2021

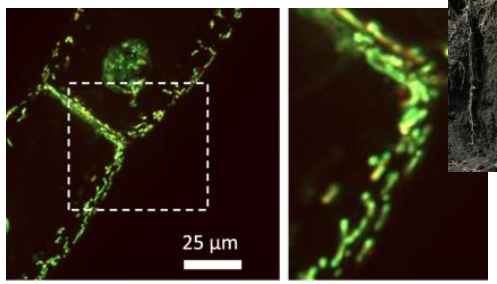
RESTRICTED

How to Slow Down Climate Change by Preventing Nitrous Oxide Emissions From Agriculture

Stuart Strand
Dept Civil and Environmental Engineering
University of Washington



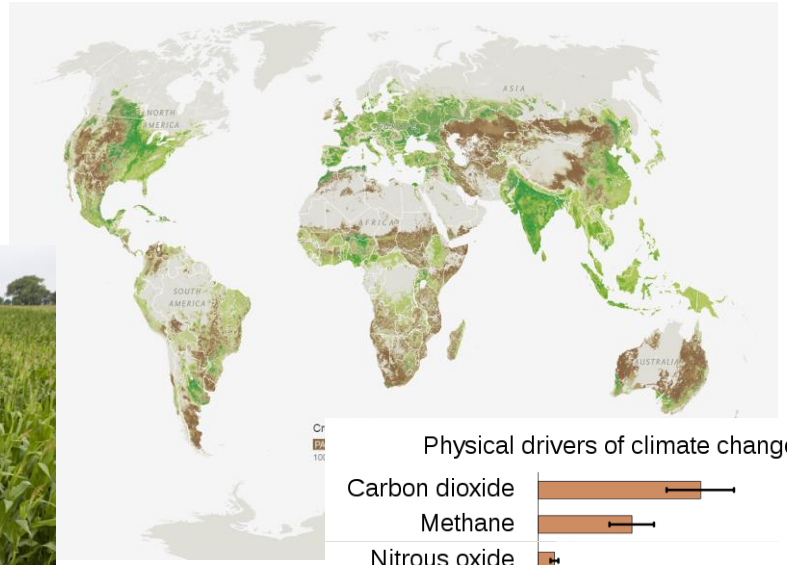
http://parts.igem.org/Part:BBa_K1866010



Asfawet al 2019 Scientific Reports 9(1):9839

Renewabls Farming LLC

DODGE INSURANCE, LLC



decolonialatlas.wordpress.com

From molecular to global

RESTRICTED

The Context

- Climate change is a threat to human civilization.
- We must achieve a carbon neutral economy, but we must also eliminate the emissions of other greenhouse gases such as **nitrous oxide**, **N_2O**.
- N_2O is a greenhouse gas 298 times more potent than CO_2.
- N_2O is also the main threat to the ozone layer, which protects people and ecosystems from the deadly effects of ultraviolet radiation.

RESTRICTED

- Most of humanity's N_2O emissions come from agricultural soils.
- Nitrogen fertilization increases N_2O emissions.
- **N_2O is the main air pollutant emitted by plant agriculture.**
- Existing attempts to reduce N_2O emissions often result in decreased crop yield,
- Setting up a conflict between fighting global warming and feeding people.

RESTRICTED

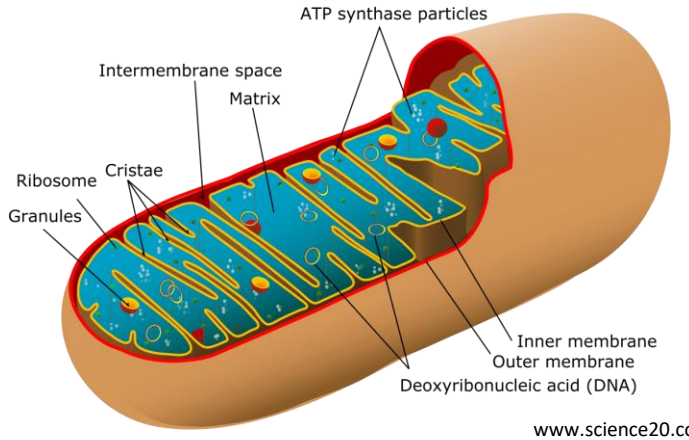
We propose a new, genetic engineering technology that can prevent N_2O emissions from crop soils

- In the soil, bacteria can use the enzyme N_2O reductase to turn N_2O into harmless N_2 ,
- But in most agricultural soils this enzyme is turned off.
- Special bacteria could be developed in the lab that have increased N_2O reductase activity,
- But when such selected bacteria are introduced into soils they rapidly die out.

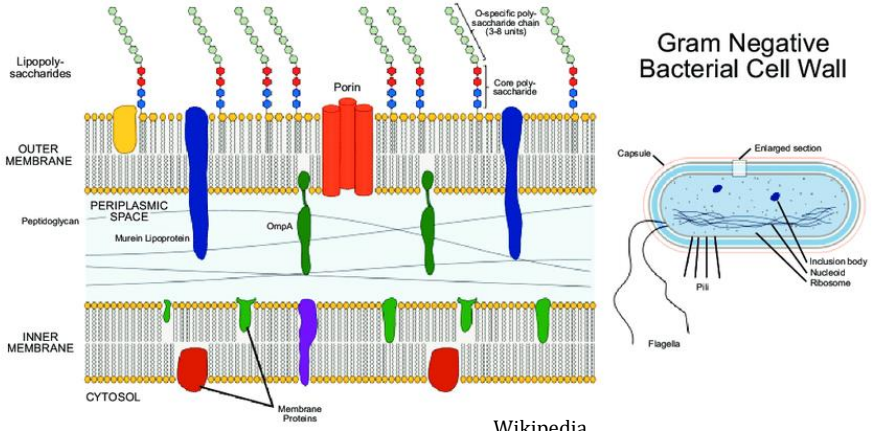
RESTRICTED

Instead, we will introduce bacterial N_2O reductase into the mitochondria of plants

- Mitochondria and bacteria derive from a common ancestor.
- The mitochondrial inter membrane space is analogous to the bacterial periplasm, where N_2O reductase functions.
- **So, we will use plant mitochondria as surrogate "bacteria"**



www.science20.com

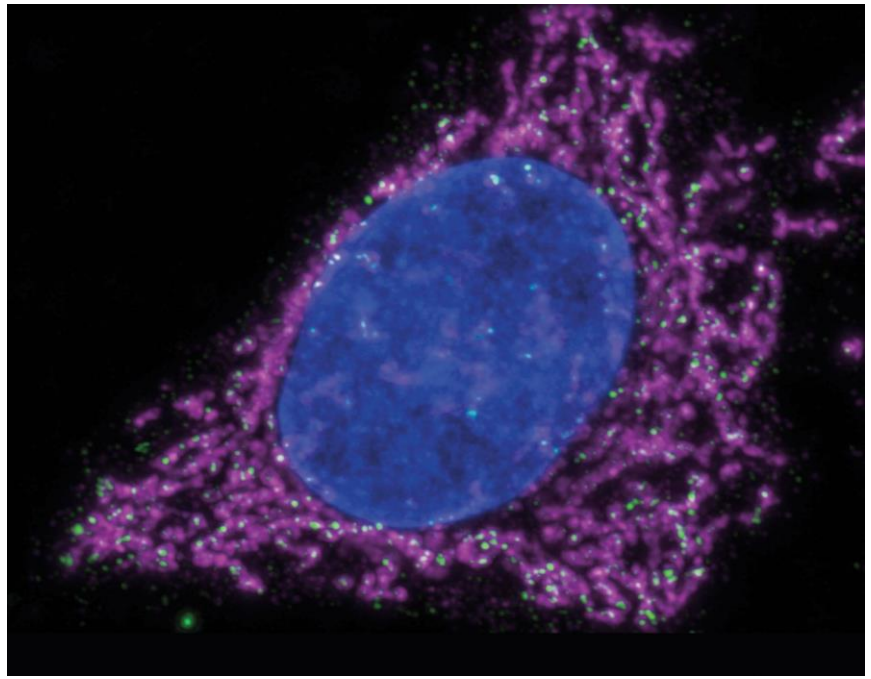


Wikipedia

RESTRICTED

Plant root mitochondria live in a protected environment

- In a square meter of corn field soil there are about 10 trillion root mitochondria
- Inside plant cells mitochondria live in protected and secure environment.
- By cultivating desirable plants, we can maintain their mitochondria.



