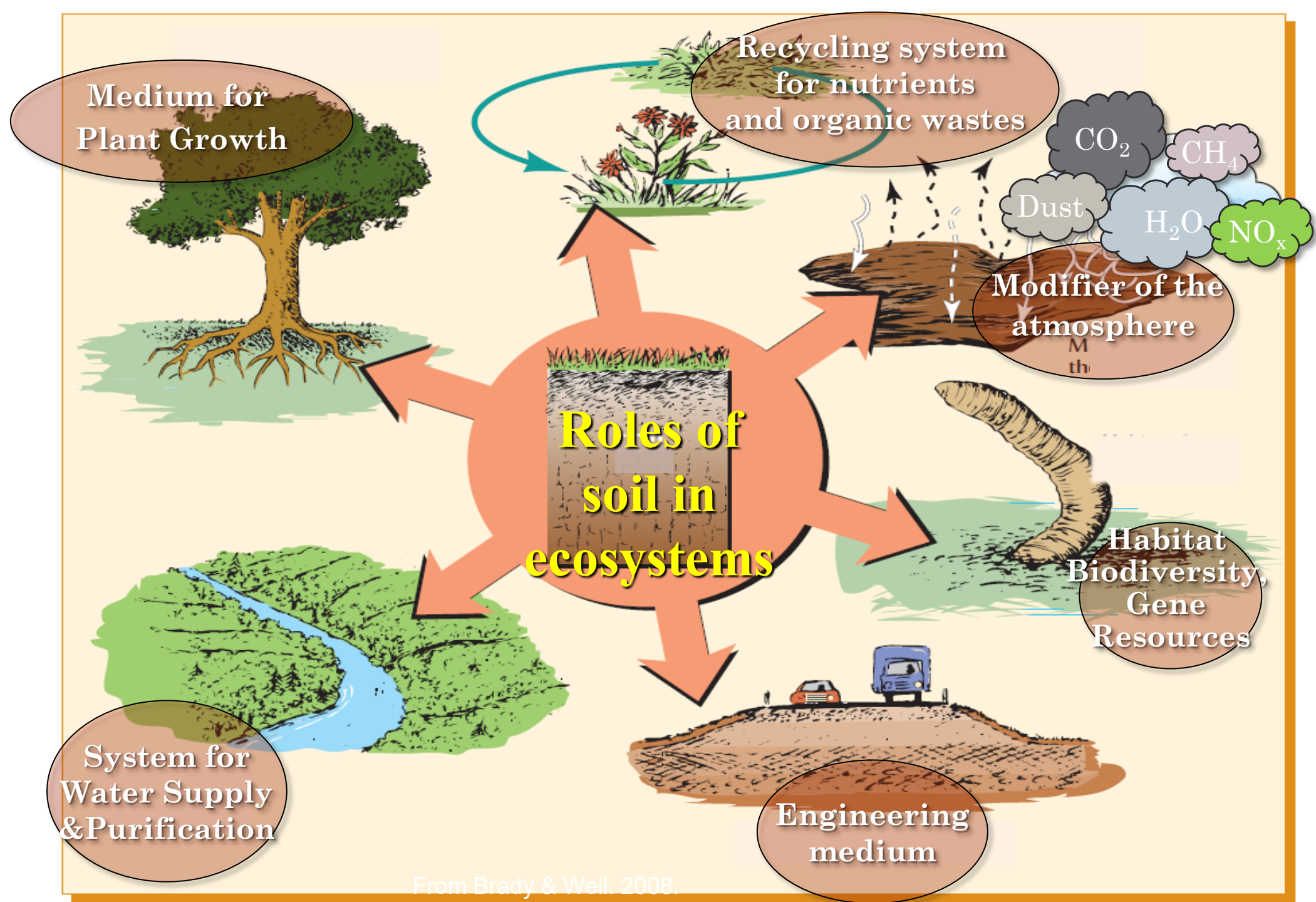


A Soils-Centric View of the SDGs & Earth's Ecosystems

NASEM Washington, DC, 13 July 2023

Ray R Weil

University of Maryland



As a Soil Scientist, I know my work promotes SDG#2, but many other SDGs well.



