



Soil Health and Drought

Harnessing the Power of the Soil Sponge

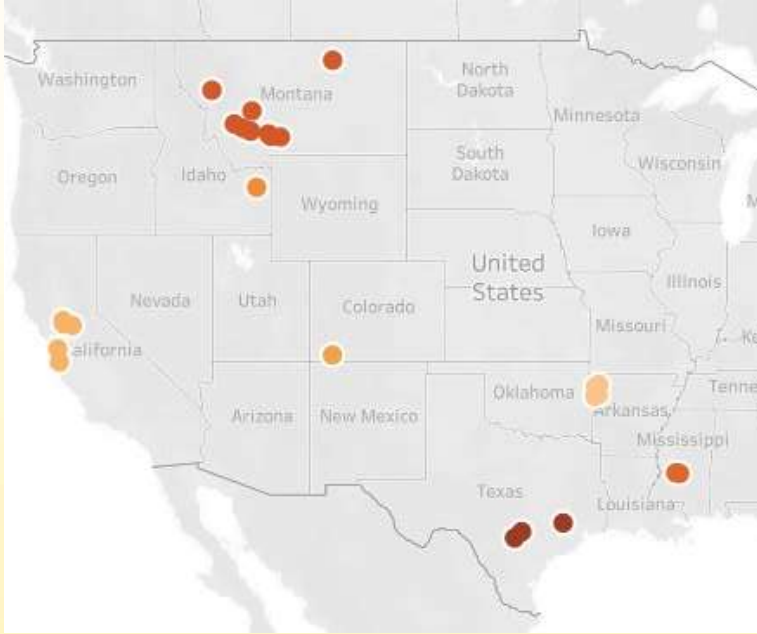
MIKE MORRIS, PH.D.
SOUTHWEST REGIONAL DIRECTOR

Colorado Water Resources and Agriculture Re
September 22, 2021



NATIONAL CENTER FOR
APPROPRIATE TECHNOLOGY

About NCAT



Saving water in soil

- ✓ a powerful, low-cost method of water conservation
- ✓ a powerful way to abate floods and drought
- ✓ a powerful reason to care about soil health



What is soil health?

The continued capacity of soil to *function* as a vital living ecosystem that sustains plants, animals, and humans. (NRCS)

- 1. Regulating water flow and cycling (infiltration/intake + retention)**
2. Sustaining diverse plant and animal life
3. Filtering and buffering potential pollutants
4. Cycling nutrients
5. Providing physical stability and support