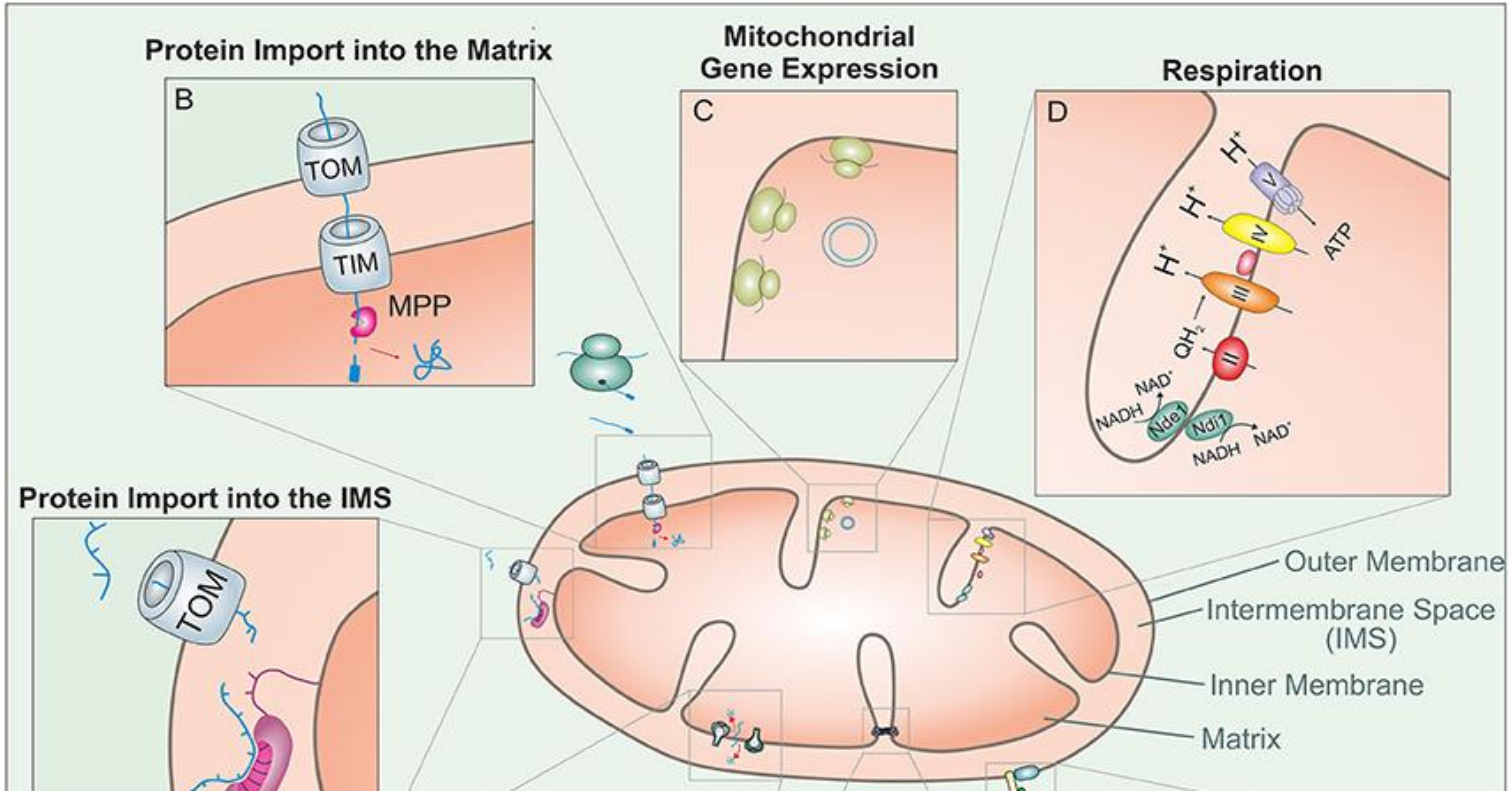
Mitochondria (magenta) in a single cell surround the nucleus (blue).

Youle, Science 2019 365, 6454

RESTRICTED

The mitochondrial proteome can be modified by traditional plant transformation

- 99% of the proteins in mitochondria are coded on the nuclear chromosome.
- These proteins are trans-located by targeting signal sequences on one end of the protein that act like zip codes on a letter.
- Many experiments have demonstrated translocation of genetically engineered proteins to the mitochondria

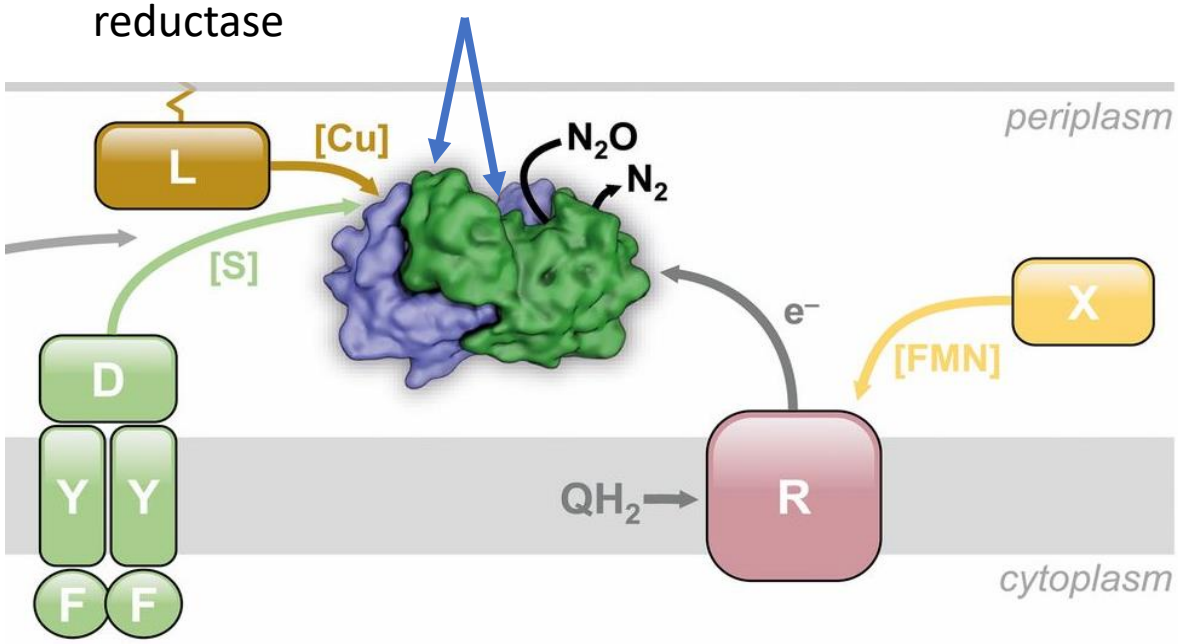


Backes & Herrmann. Front Mol Biosci. 2017. 4, 83

RESTRICTED

- We will introduce N_2O reductase into the intermembrane space of plant mitochondria,
- We will also introduce helper proteins that are needed to add copper to the enzyme
- and to connect N_2O reductase to the electron transport system of plant mitochondria.

Two NosZ proteins and 4 copper atoms make N_2O reductase



The *nos* operon of the clade I denitrifier, *Pseudomonas stutzeri*, and the putative functions of the proteins involved in maturation and activity of N_2O reductase

Zhang et al. 2019 PNAS 116 (26) 12822-12827

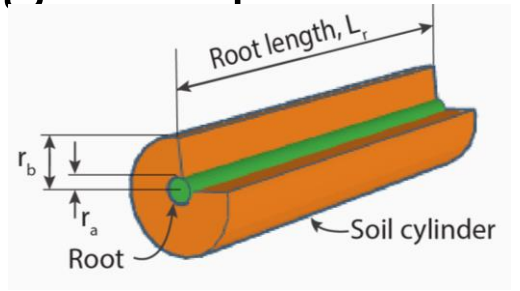
RESTRICTED

- Let's suppose that we can achieve functioning N_2O reductase in plant mitochondria.
- What effect could such a biotechnology have on N_2O emissions from crop fields and on atmospheric levels?
- To calculate that we have to jump scales
  - from molecular to plant
  - from plant to soil
  - from field to global atmosphere

RESTRICTED

Analysis of root uptake of N_2O by transgenic plants

- We calculated the flux of N_2O into a transgenic plant root using a cylindrical root-soil model and expressing the flux as a function of measured parameters.
- The potential flux from the bulk soil to the transgenic roots was calculated to be 85 kg N_2O ha^{-1} yr^{-1}, 8 times the observed emissions of N_2O from fertilized corn fields.
- So, emissions from corn fields could be reduced to zero, preventing on average about **11 kg N_2O emissions ha^{-1} yr^{-1}**.



$$Flux = \left(\frac{V_{max}}{K_s}\right) X \frac{C_b}{\left(1/K_h + \frac{\left(\frac{V_{max}}{K_s}\right) X\, ln\left(r_b/r_a\right)}{2\pi D_{eff} L_r}\right)}$$

V_{max} is the max N_2O uptake rate of the mitochondria normalized to plant root biomass
K_s is the half saturation constant for N_2O reductase
X is the biomass of roots per volume of soil
C_b is the concentration of N_2O in the bulk soil pore space
K_h is Henry's Law constant for N_2O
r_b is half the mean distance between roots
r_a is the average root diameter
D is the diffusivity of N_2O in soil
L_r is the total length of roots per volume of soil