SDG#1

POVERTY

“Poor land makes
poor people and
poor people make
poor land” – The
River



SDG#2

HUNGER

90% of human food
comes from soils



SDG#3

HEALTH

Food as medicine.
Most drugs from
soil & plants



SDG#4

EDUCATION

Soils integrate
math, physics,
chemistry,
biology, geology



SDG#6 CLEAN
WATER

Water is welcome
in soil, but soil is
rarely welcome in
water.



SDG#13
CLIMATE

Soil C >
atmosphere +
vegetation.

Soils: great integrators of the SDGs

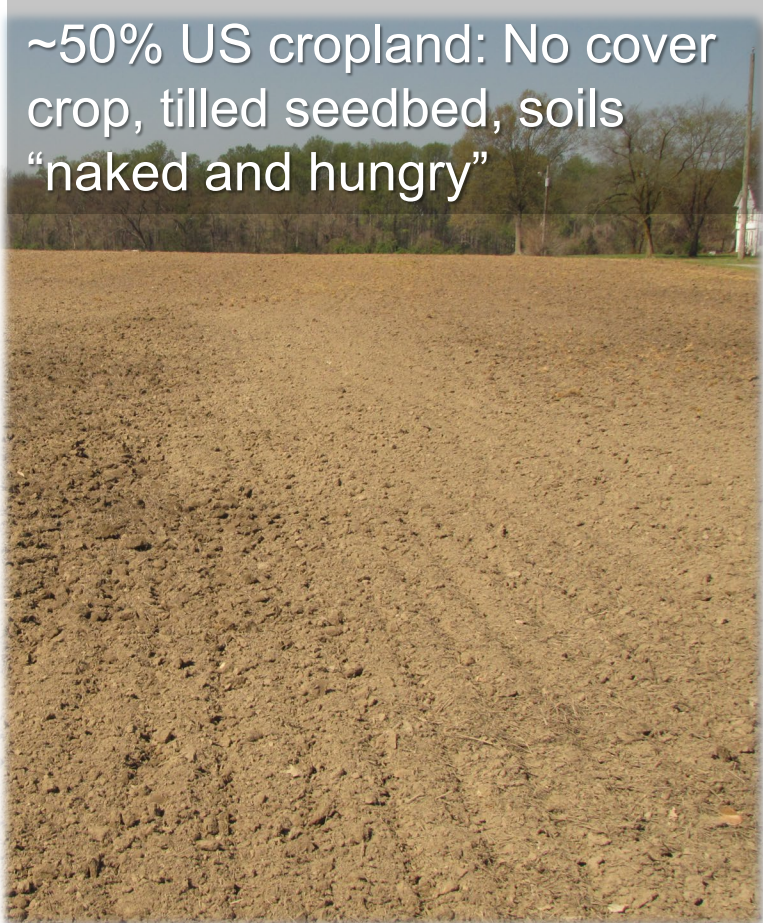


Think about...