Keep the Soil Covered



Minimize Soil Disturbance



Increase Biodiversity

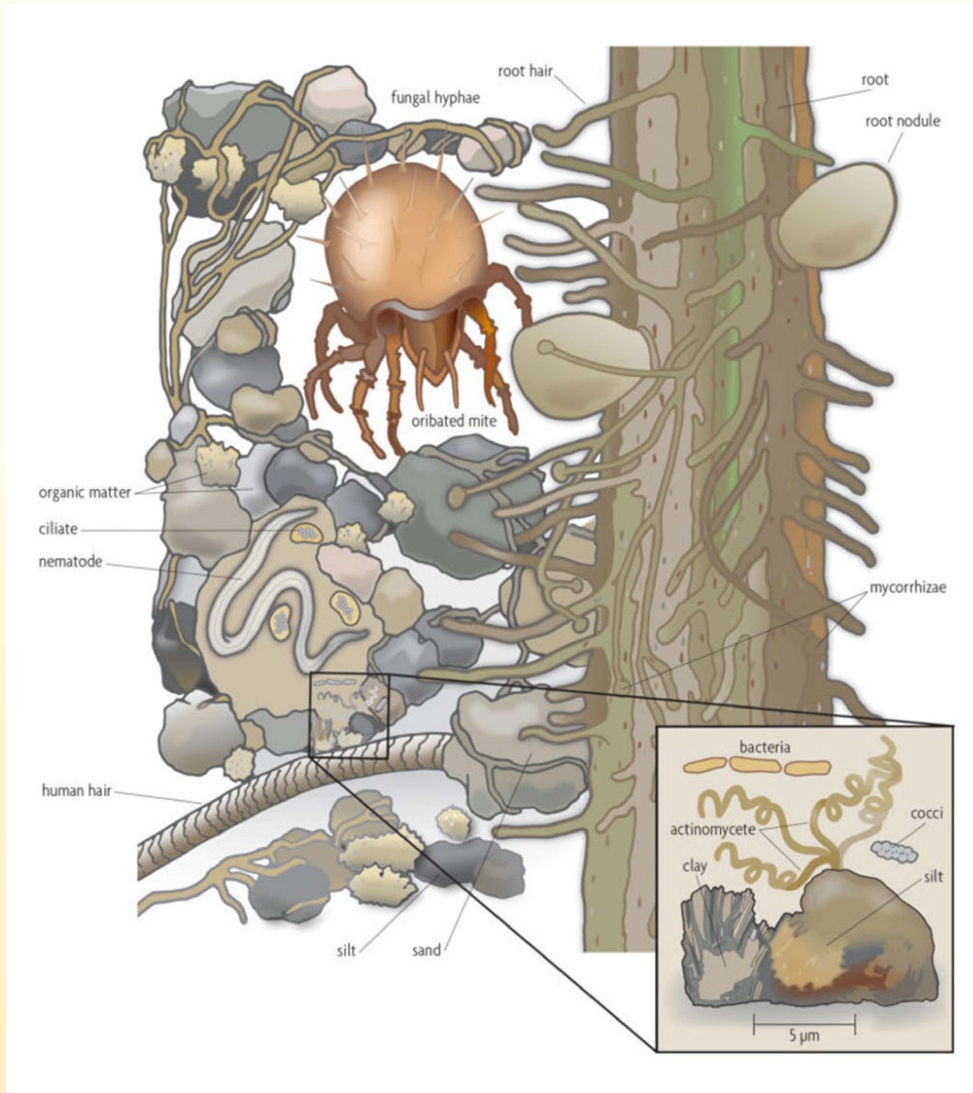


Continual Live Plant/Root

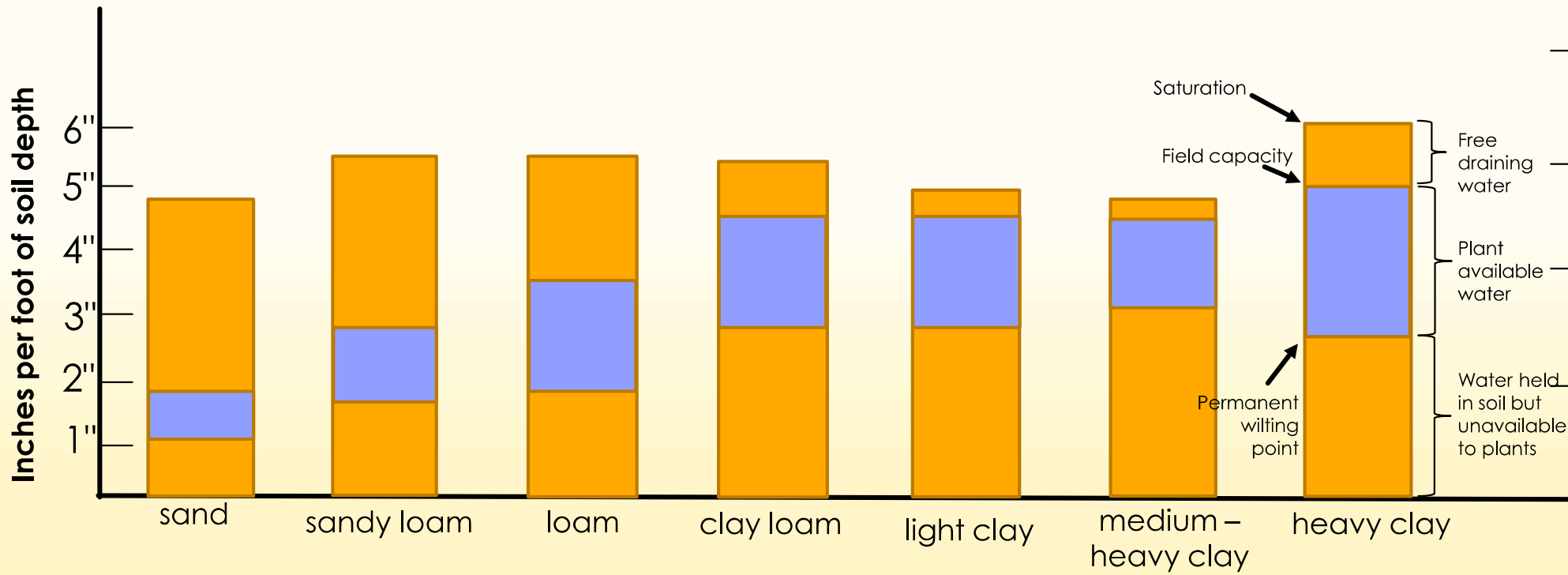


Integrate Livestock

How does soil hold water?



How much water does an acre of soil hold?



Adapted from Armstrong et. al., *Assessing Your Soil Resources for Irrigation*



How can we catch & hold more water in soil?

- Add organic matter
- Reduce tillage/no-till
- Cover crops
- Convert cropland to pasture
- Compost
- Mulches
- Perennial crops
- Better grazing management
- Integrating animals into crop farming
- Landforming (terraces & swales)
- Micronutrients & microbial inoculants
- And many more...



How does organic matter affect water-holding ca

% Organic matter	Sand	Silt loam	Silty clay loam
1	1.0	1.9	1.4
2	1.4	2.4	1.8
3	1.7	2.9	2.2
4	2.1	3.5	2.6
5	2.5	4.0	3.0

Source: Strickler 2018, *The Drought Resilient Farm*



healthy soil has amazing water-retention capacity. Every 1% increase in organic matter increases water-holding capacity by 25,000 gallons per acre.