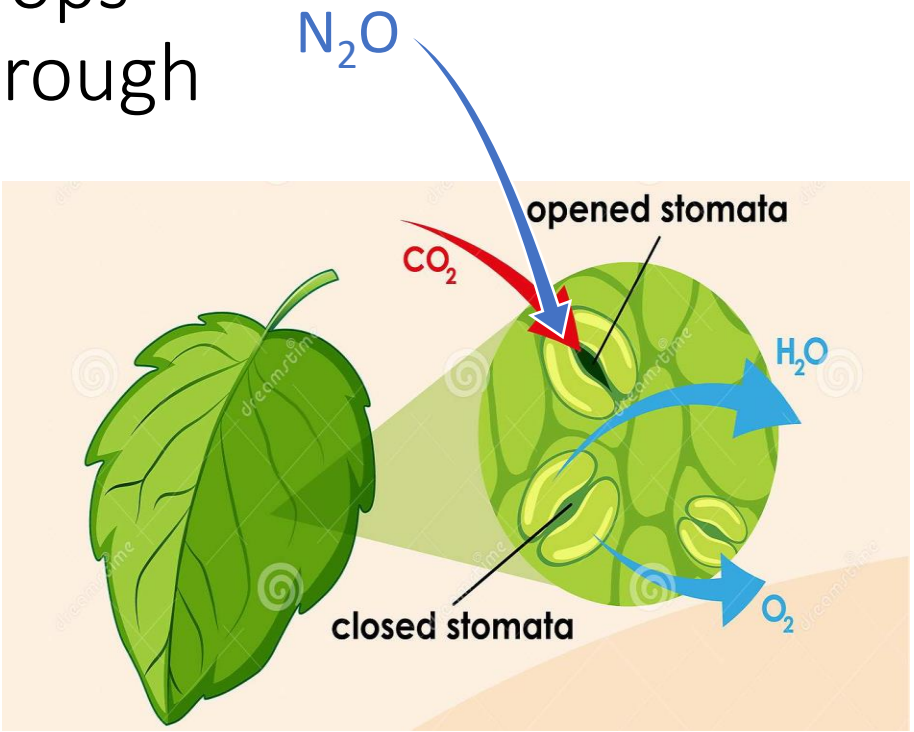
All these parameters have been measured for maize crops

RESTRICTED

The above-ground parts of the transgenic crops would remove N_2O from the atmosphere through the stomata in the leaves

- To model N_2O uptake by plants we calculate the uptake flux by setting the mass transport flux equal to the enzymatic removal by their mitochondria, yielding:

$$Flux = K_{mt} C_b \left(1 - \frac{1}{\frac{V_{max} X_{area} K_H}{K_S K_{mt}} + 1} \right)$$



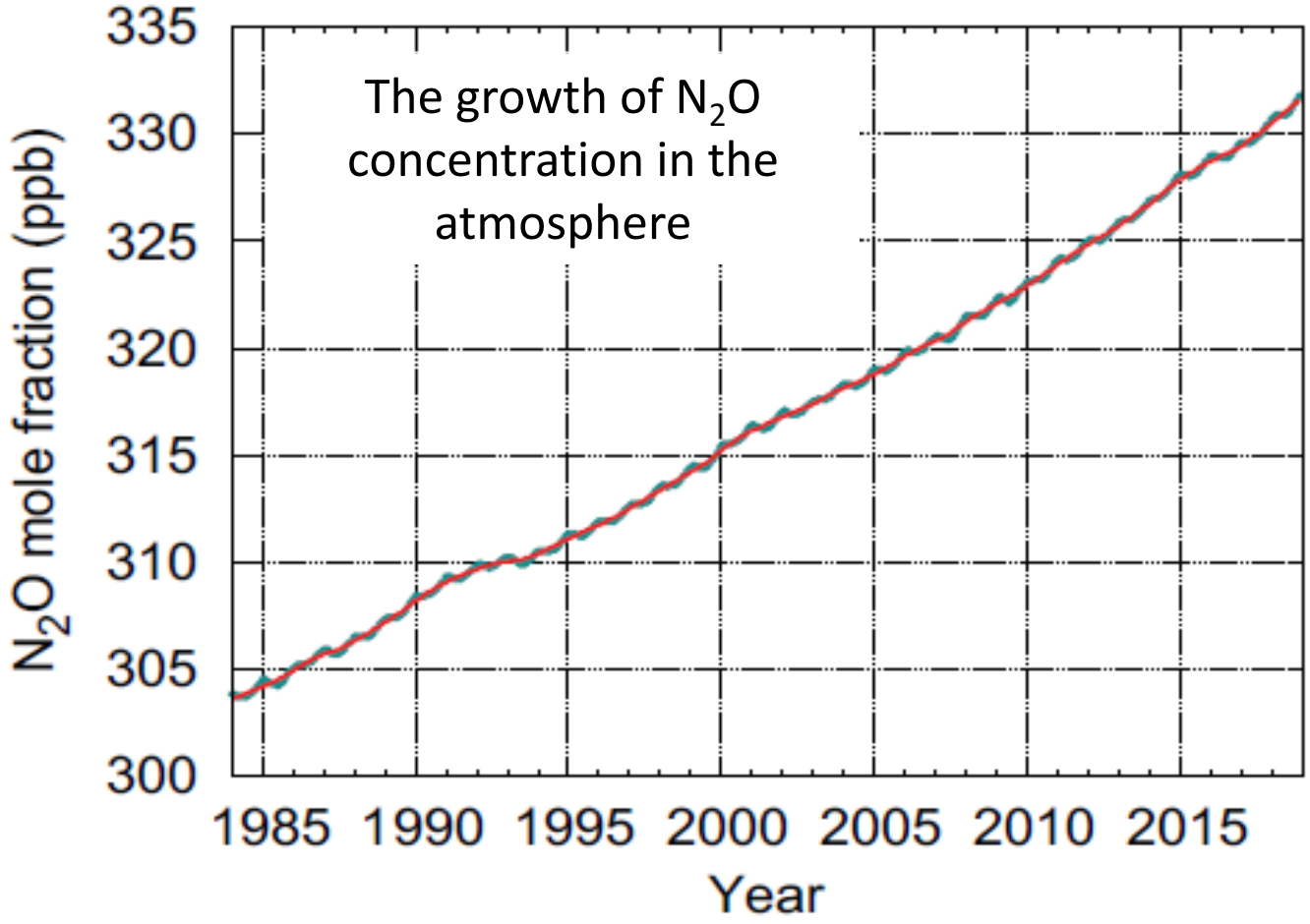
Dreamstime.com

- **N_2O uptake from the atmosphere by a field of N_2O reductase transformed corn crops would be about 21 kg N_2O ha^{-1} yr^{-1}**
- **Total annual N_2O emissions prevention and atmospheric uptake in fertilized maize would be 11 + 21 = 32 kg N_2O per ha**

RESTRICTED

Could N_2O reductase activity in transgenic crop plants significantly affect atmospheric N_2O?

- Recognizing that there are natural sinks for N_2O in the global environment, and
- Until recently natural emissions and sinks were in balance.
- Now natural sinks cannot keep up with the increasing anthropogenic N_2O emissions
- N_2O levels increase every year by **8 million tons N_2O per yr** in the total atmosphere.

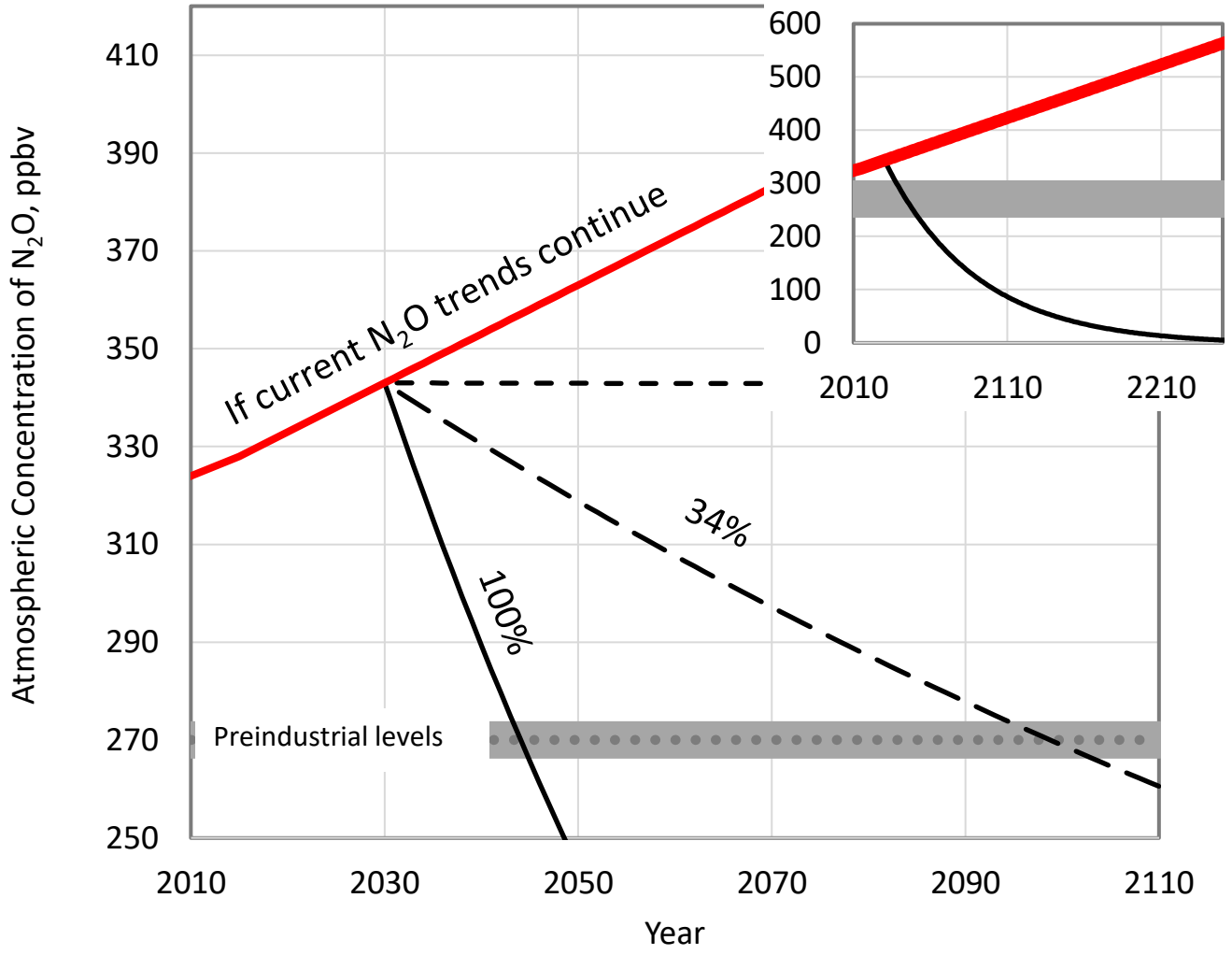


WMO and GAW Program , *The state of greenhouse gases in the atmophere based on global observations through 2018.* WMO Greenhouse Gas Bulletin, 2019(15): p. 1-7