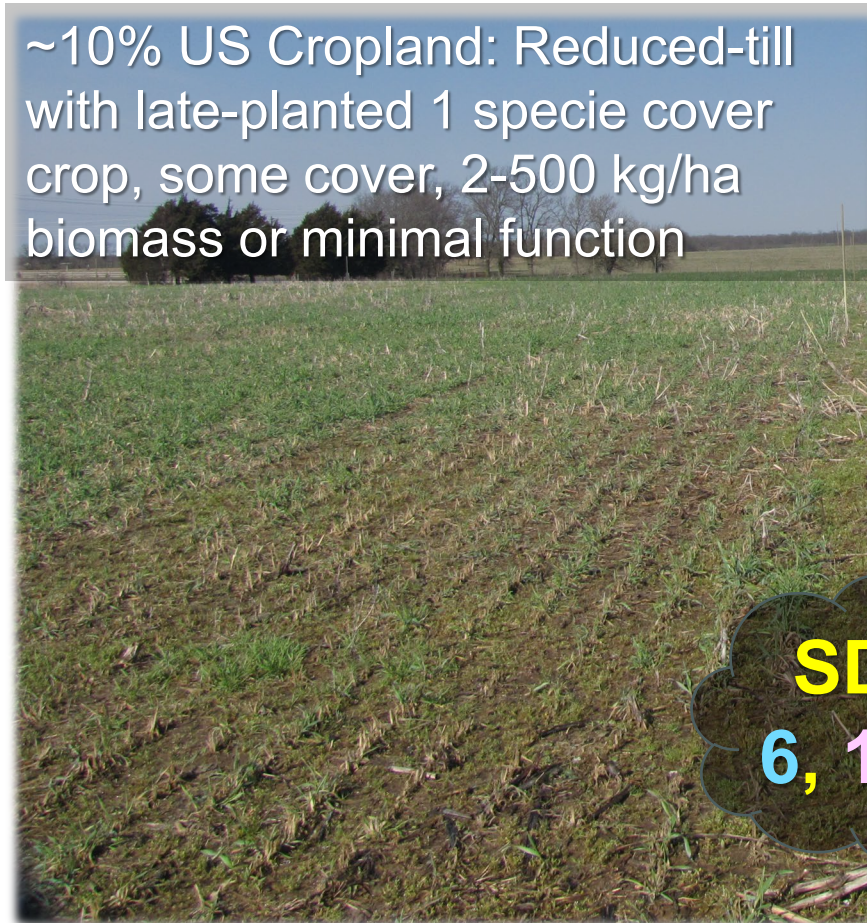
**Managing plants to
improve soils**

Cover crops are tools to manage soils by replacing winter “fallow”

~50% US cropland: No cover crop, tilled seedbed, soils “naked and hungry”