Source: Kansas State Extension Agronomy e-Update

USDA United States Department of Agriculture

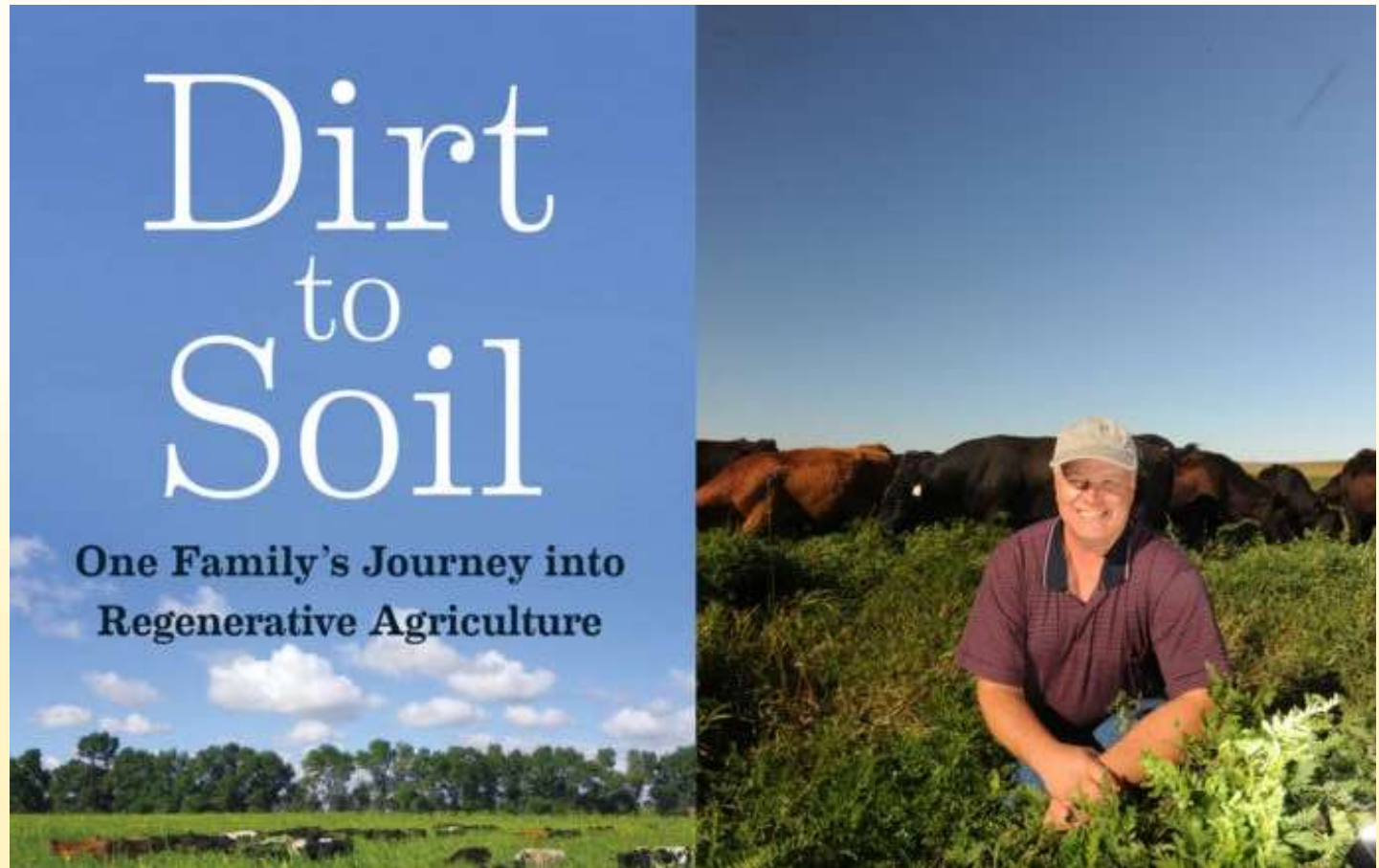
Want more? Check out www.nrcs.usda.gov

USDA is an equal opportunity provider and employer.

Are we helpless?



In college I was taught that while it is possible to increase soil organic matter, it would never be economically feasible to do so...The psychological effect of that statement was to convince generations of farmers that increasing soil organic matter is an unachievable goal, so don't even bother to try.
- Dale Strickler, *The Drought Resilient Farm*

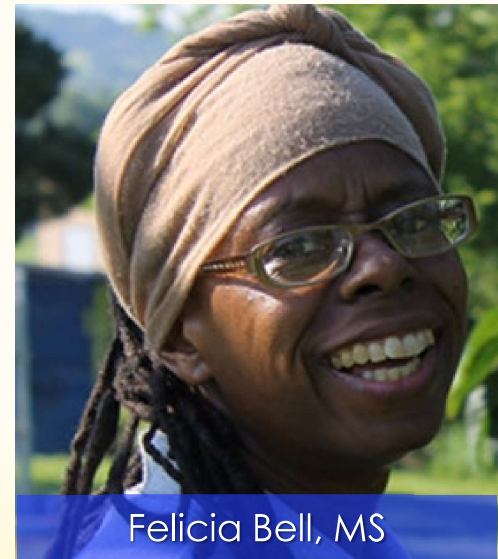




5.3 inch Rainfall Event

<p>Management:</p> <ul style="list-style-type: none"> • No-till Crop Rotation • Cover Crops • Planned Grazing Management 	<p>Management:</p> <ul style="list-style-type: none"> • Conventional • Small C • No Cov • No Gra
<p>Infiltration Rate= 6 in/hr</p> <p>143,906 gallons of water/Ac Stored</p>	<p>Infiltration Ra</p> <p>16,5 gallons of Stor</p>