RESTRICTED

Effects on atmospheric N_2O by global plantings of transgenic plants

- If about 15% of global crops were transformed with N_2O reductase, annual increases of atmospheric N_2O could be prevented.
- If about 34% of all crops globally were transformed starting in 2030, atmospheric N_2O could be restored to pre-industrial levels by 2100.



RESTRICTED

N_2O reductase expressing crops could slow the rate of climate change

- CO_2 is currently increasing in the atmosphere by about 2.5 ppmv per yr or about 20 billion tons CO_2 per yr.
- If all crops were transformed with N_2O reductase, 21 billion tons CO_2 equivalents per year could potentially be prevented and removed from the atmosphere,
- Significantly slowing the annual rate of increase in global warming.
- This technology is not a substitute for removing CO_2 from the atmosphere but is an additional tool in the effort against global warming.

RESTRICTED

Cost of this technology would be low

- Once the N_2O reductase expressing plants are created, seed production could be scaled up with little additional cost.
- With current carbon market prices* farmers would be able to claim credits on the carbon market, currently about $169 per ha or about $34,000 per year for a typical 500-acre US farm growing maize.

*$15 per ton CO_2 equivalent 2020 market

RESTRICTED

Conclusions

- The proper location for N_2O reductase in engineered plants is in the mitochondria.
- N_2O reductase plant technology could potentially prevent crop field emissions and directly remove N_2O from the atmosphere on a global scale.
- This technology, by itself, sustainably and at low cost, could potentially stop increases of atmospheric N_2O.
- Widespread application of N_2O reductase engineered crops could significantly slow global warming.
- The technical challenges of successful expression of N_2O reductase in plants are high, but the potential payoffs are large enough to be worth the effort.

RESTRICTED

Why does this matter to Ag Biotech?

- Genetically engineered crops occupy only 10% of the planted area on earth
- Growth of biotech crops has decreased
- If we can get N_2OR to work in plants, the technology would provide a moral and legal requirement for widespread planting of GE seeds.
  - N_2O is the worst atmospheric pollutant emitted by plant agriculture
  - Best available technology is the standard for control of pollution sources.
  - N_2OR in plants would be the BAT for N_2O prevention
  - Reasonable enforcement would increase the GE seed market by nearly 10-fold.
  - Therefore, agricultural biotech firms should fund N_2OR/plant research.

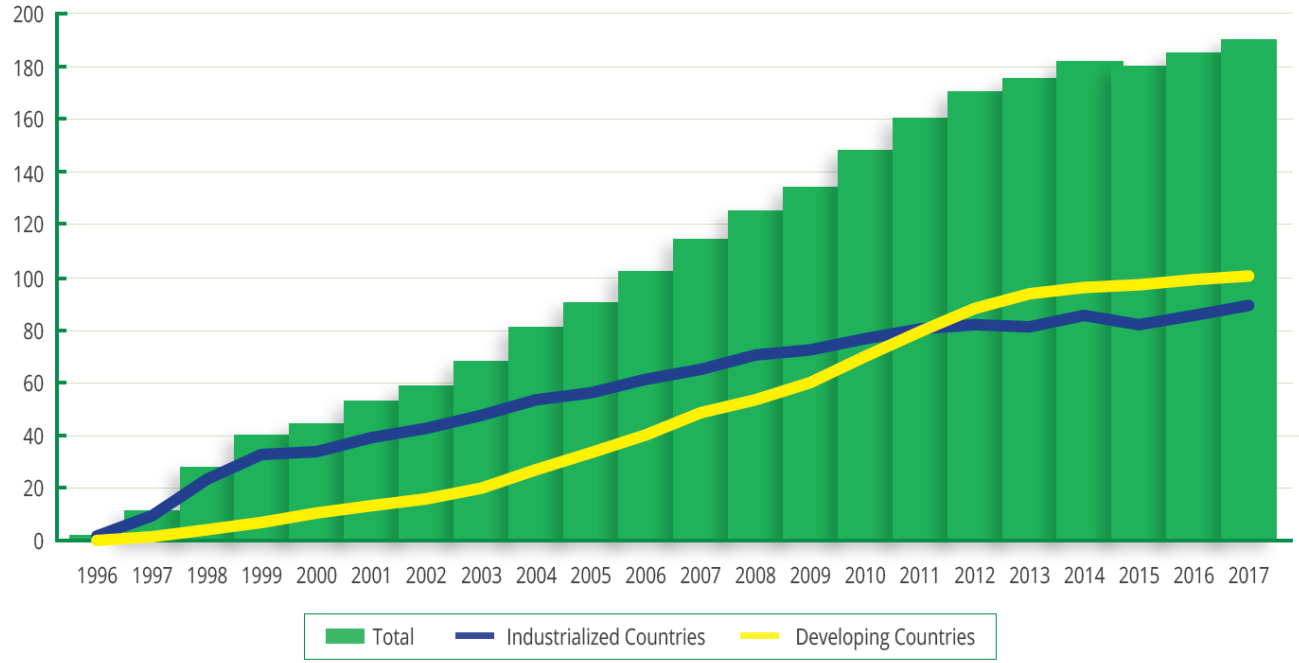


Figure 1. Global Area of Biotech Crops, 1996 to 2017: Industrialized and Developing Countries (Million Hectares)

Source: ISAAA, 2017

RESTRICTED

We Are Taking a Short Break

Back @ 10:20am

AEIC
ADVANCING BIOANALYTICAL TECHNOLOGIES

A novel quantitative method for determination of genetic trait purity

John Zheng
Indiana Crop Improvement Association

AEIC
ADVANCING BIOANALYTICAL TECHNOLOGIES

InvictDetect Plus™:
A Collaboration Between USDA and Private Industry

Chris Culkin
Agdia

AEIC
ADVANCING BIOANALYTICAL TECHNOLOGIES

agdia®

The Growing Standard.

About Agdia

- Founded in 1981 by Chet and Jane Sutula
- Privately held

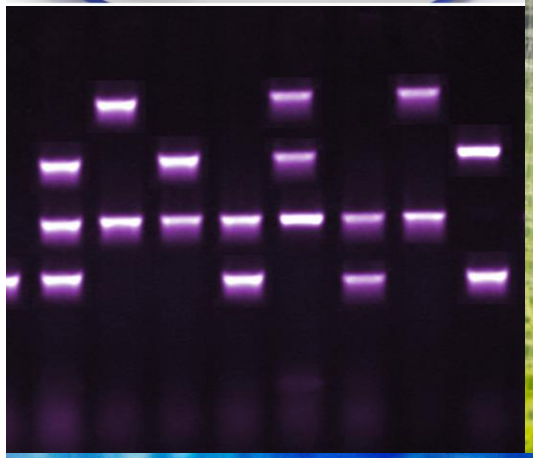
MISSION: To provide industry leading products and services that assist in the production of healthy, quality and profitable crops.