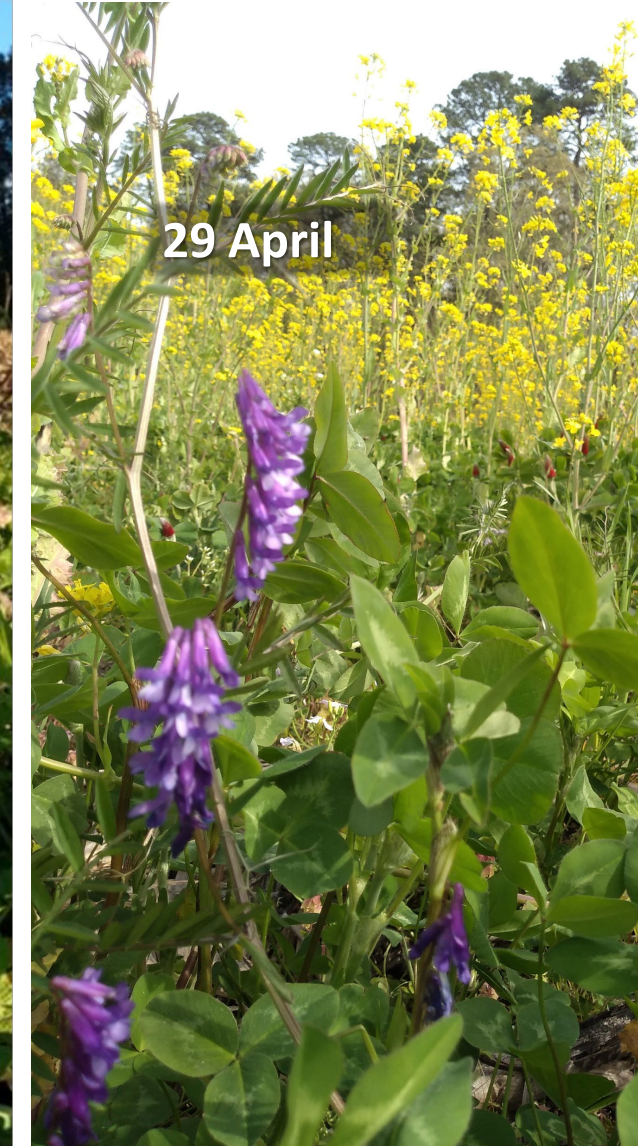
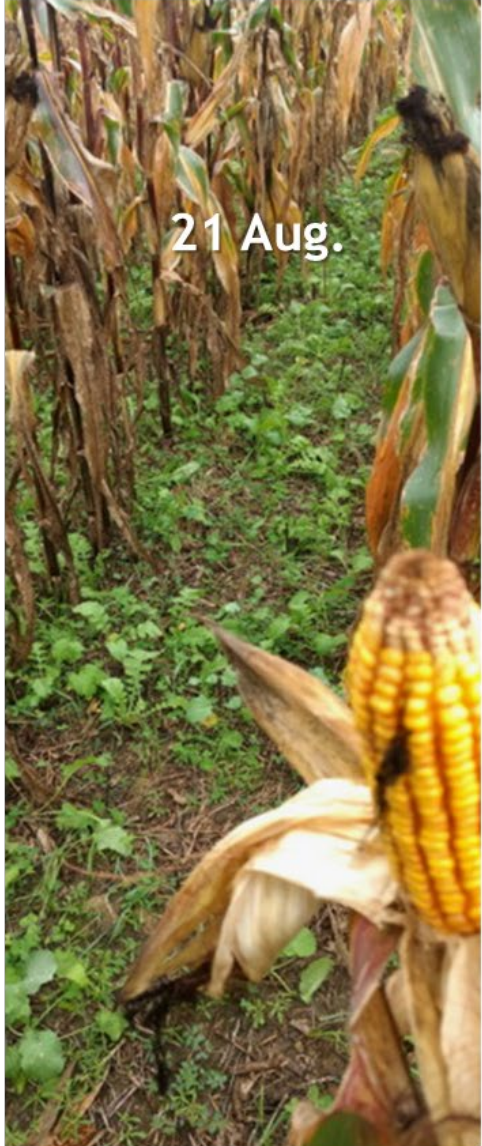
~10% US Cropland: Reduced-till with late-planted 1 specie cover crop, some cover, 2-500 kg/ha biomass or minimal function



