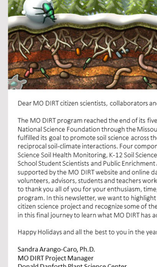
MO DIRT (2014 – 2019)



Dear MO DIRT citizen scientists, collaborators and friends.

The MO DIRT program reached the end of its five-year cycle, after being supported by the National Science Foundation through the Missouri EPSCoR grant. During those years, MO DIRT fulfilled its goal to promote soil science across the state, educating citizens on soil health and reciprocal soil-climate interactions. Four components have been offered to the public: Citizen Science Soil Health Monitoring, K-12 Soil Science Curricula, Research Opportunities for High School Student Scientists and Public Enrichment Activities. These components have been supported by the MO DIRT website and online data portals (modirt.missouriepscor.org). Many volunteers, advisors, students and teachers worked hard to make MO DIRT successful. We want to thank you all of you for your enthusiasm, time, effort and significant data contribution to this program. In this newsletter, we want to highlight some of the main accomplishments of the citizen science project and recognize some of the most important players. I invite you to join us in this final journey to learn what MO DIRT has accomplished through the years.

Happy Holidays and all the best to you in the year to come!

Sandra Arango-Caro, Ph.D.
MO DIRT Project Manager
Donald Danforth Plant Science Center

The commitment to monitor soil health

A total of 106 soil health monitoring sites were established. Of those sites, 85 were monitored for a minimum of four months by more than 400 participants!

- 70% participants monitored a site for more than one year.
- 30% participants monitored a site for more than two years.
- 50% of the sites were monitored by Master Naturalists.

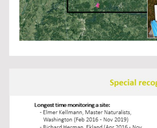
What do participants do?

High School Students	38.9
Master Naturalists	35.5
Middle School Students	11.7
Undergraduate Students	3.9
Informal Educators	2.4
Professors	2.0
Professionals	2.0
Farmers/Landowners	2.0
High School Teachers	1.0
Graduate Students	0.5
Elementary and Middle School Teachers	0.2

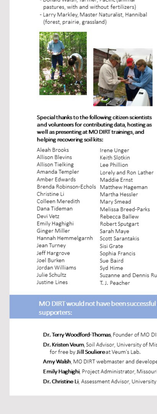
Who monitored the sites?

	Race/ Ethnicity	Females %	Males %	Total no.
Adult	White	62.9	37.1	232
	Black	100		1
	Latino	100		2
	Subtotal	**63.7**	**36.3**	**135**
Minors	White	44.8	55.2	261
	Black	56.6	43.4	43
	Latino	50	50	4
	Other minorities	42.9	57.1	7
	Subtotal	**43.8**	**56.2**	**313**
	Grand Total	**49.8**	**50.2**	**448**

Age distribution among adults	
<51 years old	12.8%
51-70 years old	63.8%
>70 years old	23.4%



Where were the soil health monitoring sites?



Special recognitions to

Longest time monitoring a site:
- Elmer Kallmann, Master Naturalists, Washington (Feb 2016 - Nov 2019)
- Richard Herman, Eklund (Apr 2016 - Nov 2019)

Largest number of soil surveys:
- Larry Markley, Master Naturalist, Hannibal (68 surveys)
- Richard Herman, Eklund (64 surveys)

Teams monitoring three sites:
- Dawn Holliday and Irene Unger, Professors at Westminster College, their undergraduate students, and Amanda Wolfgeher, graduate student at the University of Missouri-Columbia (two prairies, one woodland)
- Donald Walsh, farmer, Pacific (animal pastures, with and without fertilizers)
- Larry Markley, Master Naturalist, Hannibal (forest, prairie, grassland)

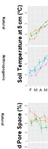
Special thanks to the following citizen scientists and volunteers for contributing data, hosting as well as presenting at MO DIRT trainings, and helping recovering soil kits:

Aleah Brooks, Allison Blevins, Allison Tiekring, Amanda Templer, Amber Edwards, Brenda Robinson-Echols, Christine Li, Colleen Meredith, Dana Tideman, Devi Vetz, Emily Haghighi, Ginger Miller, Hannah Hemmelgarnh, Jean Turney, Jeff Hargrove, Joel Burken, Jordan Williams, Julie Schultz, Justine Lines, Irene Unger, Keith Slotkin, Lee Phillips, Lorely and Ron Lather, Maddie Ernst, Matthew Hagaman, Martha Hessler, Mary Smead, Melissa Brown-Parks, Rebecca Ballew, Robert Spotgant, Sarah Maye, Scott Sarratoria, Soi Grate, Sophia Francis, Sue Baird, Syd Hime, Suzanne and Dennis Rush, T.J. Peacher

Teams monitoring two sites:
- Suzanne and Dennis Rush, Master Naturalists, Farley (prairie and woodland)
- Carmen Santos, Ann Finkling, Scott Barnes, Beth Zona, Wentzville (prairie and woodland)
- Suzanne and Dennis Rush, Master Naturalists, Farley (prairie and woodland)
- Kim LaFollette and Sue Knight, Plattsburg (animal pastures cool season and warm season grasses)
- Janet Mason, Pattonsburg (animal pasture and grassland)
- Laura Belarbi, Perryville (woodland, orchard)

Teams monitoring one site for two years or more:
- Denise and Adela Keller (mother and middle school daughter), Ballwin (forest)
- Kerry Stevinson and members of the YES-team program from the Saint Louis Science Center (lawn)
- Melissa and Regina Behnke (high school student and mother), Manchester (forest)

Teams that made a special effort to participate:
- Scott Barnes 4-hour drive to monitor an animal pasture in New London
- Andrea and Bakr Berry (mother and teenager son), driving from Illinois to participate in a Missouri project (prairie)



MO DIRT would not have been successful with the special contributions of the following supporters:

Dr. Tery Woodford-Thomas, Founder of MO DIRT, Director of EPSCoR Education Team

Dr. Kristen Veum, Soil Advisor, University of Missouri / USDA-ARS. MO DIRT soil samples were tested for free by **Bill Soulliere** at Veum's Lab.

Amy Walsh, MO DIRT webmaster and developer of the data portals, University of Missouri

Emily Haghighi, Project Administrator, Missouri NSF EPSCoR

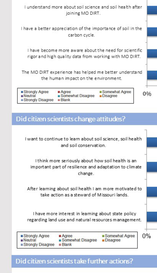
Dr. Christine Li, Assessment Advisor, University of Missouri

What about the MO DIRT data?

This MO DIRT data is accessible to the public online, for search and download through a data search portal (https://modirt.missouriepscor.org/soilhealthsurveys/search-data).
The data has already been validated and analyzed up to 2018. It is planned to include in the analyses the data from 2019 and publish the results in scientific journals and non-academic publications.

Have a look of the preliminary findings

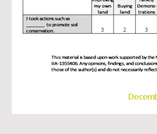
Patterns of average soil parameters in different habitats over time



Assessment of the MO DIRT experience

How did participants feel about the MO DIRT citizen science experience?

Did citizen scientists acquire new knowledge?



Did citizen scientists change attitudes?

Did citizen scientists take further actions?

ACTIONS TAKEN BY MO DIRT CITIZEN SCIENTISTS	Talk	Class	Workshop	Reading	Education activity	Meetings	Field trip	Writing	Mentoring
I have continued my education on soil science by attending a:	7	6	5	3	1	1	4		
I have promoted soil science education by offering / organizing a:	6	4			1		2	1	1
		Citizen Science	Outreach	Restoring habitat	Club/yoga nization				
I have joined an environmental group(s) for:	7	8	1	5					
	Improving my own land	Buying land	Attending / calling/ Demons trations	Meeting political leaders	Teaching	Making a donation			
I took actions such as: _____ to promote soil conservation.	3	2	3	1	1	1			

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