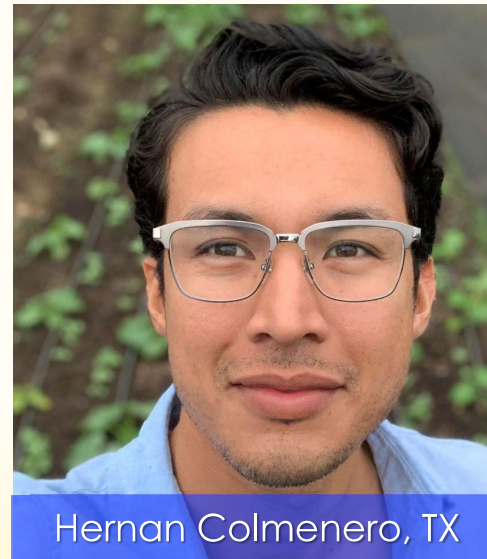




Felicia Bell, MS



Linda Coffey, AR



Hernan Colmenero, TX



Mike Lewis, KY



Mike Morris, CO



Linda Poole, MT



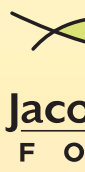
Nina Prater, AR






















Lee Rinehart, PA

Our approach: peer to peer

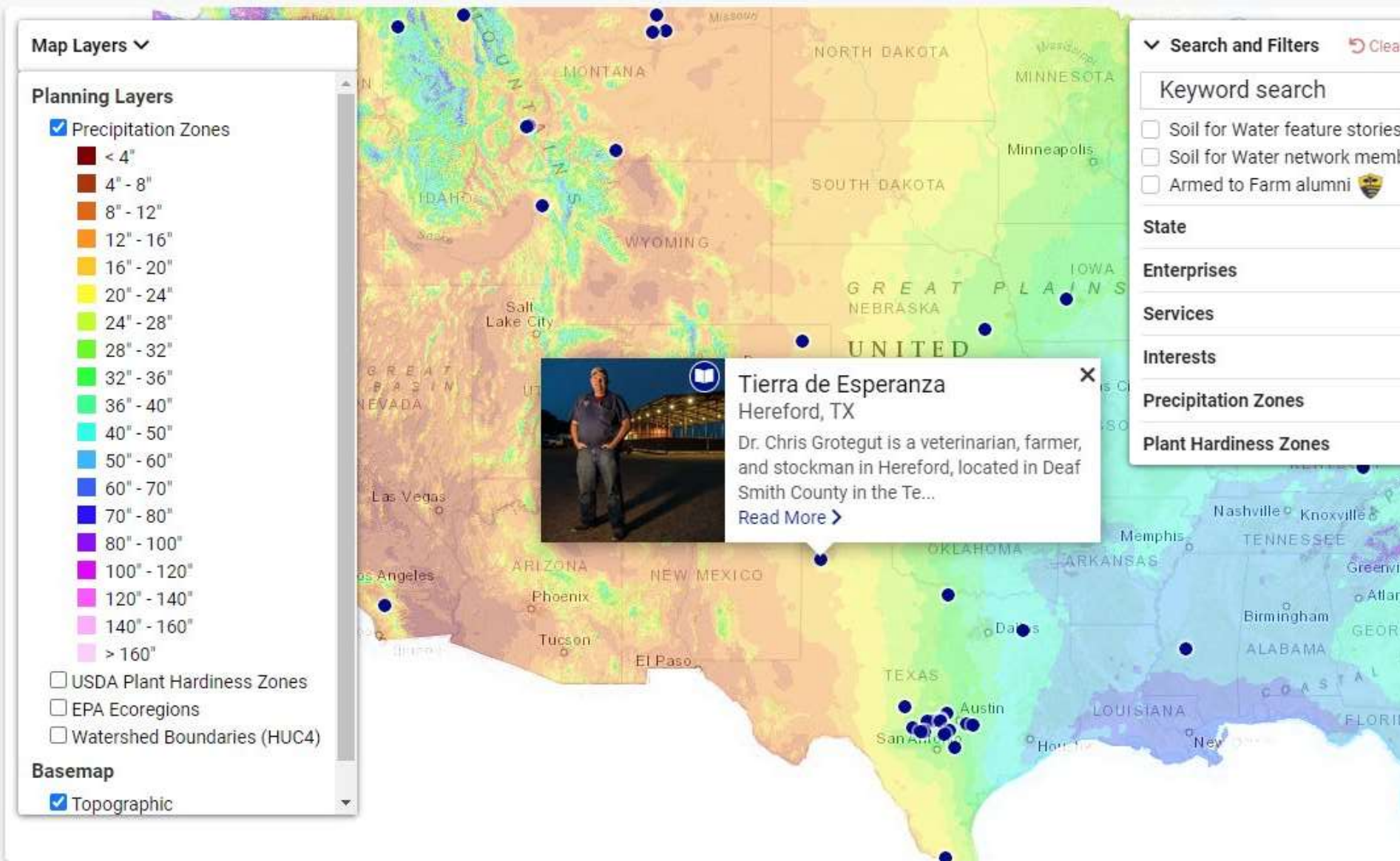
25 Colorado farms/ranches & growing



Forums			
What's new		Members	
New posts	Find threads	Watched	Search forums Mark forums read
Soil and Water			
 The Soil Sponge	Threads: 5	Messages: 9	 What is the least damaging to the Friday at 11:14 AM · Lee Rinehart
 Water Conservation	Threads: 4	Messages: 7	 Resources for retaining water on Wednesday at 11:17 PM · JustinM
 Spreading Water	Threads: 1	Messages: 3	 Catching Rainwater Dec 2, 2021 · Prairie Shepherd
 Soil Amendments, Compost, and Biochar	Threads: 1	Messages: 17	 Anyone using biochar as a soil an Feb 27, 2022 · Peter of Asheville
 Soil Testing	Threads: 3	Messages: 10	 Soil Health Testing Friday at 2:32 AM · JustinM
Livestock and Grazing			
 Animal Health and Husbandry	Threads: 4	Messages: 8	 ATTRA question on multispecies Friday at 9:15 AM · Lee Rinehart
 Carrying Capacity and Grazing Plans	Threads: 3	Messages: 5	 Troy Bishopp's Grazing Charts for Thursday at 7:27 AM · Linda Poole
 Infrastructure	Threads: 1	Messages: 13	 Electric fencing for sheep Jan 24, 2022 · Tracy Mumma
 Stockmanship	Threads: 1	Messages: 3	 Migratory Grazing Wednesday at 11:51 PM · JustinM
 Predators, Parasites, and Pests	Threads: 1	Messages: 1	 L Introducing myself Dec 11, 2021 · Linda Coffey

Regenerator's Atlas of America

Commercial producers only



On-farm trials



Birdwell & Clark Ranch



Parker Creek Ranch



Roam Ranch



Terra Purezza Farm