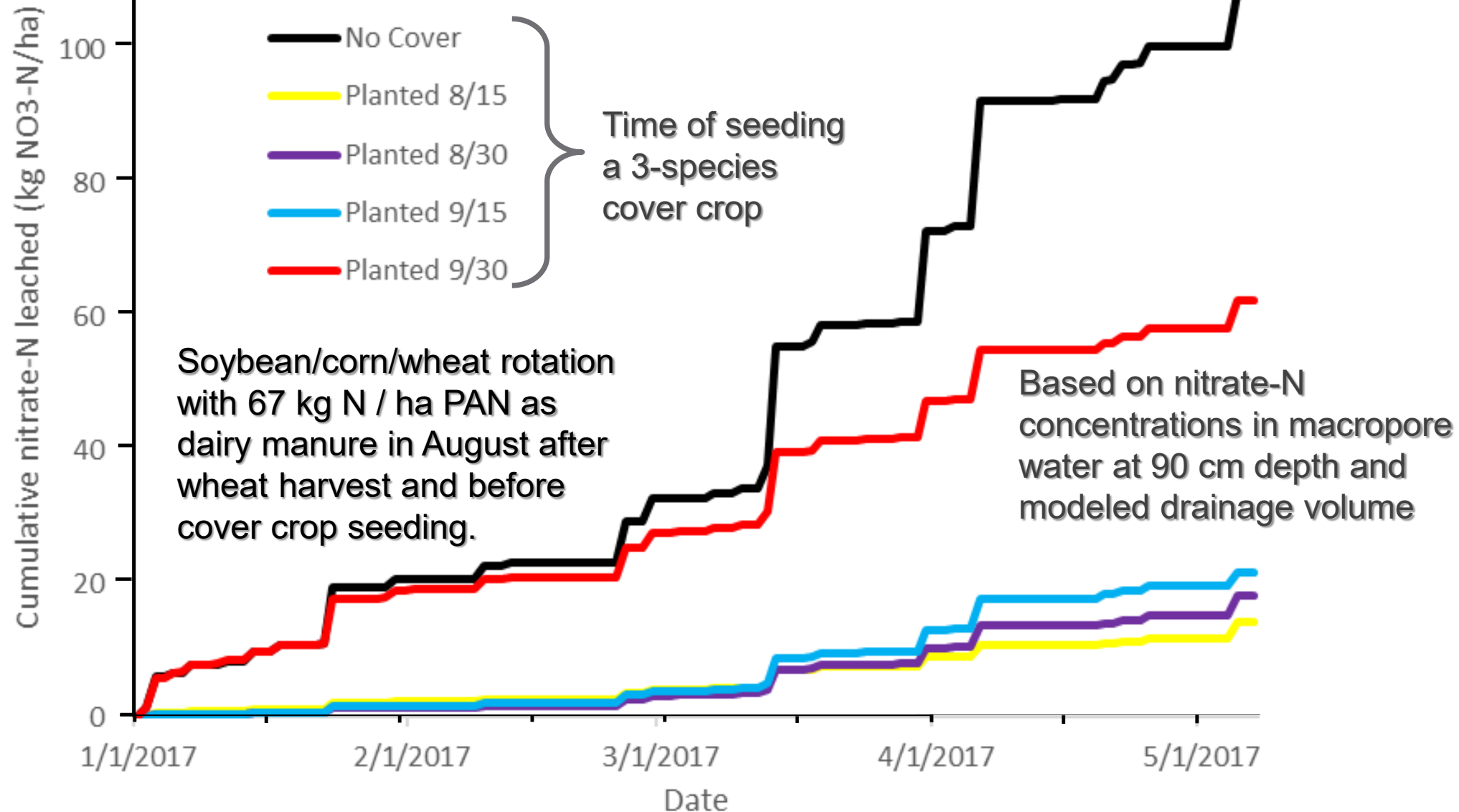
~1% US Cropland: No-till with early-planted multi-species cover crop, 3-5,000 kg biomass, highly multifunctional