Focus Areas

- Plant pathogen detection
  - Commercial products
  - Testing Services
- Trait identification (GMO)
  - Commercial products
- Insect identification
  - Imported fire ant identification kit
- Contract assay manufacturing and development
  - Primarily in GMO sector and other niche markets

Technologies

- Agdia conducts all it’s research, development, manufacturing, and QC in house
- We have 40 years of experience with the following technologies
  - ELISA and ImmunoStrip®
  - PCR and qPCR
  - Isothermal amplification
  - Nucleic acid hybridization
  - Immunofluorescence
- Combined, we have brought 200+ kits to market employing the above technologies



Dr Steven Valles

- USDA Research Entomologist
- Center for Medical, Agricultural and Veterinary Entomology
- Fire Ant Research Focuses on:
  - Development of detection devices
  - Characterization of RNA viruses
  - Development of microbial control agents

RESTRICTED

Imported Fire Ants (IFA)

- Introduced to the United States from South America in early 20th Century
- In addition to US, IFA have spread throughout the world
- *Solenopsis invicta* (Red Imported Fire Ant)
- *Solenopsis richteri* (Black Imported Fire Ant)
- *Solenopsis invicta x richteri* (Hybrids)

RESTRICTED

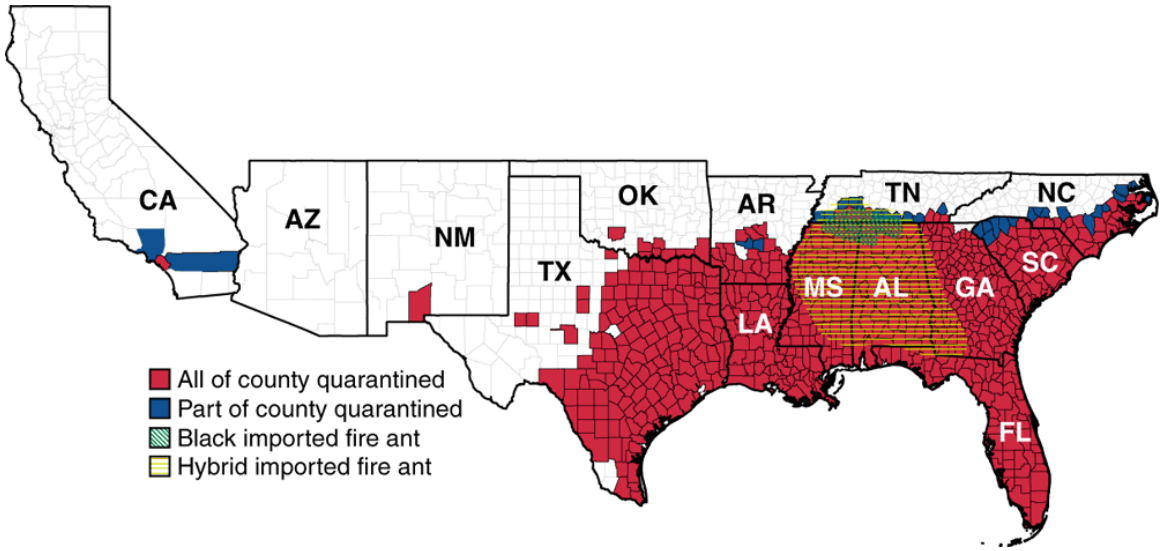
Impacts of IFA

- Destruction of crops and agricultural equipment
- Out compete native ant species
- 50% of the planet's surface is potentially inhabitable by *S. invicta*
- Reduce both vertebrate and invertebrate diversity
- Stings are painful and can induce anaphylactic shock

RESTRICTED

Imported Fire Ant Quarantine

- IFA infest approximately 367 million acres today in the US
- Eradication efforts have proven ineffective
- USDA established a Federal Quarantine (7 CFR 301.81) in 1958 to prevent artificial spread



RESTRICTED

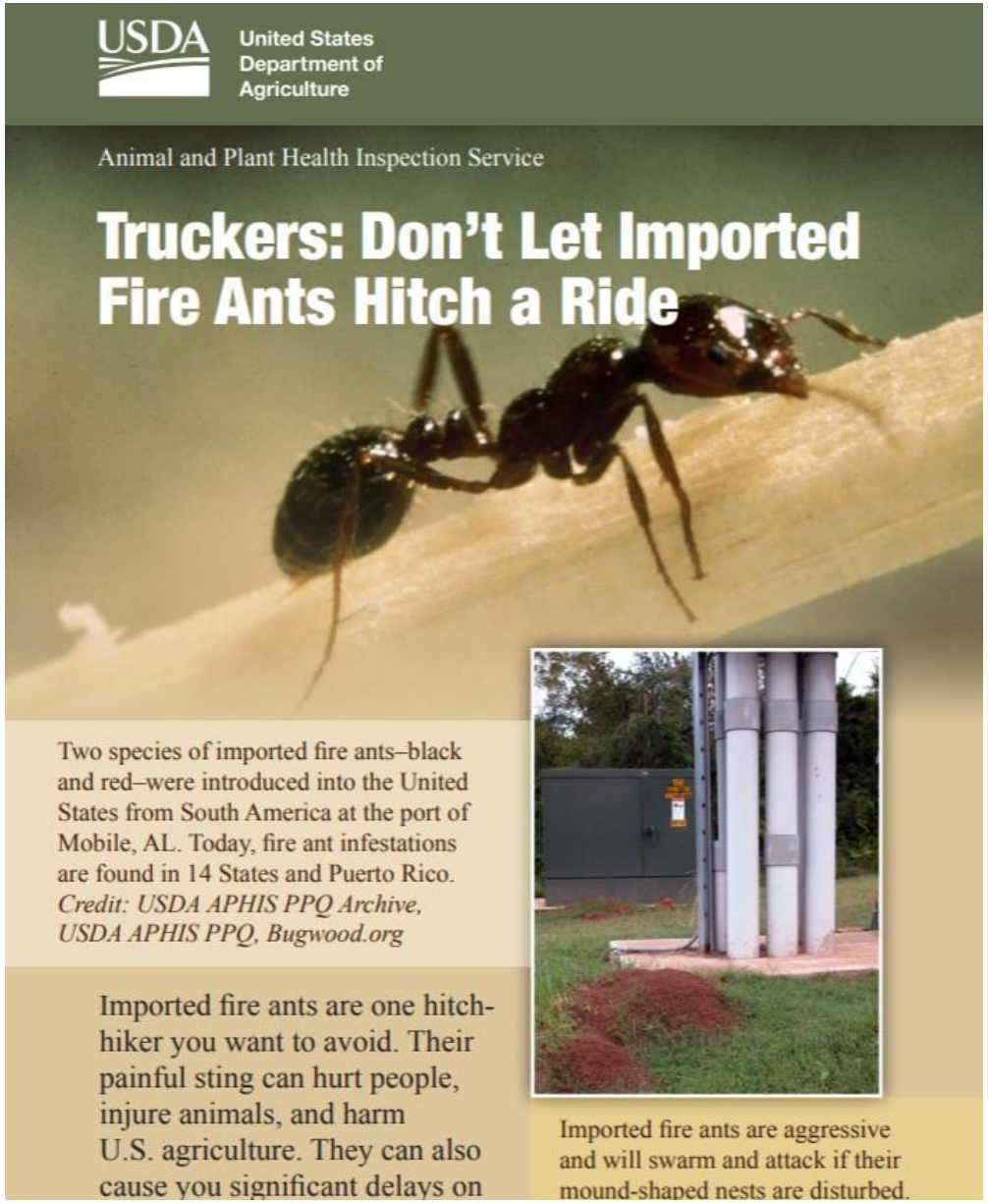
Artificial Spread of IFA

- IFA can be spread by humans through movement of:
  - Nursery Stock
  - Hay and straw
  - Agricultural equipment
  - Grass sod
- USDA requires certificate of inspection before release of regulated items

RESTRICTED

Inspection

- Quarantine items and inspection procedures are dictated by USDA-APHIS
- Inspection is responsibility of each state
- Compliance is responsibility of individuals
- Shipments are inspected at origin, in transit, and at destination
- Many states conduct annual surveys to determine IFA spread



RESTRICTED

Identification of IFA

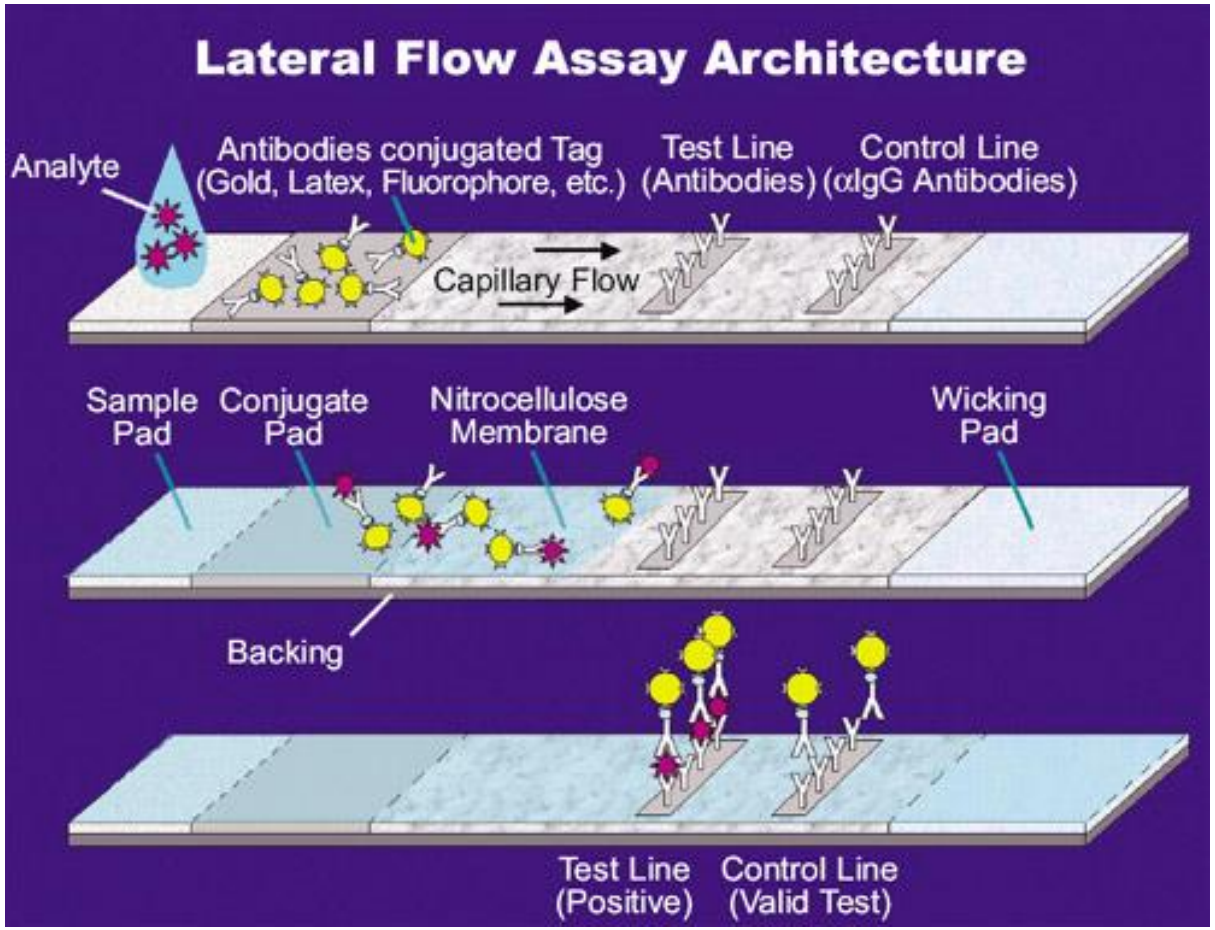
- Prompt identification is important to prevent establishment in new areas
- Rely mainly on visual identification
- Quarantine items are held until ants are identified
- IFA are difficult to visually identify from other species, especially native *Solenopsis spp.*
- Samples must be sent to an expert, thus delaying release of goods for up to two to three days

