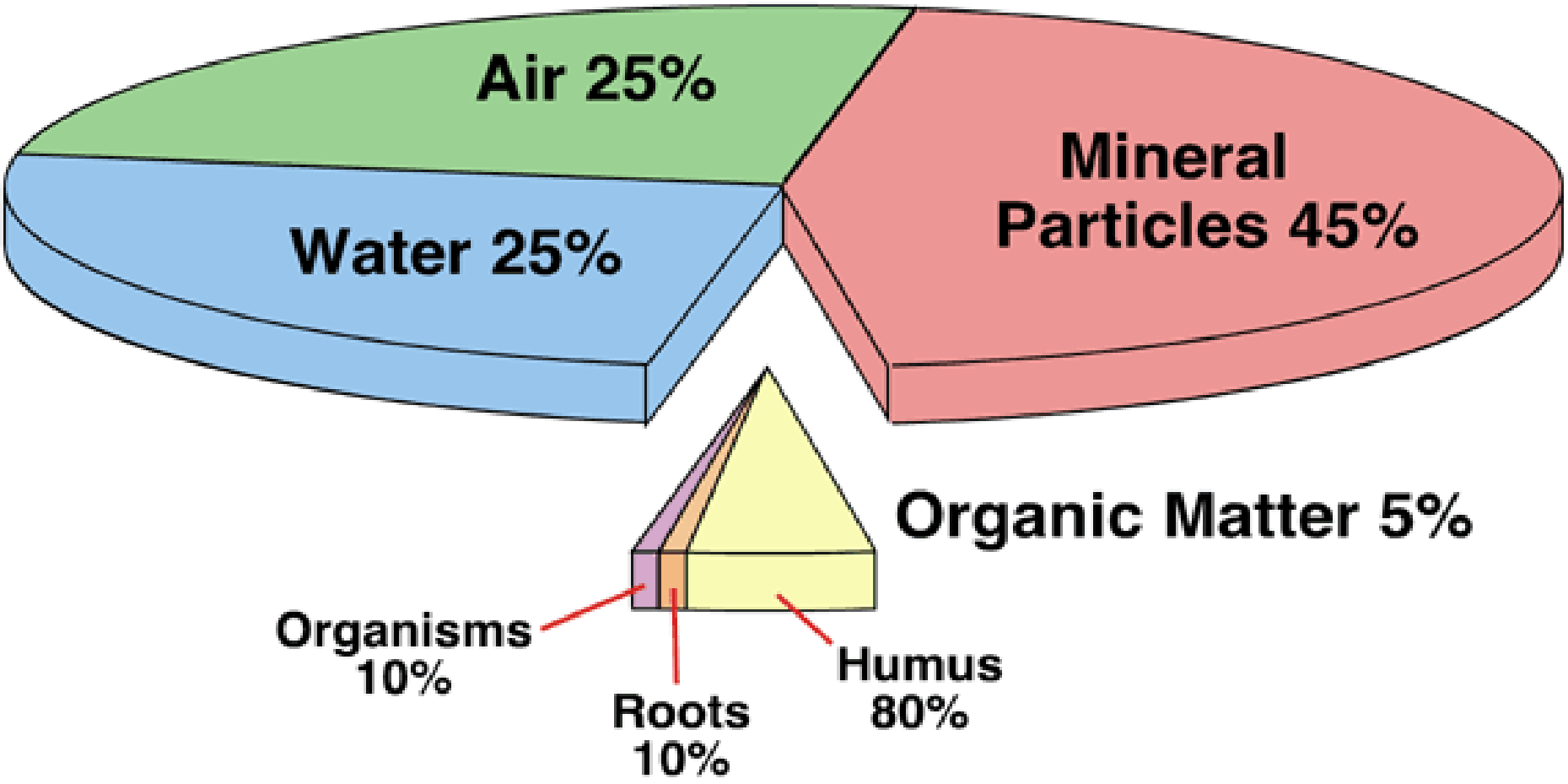
Advanced Soil Workshop, part 3 of 3

Rob Bennaton
Cooperative Extension County Director,
Alameda and Contra Costa Counties
&
Bay Area Urban Agriculture Advisor

The Soil Matrix Pie Chart



Soil is a matrix of minerals, Organic Matter, O2, H2O & living organisms.

