Sir Albert Howard inspired by ‘Eastern’ agriculture

• Small farms
• Mix of people, plants and animals; wastes recycled as nutrients
• Human and animal labor, not machines
• Food crops, not cash crops (subsistence)
• Nitrogen fixed by legumes
• Reduced cultivation
• Composting
• Mimic natural ecosystems
Howard contrasted ‘Eastern’ and ‘Western’ models

- Large, growing farms
- Monocultures
- Mechanization
- Synthetic fertilizer dominates
- Increasing crop disease/pest problems
- More processed and preserved foods
- Success judged by profit
- Too much food (low prices force farmers off land and into cities)
Organic Rule of Thumb

• Naturally-sourced products allowed
• Synthetically derived products prohibited

• … some exceptions!
Organic Production Standards

Organic agriculture is “a production system that is managed in accordance with the Act and regulations in this part to respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.”
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Site specific conditions

- not a cookbook
- plans reflect unique characteristics of each operation
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Cultural practices *(how you grow)*

- crop timing
- crop selection
- resistance
- interplanting
- spacing
- orientation
- etc...
Pest management: Resistant varieties
How hard to grow in KY?

• Some crops are harder to grow organically than others.

• Easy:
  – Okra, radish, garlic, beets

• Moderate:
  – Cabbage, onion, potato, bean

• Difficult:
  – Muskmelon, eggplant, cauliflower
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Biological practices
(use your friends)

- release biocontrols
- develop beneficial habitat
- livestock grazing
- rhizobial inoculation
- etc...
Pest Management: Natural Enemies
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**Mechanical practices (use tools)**
- till
- weed
- mow
- flame
- fence
- etc...
Vertebrate Pest Management

• Few poisons or repellents available
• Exclusion and trapping (mechanical control) often best bet
• Similar physiology to people
• Goal is to solve problem, not kill animals
An Ounce of Prevention…

- Keep cat and dog food inside
- Seal homes
- No meat and fat in compost
- Clean up the bird feeder
- Repair fences
- Use netting over fruit
Moles

- Eat worms and insects, not plants
- Damage mainly cosmetic
- Place baits or traps in main tunnels (long and straight) in spring and fall
Voles

• Plant eaters
• Damage occurs below ground
• Prefer thick, heavy mulch and grass
• Keep mulch away from plant stems
• Bury hardware cloth cylinders 6” deep
• Put mouse traps baited with apple or butter in runs
Rabbits

• Damage trees & shrubs by feeding on bark
• Eat vegetables and flowers
• Poor climbers
• Protect trees with 2’ hardware cloth cylinders
• Protect gardens with 2’ wire fence or live electric wire 4” above ground
• Hot pepper repellents effective if re-applied after rain
Deer

• Fencing is the only reliable solution
Raccoons

- Good climbers
- Love sweet corn
- Repelled by 2 strand electric fence, 6” and 12” above ground
- Hot pepper repellents work, but make vegetables taste bad (spray on surrounding vegetation)
Birds

- Netting over fruit trees and bushes
- Scare tactics work for a little while
- May be pests or beneficials
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Cycling of Resources

• Re-use on-farm resources

• Avoid inputs and waste
"Take care of the waste on the farm and turn it into useful channels' should be the slogan of every farmer."

– George Washington Carver, Inventor and Educator, Birmingham, Alabama, 1936
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**Ecological Balance**

- achievement of steady state by ecosystem
- dynamic equilibrium between organisms and environment
- reduced outbreaks / extinctions (symptoms of imbalance)
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Biodiversity

Diversity of living organisms

Consider scale:
- range from cellular to biome
- applies to genes, species, ecosystems
What is soil?

- Water: 25%
- Minerals: 45%
- Air: 25%

Organic matter: 1-5%
- Living organisms: <5%
- Stabilized organic matter (humus): 33% - 50%
- Fresh residue: <10%
- Decomposing organic matter (active fraction): 33% - 50%
Soil Organic Matter

• Fresh
  – incompletely decomposed
  – adds bulk
  – food for soil organisms

• Humus
  – decomposed
  – dark brown or black
Humus

- Stores nutrients
  - 30-70% of CEC
  - 90-95% of soil N
  - 15-80% of soil P
  - 50-70% of soil S
- Makes nutrients available
- Holds water
- Aggregates soil

- Buffer
  - stabilizes pH
  - protects against high salt levels and toxic ion levels
- Moderates temp.
- Holds water
- Stimulates soil life
Soil Fertility: Animal Waste

• Raw manure pre-harvest interval:
  > 90 days if edible portion does not contact soil
  > 120 days if edible portion contacts soil
Soil Fertility: Compost

- No pre-harvest interval
- Strict requirements for manure-based compost
  - 131-170°F for 15 days in windrows
  - C/N = 25-40
# Soil Fertility: Cover crops