Stowers Ranch



Chris Grotegut: Tierra

Workshops & fun stuff



What you can do

- Continue to support the Soil Health Initiative and STAR program at the Colorado Dept of
- Continue to support soil health initiatives in the Colorado Water Plan.
- Encourage experimentation and peer-to-peer learning.
- Follow our project. Sign up for our e-mail list for news & updates.
- Tell us about Colorado success stories we can feature on our website.



A few good resources

- Drought Resilient Webinar series **TONIGHT** with Dale Strickler, the guru of Drought Resilient Agriculture
<https://us06web.zoom.us/j/8445121212>
- Soil for Water: <https://soilforwater.org/> A community & resource for all interested in catching and holding moisture
- NCAT's ATTRA sustainable agriculture information service: <https://attra.ncat.org/>
Free publications, videos, podcasts, and technical assistance—for all involved in commercial agriculture
- Soil Health Program at the Colorado Dept of Agriculture: <https://ag.colorado.gov/soil-health>
- Turning Soil into Sponges: <https://www.ucsusa.org/resources/turning-soils-sponges>
Everything you really need to know, in a 3-minute video
- NRCS Soil Health: <https://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>
- Kiss the Ground: <https://kisstheground.com/> “Awakening people to the possibilities of regeneration”
- The Carbon Cowboys: <https://carboncowboys.org/> Soil regeneration success stories on agricultural land
- Open ET: <https://openetdata.org/> Free, satellite-based, evapotranspiration estimates in Google Earth format for individual farm fields as small as ¼ acre.

THANK YOU!

Mike Morris, mikem@ncat.org
soilforwater@ncat.org
[Soilforwater.org](https://soilforwater.org)