What is SOM?

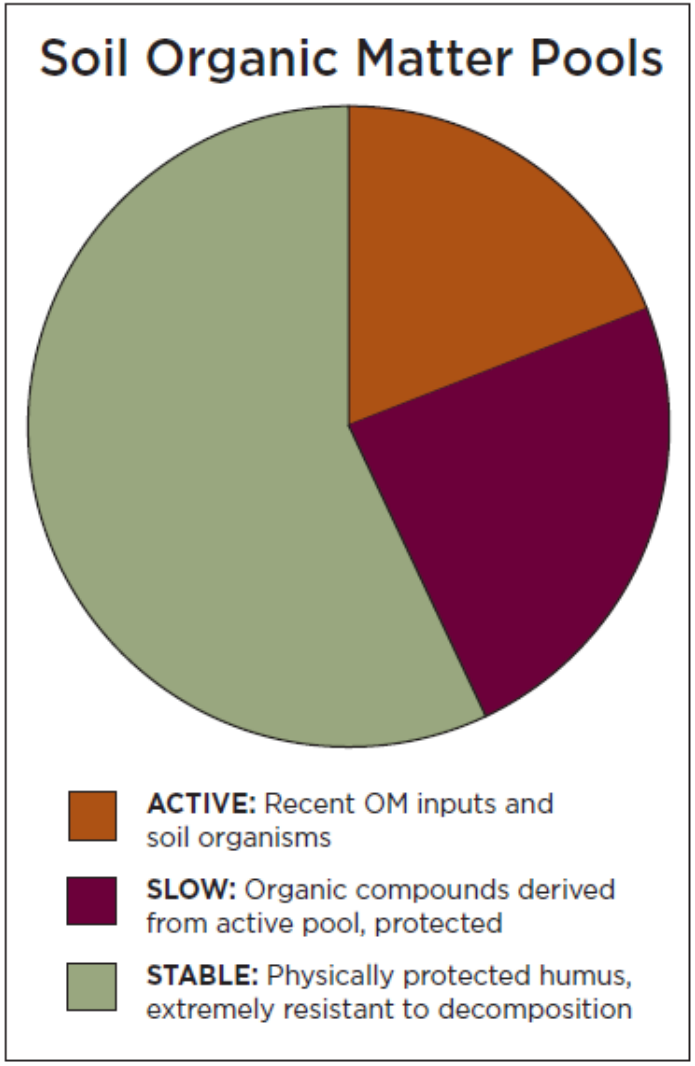


Fig. 2. Typical distribution of soil organic matter between active, slow, and stable pools. Actual proportions will vary with soil type and management practices.

Building SOM

1. Slow decomposition rate
2. Enhance carbon inputs
    1. Reduce amount of tillage (turning of soil)
    2. Organic amendments, topdressing, cover crops

Management plans should accomplish 1+2 simultaneously (although not always)

Building Stable SOM

- Key=Time
- Practices designed to increase amount of Carbon taken up by Slow and Active SOM pools
- Key result of appropriate slow SOM pool building techniques