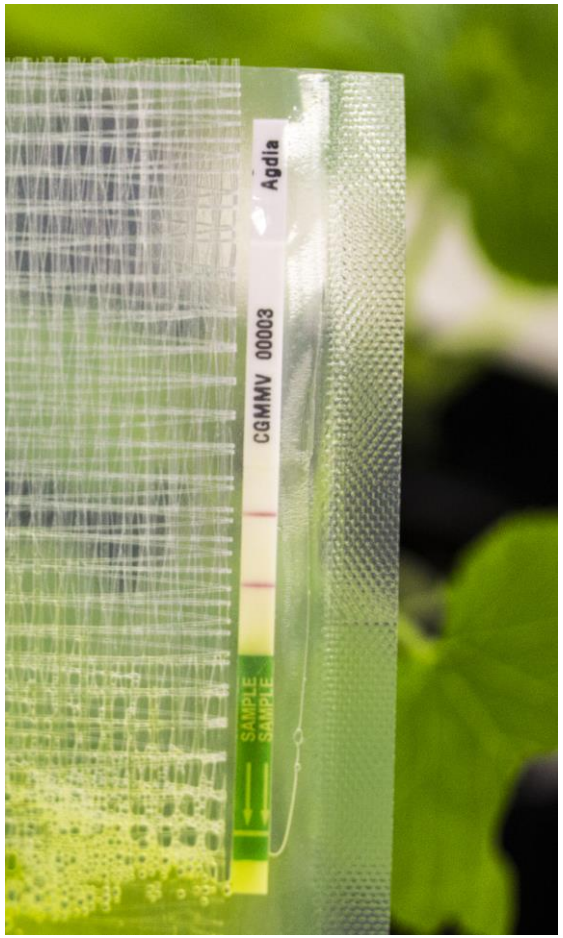
USDA Test Requirements

- Field-Portable
- Rapid
- Easy-to-use
- No specialized equipment
- Uses a small sample of ants
- Sensitive and specific
- Able to discriminate both species of IFA and their hybrids from native ants

RESTRICTED

Sample Lateral Flow Device

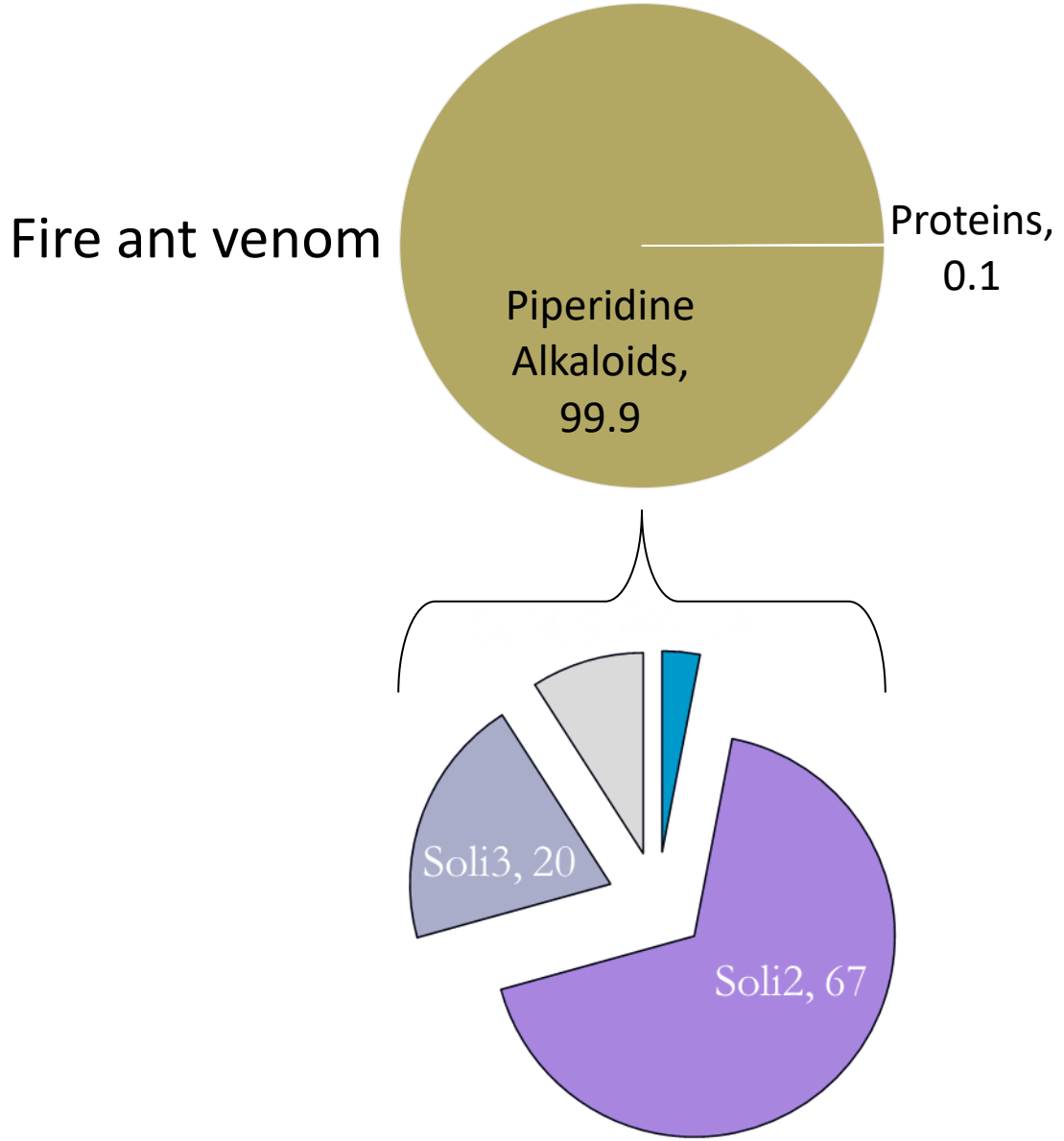




RESTRICTED

Target Protein in IFA Venom

- *Solenopsis* species venom protein 2
- *Soli2* and *Solr2*
- Unique to IFA
- Abundant
- Species specific
- Well characterized



Valles et al 2018

RESTRICTED

USDA Development

- Developed monoclonal antibodies to *Soli2* and *Solr2* proteins
- Confirmed specificity for IFA
- Manufactured field deployable kits
- Contacted Agdia to manufacture and release kits for commercial sale

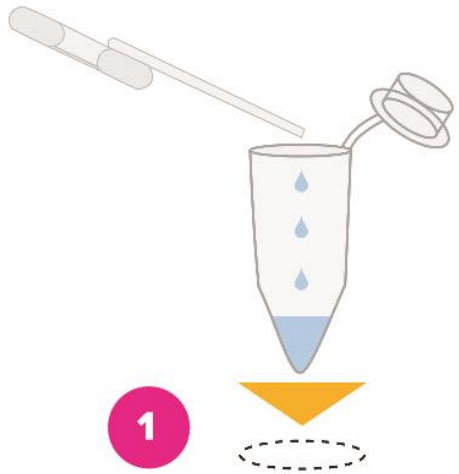
RESTRICTED

Kit Contents

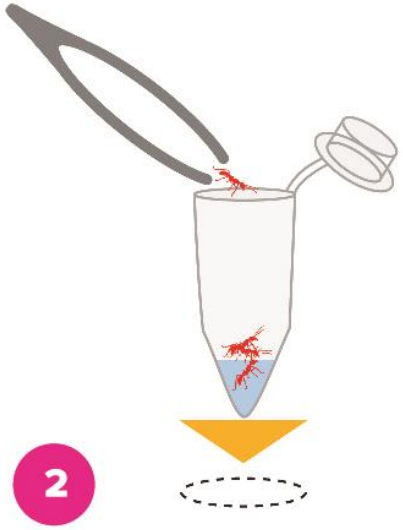
- 10 ImmunoStrips
- Tubes and Pestles
- Buffer
- Exact Volume Pipettes