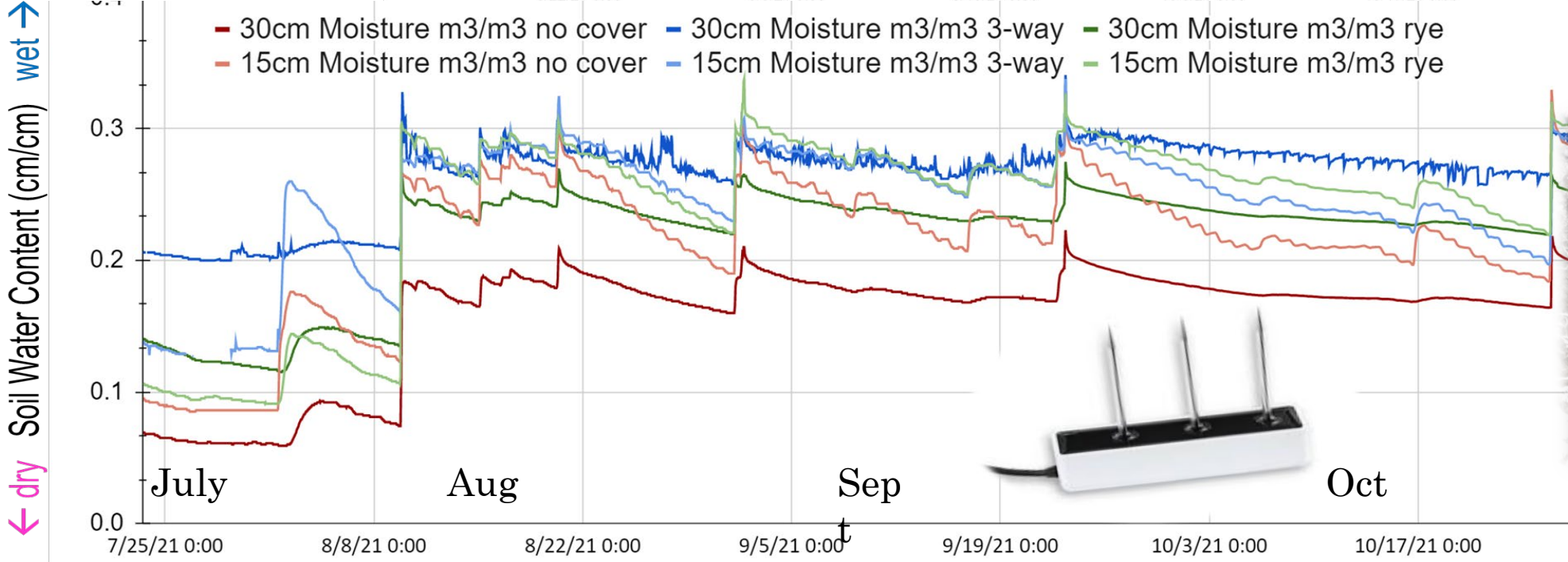
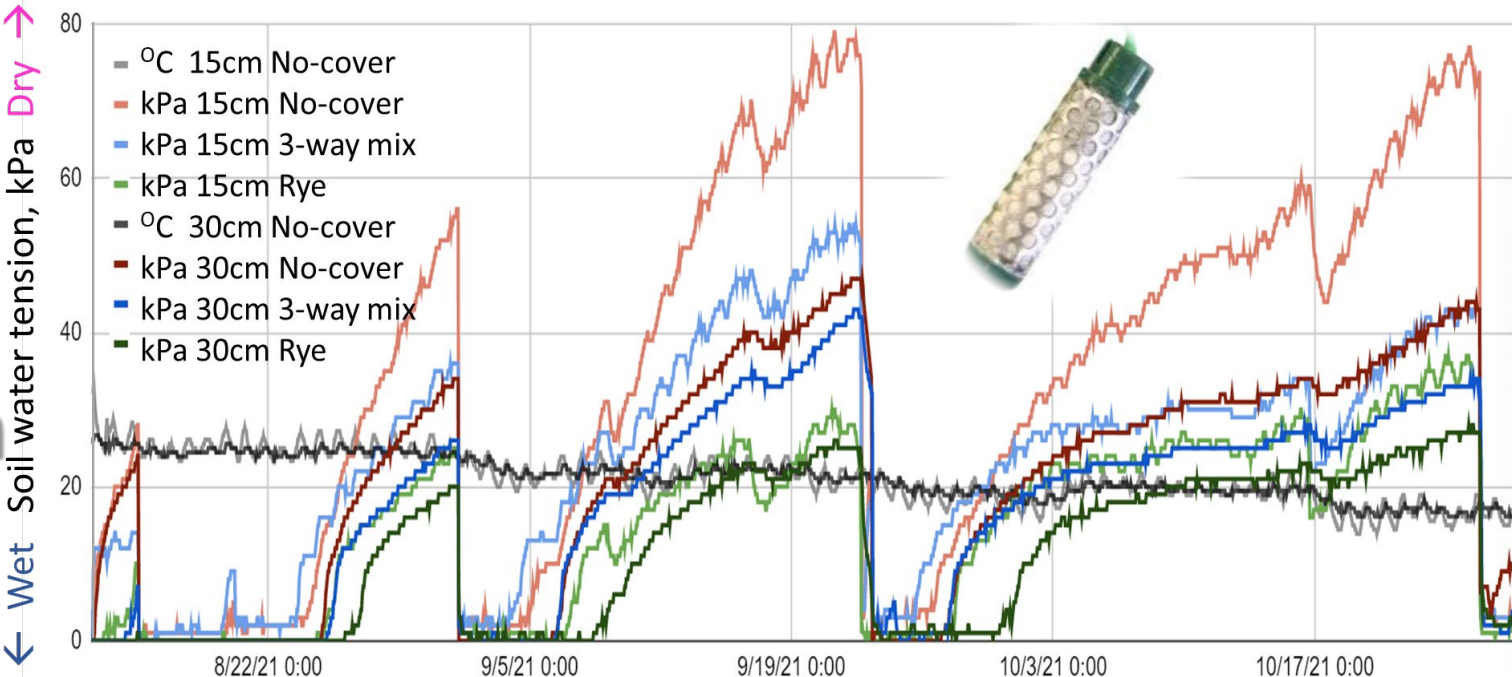
Multi-species, interseeded cover crops add diversity & ecosystem services to commercial food production