Slow SOM

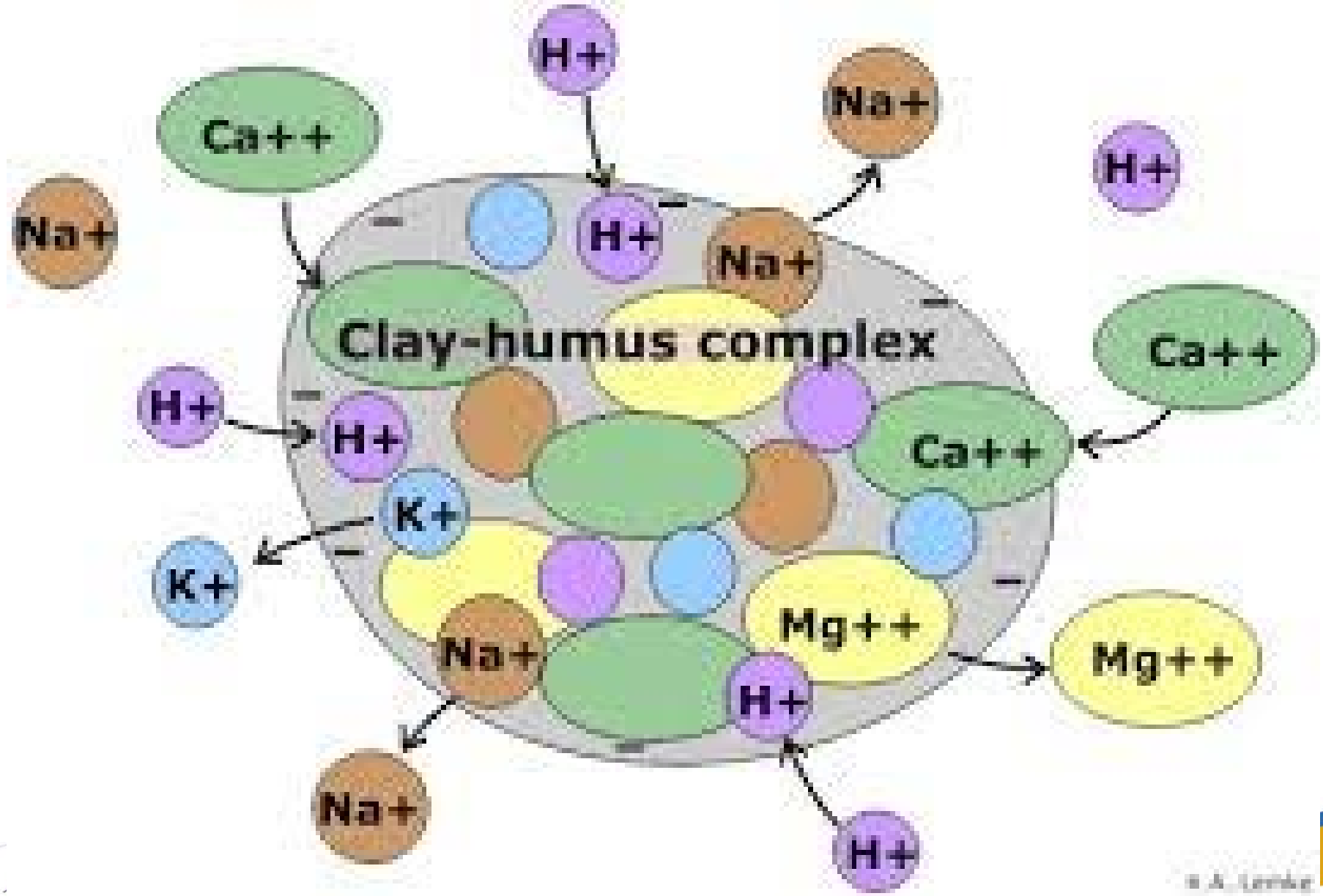
- Adding of organic material key
  - Cover crop/crop residue left as mulch
  - Manure
- Large taproot systems
  - Alfalfa ^, legumes- C reintroduction
- Tradeoffs associated with different types of organic matter amendments