RESTRICTED

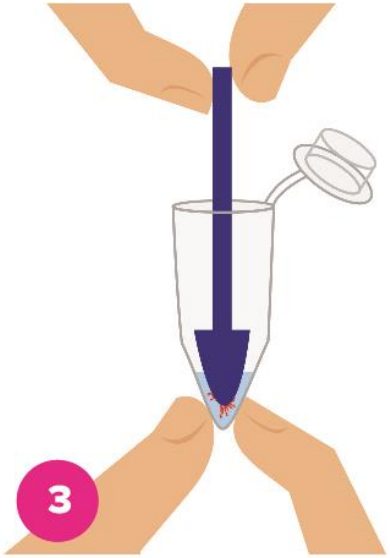
Procedure



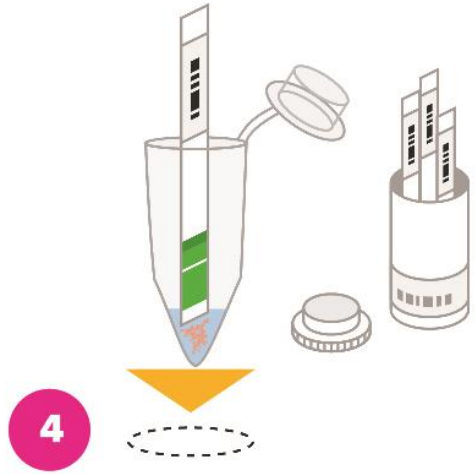
Add AEB2 buffer to tube



Add 5 worker ants to buffer filled tube



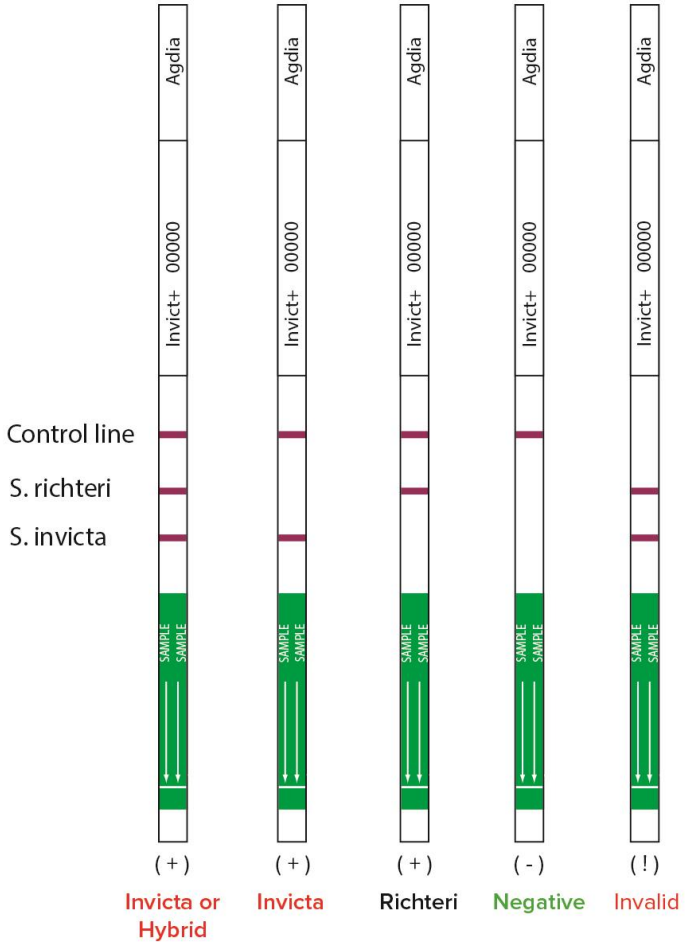
Thoroughly macerate ants inside tube with pestle

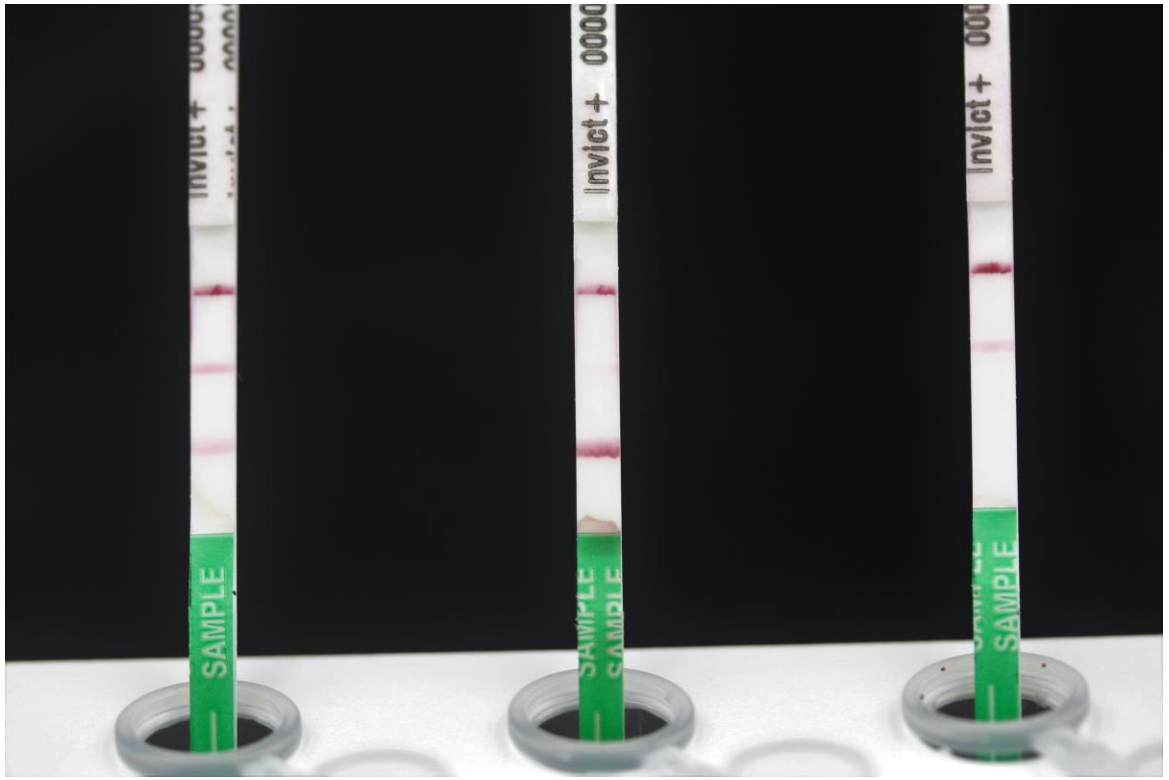


Insert InvictDetect Plus ImmunoStrip® for 10 to 30 minutes

RESTRICTED

Interpretation





Hybrid *S. invicta* *S. richteri*

RESTRICTED

Validation

- Total of 630 Samples
- Seven Operators
- Two species of non-*Solenopsis* ants
  - *Tetramorium sp.*
  - *M. floricola*
- Twelve colonies of imported ants provided by Dr Valles
  - 3 Colonies of each *S. richteri* and hybrids
  - 9 Colonies of *S. invicta* polygynous ants

