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W5170 multi-state biosolids research group: history and future perspectives

Jim Ippolito (The OSU)

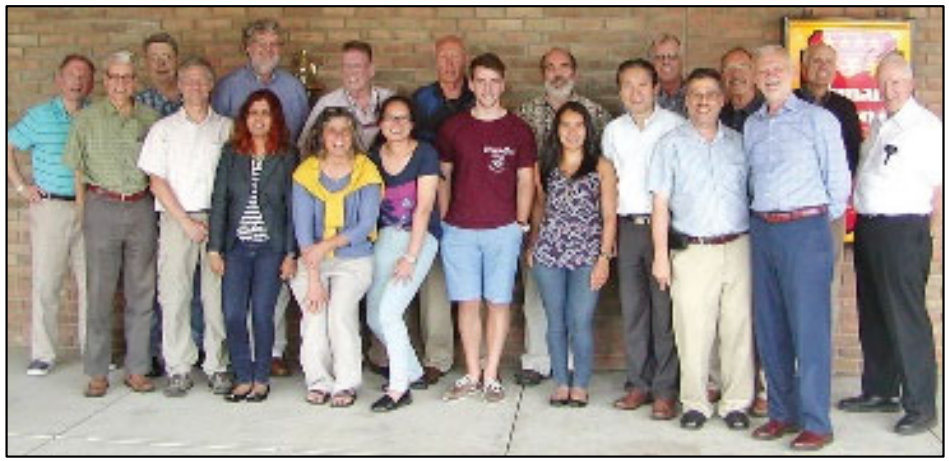
and

Maria Silveira (University of Florida)

USDA NIFA W5170 Research Committee

Beneficial Use of Residuals to Improve Soil Health and Protect Public and Ecosystem Health

- Groups of 50+ scientists from 30 states with extensive history on biosolids
- USEPA Office of Water
- USEPA ORD, Cincinnati, OH
- USDA ARS
- Biosolids Regional Groups (NW, NEBRA, CASA, MWRD, Mid Atlantic
- Other biosolids stakeholders



- Started as: W170 provided research data and risk assessment support to develop risk based guidelines (Tables 2, 3, 4) in Part 503 1993 rule

Wx170 Roots in Beneficial Use of Biosolids to Cropland

TASK FORCE MEMBERS

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EPA 430/9-76-013
CONSTRUCTION GRANTS PROGRAM
INFORMATION

APPLICATION OF SEWAGE SLUDGE TO CROPLAND:

APPRAISAL OF POTENTIAL HAZARDS OF THE HEAVY METALS TO PLANTS AND ANIMALS

NOVEMBER 1976

U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER PROGRAM OPERATIONS
MUNICIPAL CONSTRUCTION DIVISION
WASHINGTON, D.C. 20460

Regional Project Time Line

- 1972 NC-118 “Utilization and Disposal of Municipal, Industrial and Agricultural Processing Waste on Land”
- 1972 W-124 "Soil as a Waste Treatment System"
- 1977 W-124 "Optimum Utilization of Sewage Sludge on Land”
  - New project combined NC-118 and W124
  - Chicago sludge experiment started with annual and single applications
  - Granted a two year extension in 1982
- 1984 W-170 “Chemistry and Bioavailability of Waste Constituents in Soils”
- 1989 W-170 “Chemistry and Bioavailability of Waste Constituents in Soils”
- 1994 W-170 “Chemistry and Bioavailability of Waste Constituents in Soils”
- 1999 W-170 “Chemistry and Bioavailability of Waste Constituents in Soils”
- 2004 W-1170 “Chemistry, Bioavailability, And Toxicity Of Constituents In Residuals And Residual-Treated Soils”
- 2009 W-2170 “Soil-Based Use of Residuals, Wastewater and Reclaimed Water”
- 2014 W-3170 “Beneficial Reuse of Residuals and Reclaimed Water: Impact on Soil Ecosystem and Human Health”
- 2019 W-4170 “Beneficial Use of Residuals to Improve Soil Health and Protect Public, and Ecosystem Health”
- **2024 W-5170 “Beneficial Use of Residuals to Improve Soil Health and Protect Public and Ecosystem Health”**

Wx170 Research to Support Risk-Based Beneficial Land Application of Biosolids and other Municipal / Industrial and Agricultural Byproducts