UC Cooperative Extension Programs

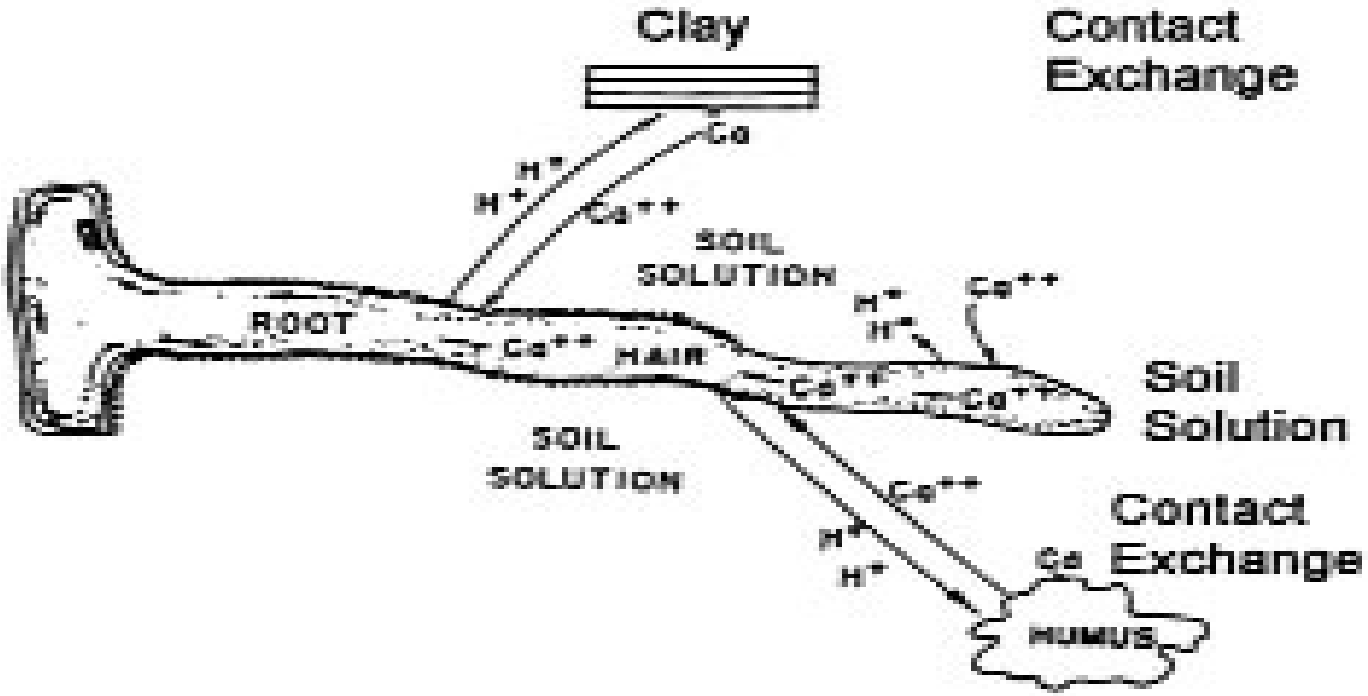
Residue Quality	Poultry Manure	Slurry Manure (Swine or Beef)	Dairy Manure	Wheat straw*	Legume roots and leaves**
N content	2–4%	1–3%	1–4%	<1%	2–5%
C content	19–28 %	14–23%	16–45%	45%	45%
C:N ratio	5–14	4–25	11–45	40 or higher	25 or lower
pH	Neutral to Alkaline	Acidic	Neutral	Neutral	Neutral
Quality: for active SOM (nutrient supply)	High	Medium	Low-Medium	Low	High
Quality: for stable SOM (build C)	Low	Low	Medium-High	High	Low-Medium

* Stover from other small grains such as rye or barley has similar properties.

** Legumes grown in rotation as forage or cover crops provide inputs from leaves which are high in nitrogen and root tissues, which have moderate nitrogen levels and are relatively slow to decompose.