Cover Crop Use and Timing Affects Nitrate-N Leached from Sandy Coastal Plain Cropland



Cover crops impact how rainwater interacts with soil



Winter rainwater infiltration in Pistachio orchards with and without a cover crop



4-5y Pistachio trees Davis, CA winter fallow after 3 cm rain, Pescadero SiC soil



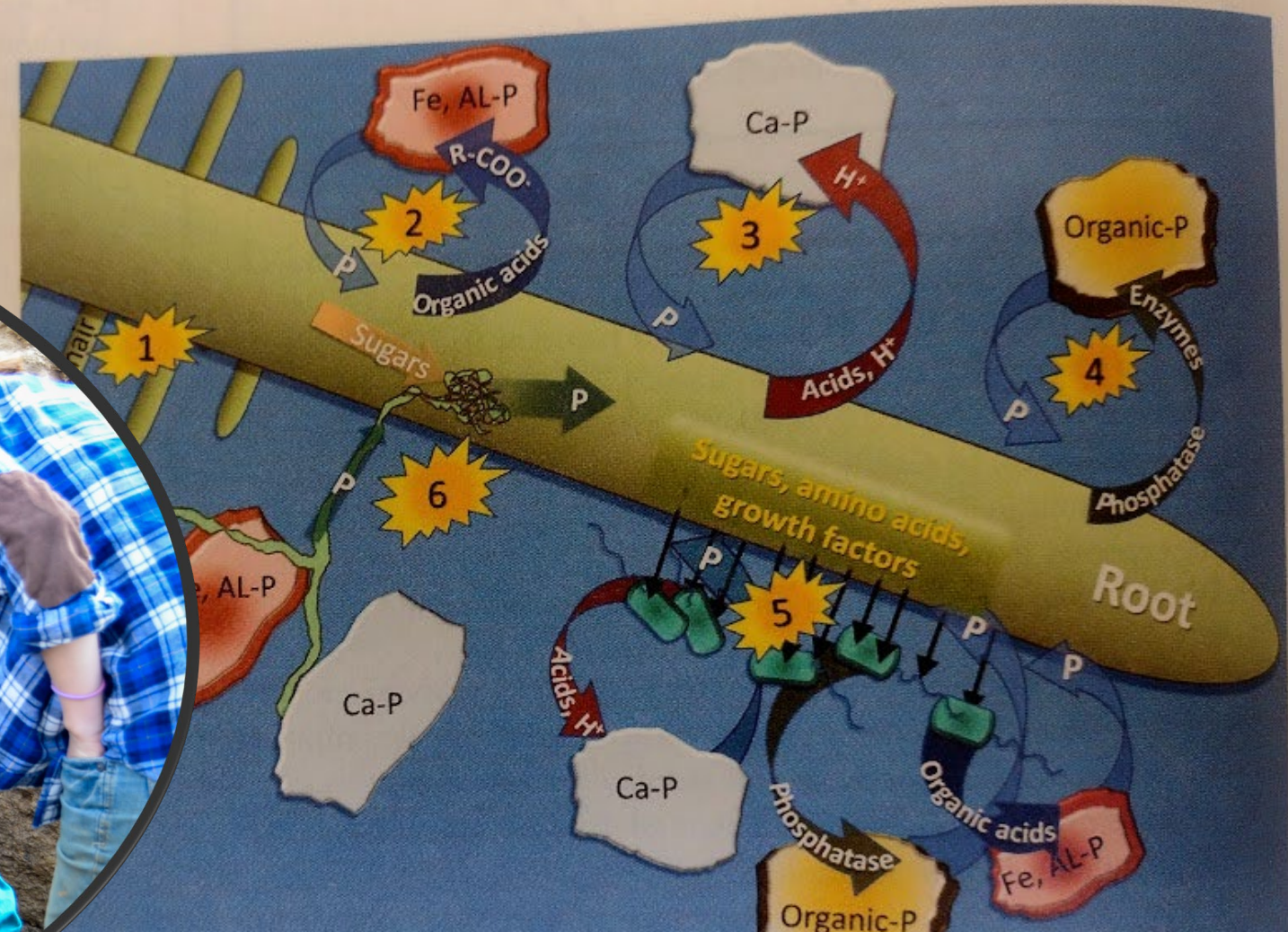
4-5y Pistachio trees Davis, CA with cover crop after 3 cm rain, Rinco SiCL

SDGs
6, 13, 15

Personal comm. 2023. Z. Kabir, USDA/NRCS

- of H^+ ions and pH
4. Roots may exude enzymes (phosphatases) that can break down organic compounds, especially in dissolved organic P, making the phosphorus available for root uptake.

Figure 14.30 Six basic strategies that plant roots may employ to enhance their uptake of various forms of phosphorus from soils.



SDGs 4, 17
Education,
Collaboration



Thank you.

SDGs 4, 17
Education,
Collaboration



124 years of evolution: *The Nature and Properties of Soils*

SUSTAINABLE DEVELOPMENT GOALS