Biosolids Research leading to Part 503

- **1979** At request of EPA, reviewed "U.S. EPA Criteria of Solid Waste Disposal Facilities - Proposed Classification Criteria", Federal Register, Feb. 6, 1979. Report submitted March 31, 1979
- **1979** At request of EPA, reviewed "Interim Final Criteria", Federal Register, September 13, 1979. Report submitted January 25, 1980.
- **1985** Organized and conducted a workshop on "Land Application of Municipal Sewage Sludge". Brought together researchers involved in sewage sludge land application to evaluate and summarize their most recent data. **The workshop also assessed the validity of assumptions made in the risk assessment process on fate of sludge contaminants.**
- **1987** EPA Science Advisory Board. Review of Technical Documents. Supporting Proposed Revisions to EPA Regulations for the Disposal/Reuse of Sewage Sludge under Sec. 405(d) of the Clean Water Act.
- **1989** Peer Review Committee (PRC) formed, focused on Standards for the Disposal of Sewage Sludge U.S. EPA Proposed Rule 40 CFR Parts-257 and 503 (February 6, 1989 Federal Register pp. 5746-5902)

Biosolids Research leading to Part 503

- **1993** Provided data summaries and technical suggestions on the comments received on Standards for the Disposal of Sewage Sludge U.S. EPA Proposed Rule 40 CFR Parts- 257 and 503 (February 6, 1989 Federal Register pp. 5746-5902). The final Standards for the Use or Disposal of Sewage Sludge (Title 40 of the Code of Federal Regulations [CFR],Part503), was published in the Federal Register (58 FR 9248 to 9404) on February 19, 1993, and became effective on March 22, 1993.

Select Biosolids Research since Part 503

- Many field studies to refine / validate Part 503 constituents (metals, PBT organic chemical contaminants)
- Research on fate and risk posed by pharmaceutical and personal care products in land applied biosolids
- Risk based research of fate of antibiotics, microbial contaminants including COV19 in biosolids
- Research on PFAS and trace organic chem contaminants in biosolids and biosolids products

Risk Based Research for other Residuals/byproducts

Risk Assessment for Beneficial use of Foundry Sand in Topsoil Blends

U.S. EPA Office Resource Conservation and Recovery Economics and Risk Assessment Staff, USDA Agricultural Research Service and The Ohio State University. 2014. Risk assessment of spent foundry sands in soil-related applications. EPA-530-R-14-003. https://www.epa.gov/sites/production/files/2016-03/documents/risk_assessment_sfs_in_soil.pdf

Use of Drinking Water Treatment Residuals and other Byproducts to Reduce Risk from Non-Point Agricultural Land

Water treatment residuals to reduce nutrients in surface runoff from agricultural land. 1999. Gallimore, Basta, Storm, Payton, Huhnke, & Smolen. J. Environ. Qual.

Phosphorus retention mechanisms of a water treatment residual. 2003. Ippolito, Barbarick, Heil, Chandler, & Redente. J. Environ. Qual.


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THE SKY IS FALLING!

PRESIDENT DECLARES A STATE OF EMERGENCY

RELIGIOUS LEADERS URGE ALL TO LOOK UP

CHICKEN LITTLE NOWHERE TO BE FO

THE OHIO STATE UNIVERSITY

Climate Change

Response Documents Have Been Created

To US EPA (2018) questioning risk assessment tools used to determine safety of 352 pollutants found in biosolids

On W4170 website: https://www.nimss.org/projects/18624
under "outline", "attachments"
Direct link:
https://nimss.org/storage/10707/W4170-Response-to-OIG-Report-July-23-2020-final.pdf

- **Response to chemical issues**, Dr. Nick Basta, OSU
- **Response to PFAS issues**, Dr. Linda Lee, Purdue
- **Response to Antibiotic and pathogens issues**
  Dr. Ian Pepper, Univ. of Arizona
- **Overall review**, Greg Kester CASA

Beneficial Use of Biosolids is a Solution for "The Grand Challenges"