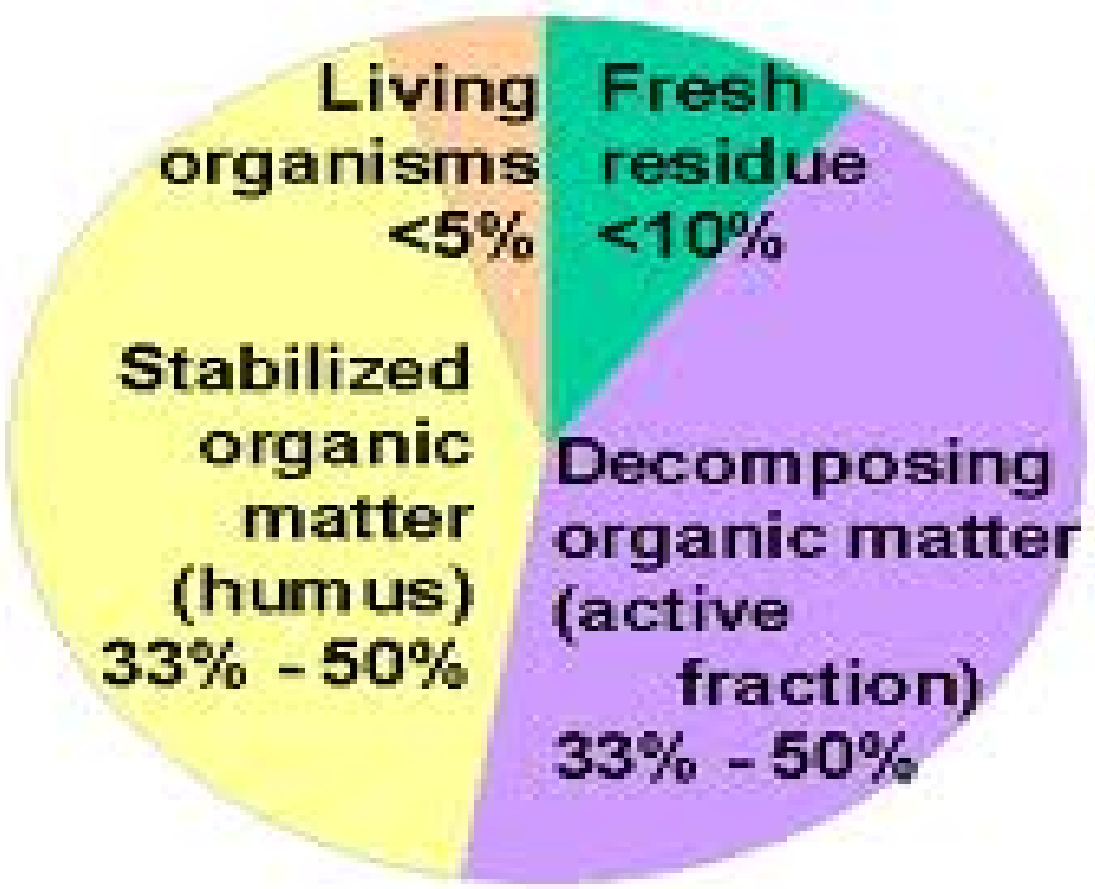

H+
Ca++
Na+
Na+
H+
H+
Na+
Clay-humus complex
Ca++
H+
H+
Ca++
K+
K+
Mg++
Mg++
Na+
H+
Na+
H+

Cation Exchange at Root Tip



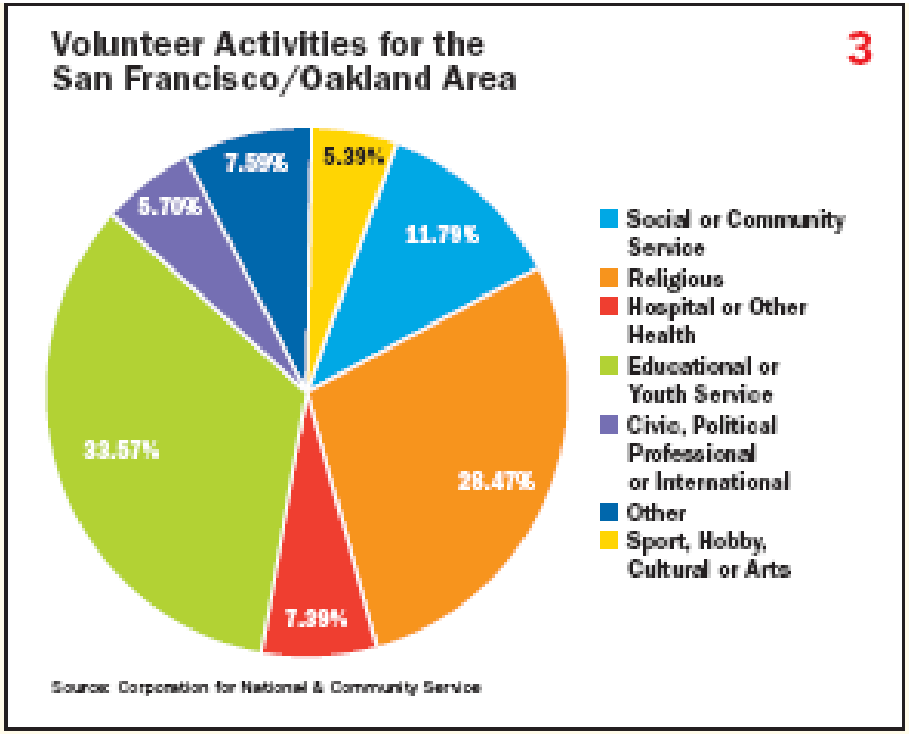
Diagrammatic scheme showing how root hair takes in nutrients from exchangeable ions on a clay crystal and on humus, and from soil.