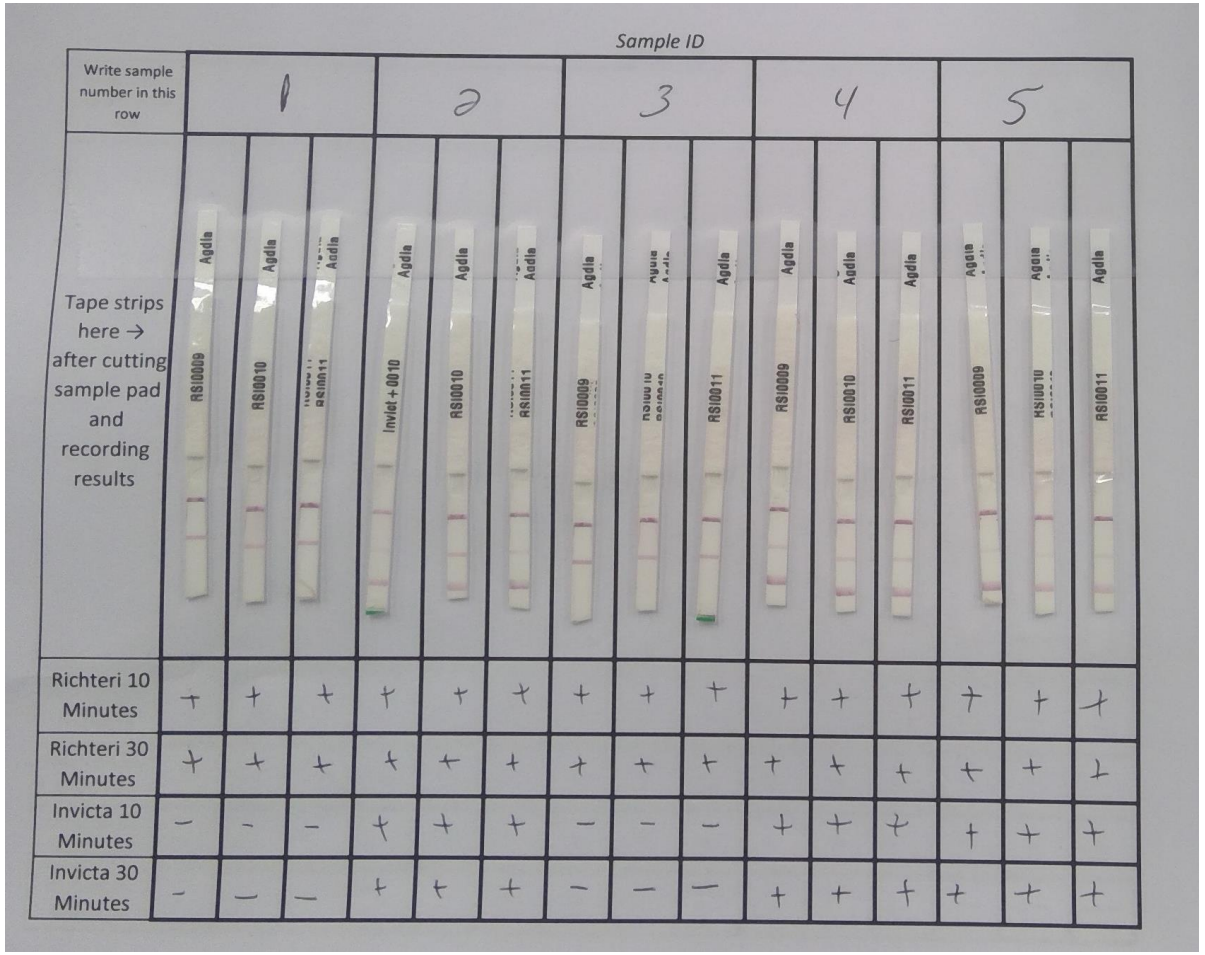
RESTRICTED

Validation Results

Species	Results		Accuracy		Error Rate	
	10 min	30 min	10 min	30 min	10 min	30 min
Non-*Solenopsis*	209/210	209/210	99.52%	99.52%	2.24%	2.24%
Solenopsis sp.	416/420	418/420	99%	99.50%	2.17%	1.49%
Total	625/630	627/630	99.21%	99.52%	1.66%	1.23%

RESTRICTED

Validation Results



RESTRICTED

Validation Results
Specificity

	Taxonomic ID Hybrid/S. invicta vs S. richteri					
Species	**Results**		**Diagnostic Specificity**		**Error Rate**	
	10 min	30 min	10 min	30 min	10 min	30 min
Hybrid/S.*invicta*	259/273	261/273	94.80%	95.60%	7.90%	7.02%
S. richteri	146/147	146/147	99.31%	99.31%	3.19%	3.19%
Total	405/420	407/420	96.40%	96.90%	5.45%	4.88%

RESTRICTED

Summary

- USDA and Agdia Inc successfully developed a multiplexed assay capable of discriminating IFA from non-IFA
- Kit is easy to use and requires no additional equipment or extensive training
- Sample size of only five ants
- Results in 30 minutes
- Components can be stored at room temperature increasing portability

RESTRICTED

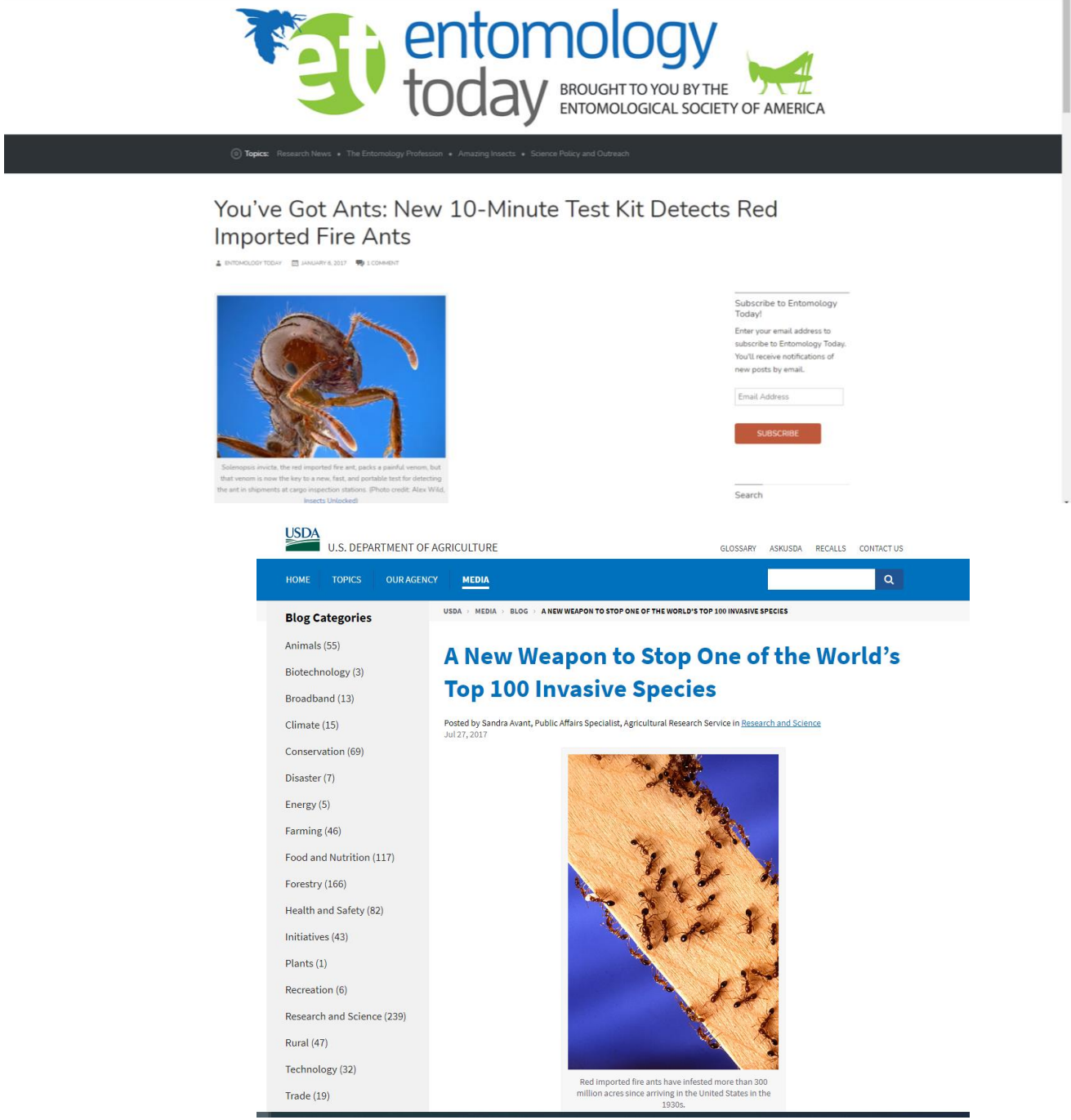
InvictDetect Featured Articles

A Field Kit for Fire Ants

Accurately identifying red imported fire ants at ports of entry, inspection points, and quarantine areas could get a lot easier and faster to do, thanks to a new field kit developed by scientists with ARS and the USDA Animal and Plant Health Inspection Service (APHIS). The invasive ant, *Solenopsis invicta,* is a biting and stinging pest that poses a danger not only to people and small animals but also to property and crops. Indeed, since arriving in the United States in the 1930s, the species has infested 367 million acres and caused an estimated $6 billion in control costs and damages. Drawing on decades of expertise, ARS and APHIS researchers used a protein from the fire ant's own venom to develop a highly specific antibody-based field kit that, in 10 minutes, can tell the pest apart from other ant species. This speed and accuracy is especially critical at ports of entry and truck inspection stations, where authorities must quickly but thoroughly check cargo or other items in transit to ensure they're free of invasive stowaways. The field kit, which has been commercially developed by Agdia, Inc., under the trade name InvictDetect™ ImmunoStrip®, is equally important in maintaining fire ant quarantine zones. A new version is under development that will also identify the black imported fire ant, *S. richteri.*

Related Information

Article: *Fast Test Identifies Red Imported Fire*



RESTRICTED

Acknowledgements

- Dr Steven Valles-USDA
- Ann Marie Calcott
- Dr Ronald Weeks
- Colleagues at Agdia Inc

RESTRICTED

Thank you!

Ambiguous results – how do you score them

Ray Shillito, BASF

David Syme, BASF

Updates from Industry Associations

1) Scott Bloomer: AOCS update

2) Palmer Orlandi: AOAC

3) Ray Shillito: ISO TC34/SC16

Thank You!

AEIC
ADVANCING BIOANALYTICAL TECHNOLOGIES