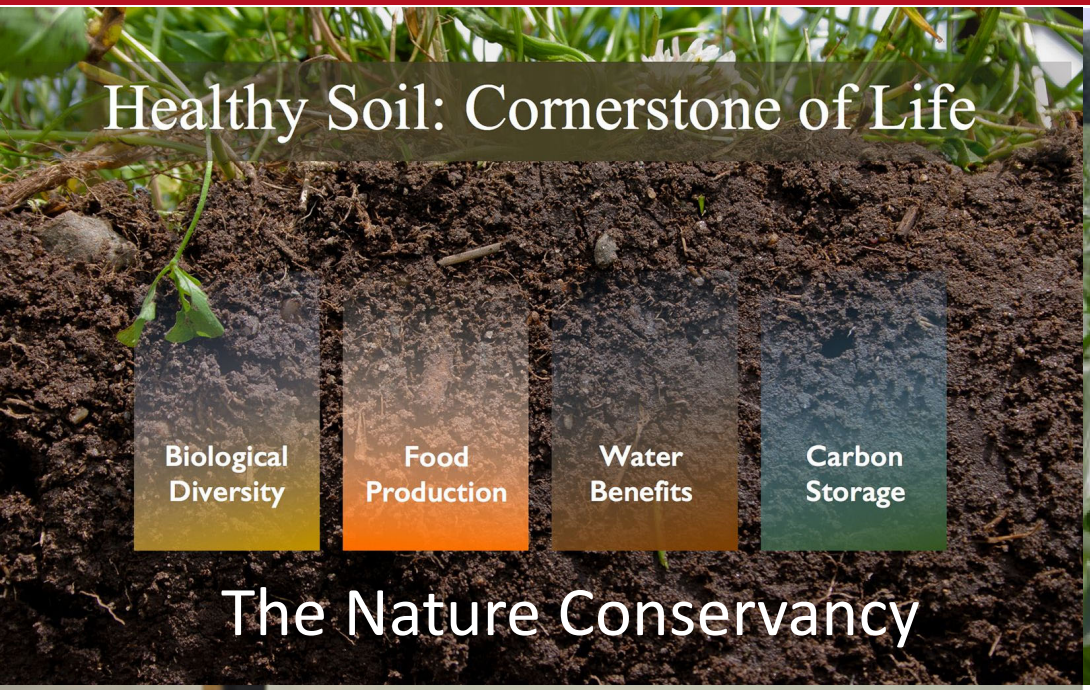
- Food production / security
- Clean water
- Contaminant Remediation
- Climate Regulation (resilience)
- Waste Reuse

The answer is

biosolids

With respect to the above, and biosolids use, W5170 focuses on soil health and PFAS

"Carnac The Magnificent"