Your Goal


Living organisms <5%
Fresh residue <10%
Stabilized organic matter (humus) 33% - 50%
Decomposing organic matter (active fraction) 33% - 50%

Active SOM Pool

Making Every Volunteer's Hours Count



4-H Community Volunteer

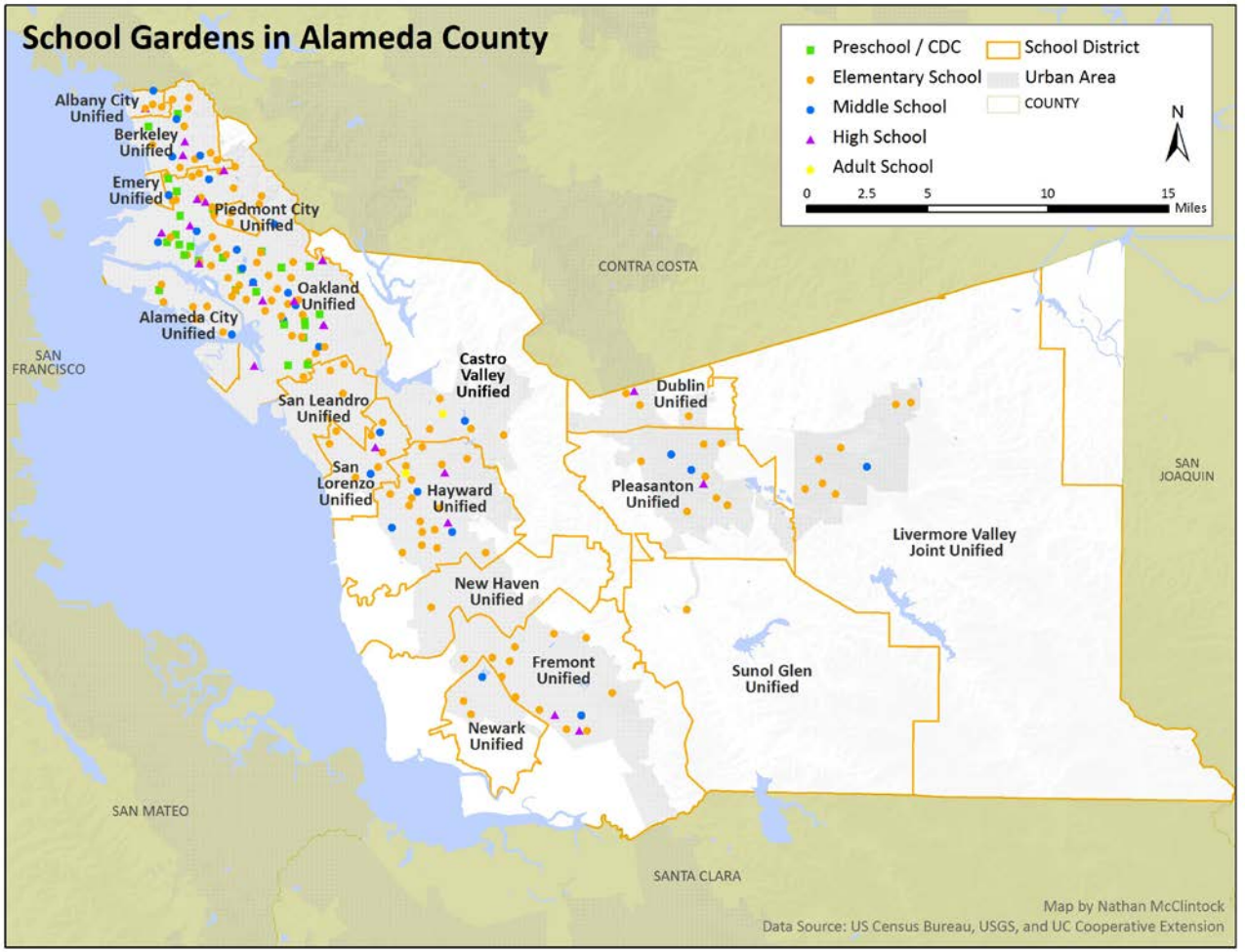
2008-2010 Hours = 11,247

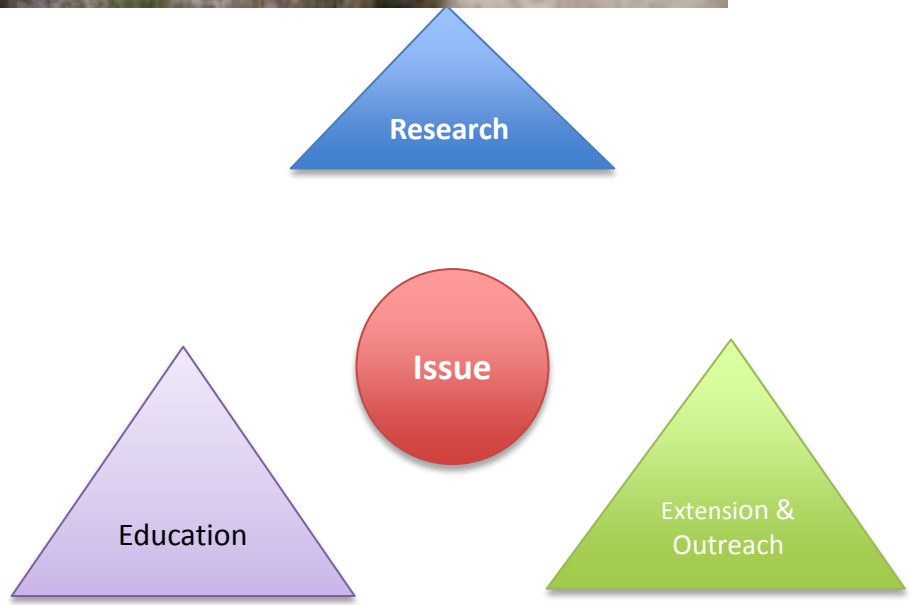
Hours Valued = $278,363

Master Gardener Volunteers

2008-2010 Hours = 15,436

Hours Valued = $339,129


School Gardens in Alameda County
Preschool / CDC
Elementary School
Middle School
High School
Adult School
School District
Urban Area
COUNTY
N
0 2.5 5 10 15
Miles
Albany City Unified
Berkeley Unified
Emery Unified
Piedmont City Unified
Oakland Unified
Alameda City Unified
San Leandro Unified
San Lorenzo Unified
Hayward Unified
Castro Valley Unified
Dublin Unified
Pleasanton Unified
Livermore Valley Joint Unified
New Haven Unified
Fremont Unified
Newark Unified
Sunol Glen Unified
CONTRA COSTA
SAN FRANCISCO
SAN MATEO
SANTA CLARA
SAN JOAQUIN
Map by Nathan McClintock
Data Source: US Census Bureau, USGS, and UC Cooperative Extension



Our Approach to Outreach, Action and Involvement

1. Identify Issue

The food on your plate may come from the next county or from the other side of the world.

2. Conduct Research

To keep growers produce better quality at low-cost; to increase access to consumers.

3. Measure Potential Impact