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Crops</th>
</tr>
</thead>
<tbody>
<tr>
<td>N source</td>
<td>Hairy vetch, crimson clover, subterranean clover, berseem clover, cowpea</td>
</tr>
<tr>
<td>Soil builder</td>
<td>Rye, sudex, subterranean clover</td>
</tr>
<tr>
<td>Erosion fighter</td>
<td>Subterranean clover, cowpea, rye</td>
</tr>
<tr>
<td>Subsoil loosener</td>
<td>Sudex, forage radish, sweet clover</td>
</tr>
<tr>
<td>Pest fighter</td>
<td>Rye, sudex, mustard/rape</td>
</tr>
<tr>
<td>Weed fighter</td>
<td>Buckwheat, subterranean clover, rye, sudex</td>
</tr>
</tbody>
</table>

Adapted from SARE, 2007. 
Managing Cover Crops Profitably.
Why Mulch?
- Weed management
- Moisture retention
- Add O.M.

What Mulch?
- Organic
  - wood chips, shredded bark, chopped leaves, straw, grass clippings, compost, sawdust, pine needles, paper
- Inorganic
  - gravel, stone, black plastic, landscape fabric
Organic Mulch

- 4”-6” to completely discourage weeds
- mulch next to stems invites slugs, rodents
- slows warming in spring
- adds O.M.

Plastic Mulch

- Warms soil, radiates heat at night
- Protects fruit from rotting
- Conserves moisture
- Non-renewable, non-biodegradable
- Organic standards require complete removal each year
• Eighteen raised beds, 6’ x 36’
• Five mulch treatments in four replicate blocks:
  – Bare control
  – Black Plastic
  – Silver Plastic
  – Black Landscape Fabric
    (2 reps only)
  – Hay
Monitoring

• Soil moisture
  – June 22 – Sept. 29
  – Field Scout TDR-300

• Soil temperature
  – June 30 – Aug. 10
  – Temp. recorded hourly 2 cm below soil surface
  – Probes attached to CR-1000 datalogger

• Yield
  – All fruit harvested Sept. 16 and Sept. 29
  – Counted, graded & weighed
Results – Soil Temperature

- Temperature lowest at sunrise; highest mid-afternoon
- Hay moderates daily temperature flux
- Black plastic maintains warmer temperature throughout day
Results – Soil Moisture

• Higher soil moisture under landscape fabric than other mulches
Results - Yield

• Yields higher with hay mulch than with no mulch or landscape fabric
Conclusions

• Advantages of hay:
  – Moderates soil temperature
  – Maintains soil moisture as well as plastic, but not as well as landscape fabric
  – Contributes organic matter to soil
  – Improves yield of summer-grown heirloom tomatoes
Organic agriculture benefits producers, consumers, environment

<table>
<thead>
<tr>
<th>Farmers</th>
<th>Consumers</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium prices</td>
<td>Third party certification of growing practices</td>
<td>Greater biodiversity</td>
</tr>
<tr>
<td>Growing demand</td>
<td>Mounting evidence of nutritional benefits (more antioxidants)</td>
<td>Reduced fertilizer runoff</td>
</tr>
<tr>
<td>More biological pest control without exposure to synthetic pesticides</td>
<td>Reduced pesticide residues on food</td>
<td>No synthetic pesticides added to air, water, soil</td>
</tr>
<tr>
<td>Greater energy independence</td>
<td>No routine antibiotics or growth hormones</td>
<td>Lower energy use</td>
</tr>
<tr>
<td>Improving soil quality (greater capacity to hold water and nutrients)</td>
<td>No genetically modified organisms</td>
<td>Carbon capture and storage in soil</td>
</tr>
</tbody>
</table>
Exponential growth

- U.S. organic product sales grew 17-21% annually for two decades, then 5-10% annually through 2009-12

- U.S. conventional food sales usually grow 1-5% annually

- Organic food sales represent more than 4% of U.S. food sales.

- Organic fruit and vegetable sales represent 12% of U.S. fruit and vegetable sales
  
  - (Organic Trade Association 2012)
Certified organic farms, by zip code: 10,159

Data from 2007, the most recent agricultural census.
Kentucky Certified Organic Producers, 2012
It’s the Law:
Who can sell farm products labeled “organic”?