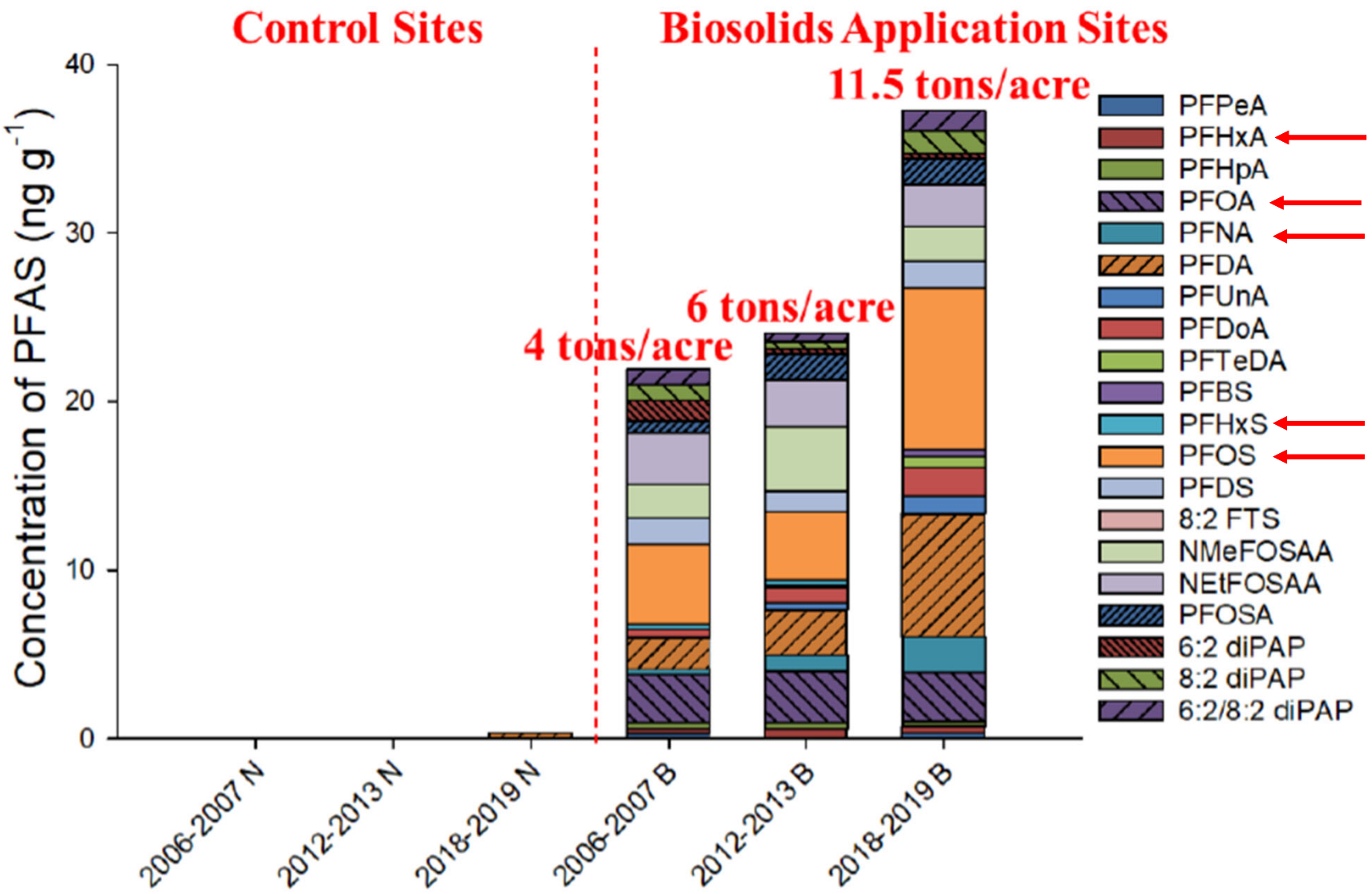


W5170 and The OSU

Biosolids, Soil Health & PFAS Research, Teaching and Extension

- Biosolids or inorganic N fertilizer applied at agronomic rates over time (1999 to present)
- Long-term biosolids improves soil health
  - Biological soil health
- What about PFAS?

Distribution of PFAS in the 0-5cm soil depth over time



Non-detect for all PFAS compounds in winter wheat and corn grain over time

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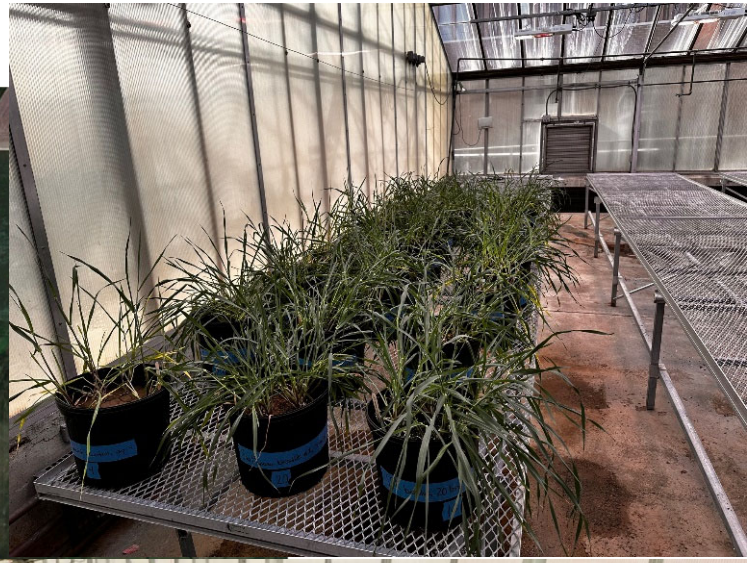
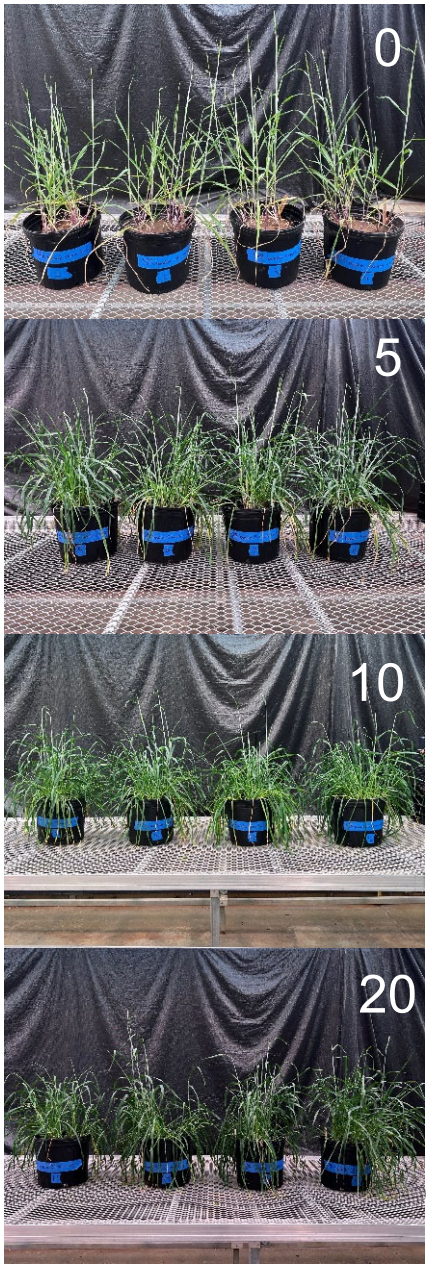
Increasing biosolids application, or application with biosolids containing varying PFAS concentrations:





Questions

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