Identify some issues associated with high cost or no availability of produce.

4. Select Education Approach

Measure outcomes and impacts

5. Conduct Outreach & Program

Assess & Evaluate; ID Needs

UCCE Aligned with Alameda & Contra Costa County's Priorities

→ Equity & Quality of Life →

Initiate 3: Enhance competitive, sustainable food systems

Initiate 2: Helping build and maintain healthy families and communities

Initiate 1: Enhancing County residents health through Community Education

Initiate 4: Increasing youth life skills, science education and reducing nature exposure deficits

Initiate 5: Helping build and maintain sustainable ecosystems

Initiate 6: Ensure safe and secure food supply

Environmental Health

Economic Health

People we Serve

- ✓Low-income Families
- ✓ Grandparents
- ✓ Senior Citizens
- ✓ Low-income mothers with young children
- ✓ Schools serving low-income children
- ✓ Teens
- ✓ Community Based Organizations
- ✓ Park and Recreation Department
- ✓ Youth Development Professionals.
- ✓ Community Health/Human Services Providers
- ✓ Professional Organizations
- ✓ School and Public Ground Services Agencies
- ✓General Public

UC Cooperative Extension

Serving the People of Alameda & Contra Costa Counties

With Support from Alameda County Environmental Services Department and Contra Costa County Agriculture Department