<table>
<thead>
<tr>
<th>Organic Exempt</th>
<th>Certified Organic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Those who can answer ‘yes’ to ALL of the following can legally sell ‘organic’ products without certifying.</td>
<td>Those who answer ‘yes’ to ANY of the following MUST certify in order to sell products as ‘organic.’</td>
</tr>
<tr>
<td>I sell less than $5,000 worth of organic product each year.</td>
<td>I sell more than $5,000 worth of organic product each year.</td>
</tr>
<tr>
<td>I sell directly to the consumers.</td>
<td>I sell to wholesalers or resellers.</td>
</tr>
<tr>
<td>I have read, understand, and comply with national organic program standards.</td>
<td>I sell feed for organic livestock.</td>
</tr>
<tr>
<td>I have registered my farm as ‘exempt’ with the KDA.</td>
<td>I sell ingredients for organic processed foods.</td>
</tr>
<tr>
<td>I do not use the USDA organic seal.</td>
<td>I use the USDA organic seal.</td>
</tr>
</tbody>
</table>
GOLD New Potatoes
$1.50/pound
Scott County from our farm

Fayette Co.
$1.50
Heirloom Tomatoes
100% Chemical Free
Organic Certification Requirements

1. Management plan, approved by certifier
   – Required:
     • Boundaries, buffer zones separate organic from conventional
     • Organic seed, transplants
     • Maintain/improve soil fertility, organic matter
     • Rotation
   – Prohibited:
     • Synthetic fertilizers and pesticides
     • Genetically modified organisms
     • Sewage sludge
     • Burning (some exceptions)

2. Record keeping
Organic Seed

- Grown on certified organic land
- No GMOs
- Hybrids OK
- No synthetic seed treatments
- Expect premium price
Certification Paperwork

• General
  – Name, address, farm type

• Land
  – Crops, fields, 3 years of organic management

• Seed, seedlings, planting stock
  – Source, organic availability, treatments, GMO free

• Soil & fertility management
  – Composts, manures, fertilizers, irrigation

• Crop management
  – Rotation, weeds, pests, diseases

• Organic integrity
  – Buffers, barriers, handling, storage, transport

• Records
  – Maps, history, management, inputs, harvest, sales
Organic Marketing

The Kentucky Department of Agriculture provides guidelines and regulations for organic marketing. The Organic Program as a Certifying Agency certifies organic Crops, Wild Crops, Livestock, and Handling Operations.

KDA currently certifies only entities located within the state of Kentucky.

2013 Applications available early January 2013.

Regulations and Resources:

- **USDA organic regulations**: 7 CFR Section 205 includes all USDA organic standards, including prohibited practices, requirements, and the National List of Allowed and Prohibited Materials.
- **National Organic Program Handbook**: This compilation of guidance documents, policy memos, and instructions is intended to clarify policies and assist those who own, manage, or certify organic operations with complying with NOP regulations.
- **ATTRA**: Guide to Organic Crop Production
- **ATTRA**: Guide to Organic Livestock Production
- **ATTRA**: Guide to Organic Processing
- **ATTRA**: Guide to Organic Certification

**USDA NOP Certified Operations**:

- USDA NOP: What Is Organic Certification
- USDA NOP: Do I Need To Be Certified Organic?

**Additional Links**:

- National Organic Program Handbook
- USDA National Organic Program
- Organic Association of Kentucky
- eOrganic
- ATTRA - National Sustainable Agriculture Information Service
- USDA List of Certified Operations Database
Organic Marketing

The Kentucky Department of Agriculture is accredited to operate the United States Department of Agriculture National Organic Program as a Certifying Agent for the state of Kentucky.

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  - ATTRA: Guide to Organic Processing
  - ATTRA: Guide to Organic Certification

USDA NOP Certified Operations:
- USDA NOP: What is Organic Certification
- USDA NOP: Do I Need To Be Certified Organic?
KDA Organic Program Fees

• In state only
  – $125 to file plan
    • Crop Production
    • Livestock Production
    • Processor/Handler

  – Free inspection
  – $25 to register as exempt
  – Lowest price in USA?
PURPOSE

OAK is a member-driven nonprofit organization. Members work together to:
- Promote Kentucky’s organic farms and farmers
- Share information with one another
- Guide research programs related to organic agriculture
- Educate consumers about organic food and farm products

Membership is open to anybody willing to support the OAK mission and does not require an annual fee.

MIS

OAK projects are focused on community development and support of small-scale farmers.

FORMATION

During 2003, several organic farmers and retailers in central Kentucky formed the OAK Vegetable Certification Program.

This market is being made by the exceptional goodness of the product as well as the support of the organic community that strengthens communities by...
Organic Association Field Day at Cedar Ring Greens

Published by Cheryll Frank under Farm Topics, Happenings, News

Saturday, November 9, 2013 – 2:30 PM
7134 Owenton Rd, Frankfort, KY 40601

Event is FREE, but please RSVP to cmfrank@savannaorganics.com!

Cedar Ring Greens – Cedar Ring Greens is a certified-organic market garden located on 12.5 acres in Peaks Mill that is owned by Connie Lemley and Andy McDonald. Cedar Ring Greens specializes in salad mixes and cooking greens, and they also grow a wide variety of other vegetables. The farm includes two high-tunnels (unheated greenhouses) for extending the growing season and growing greens through the winter, a small greenhouse with solar fan for starting
Dr. Michael Bomford
michael.bomford@kysu.edu
http://organic.kysu.edu
502-597-5752