Composting 101

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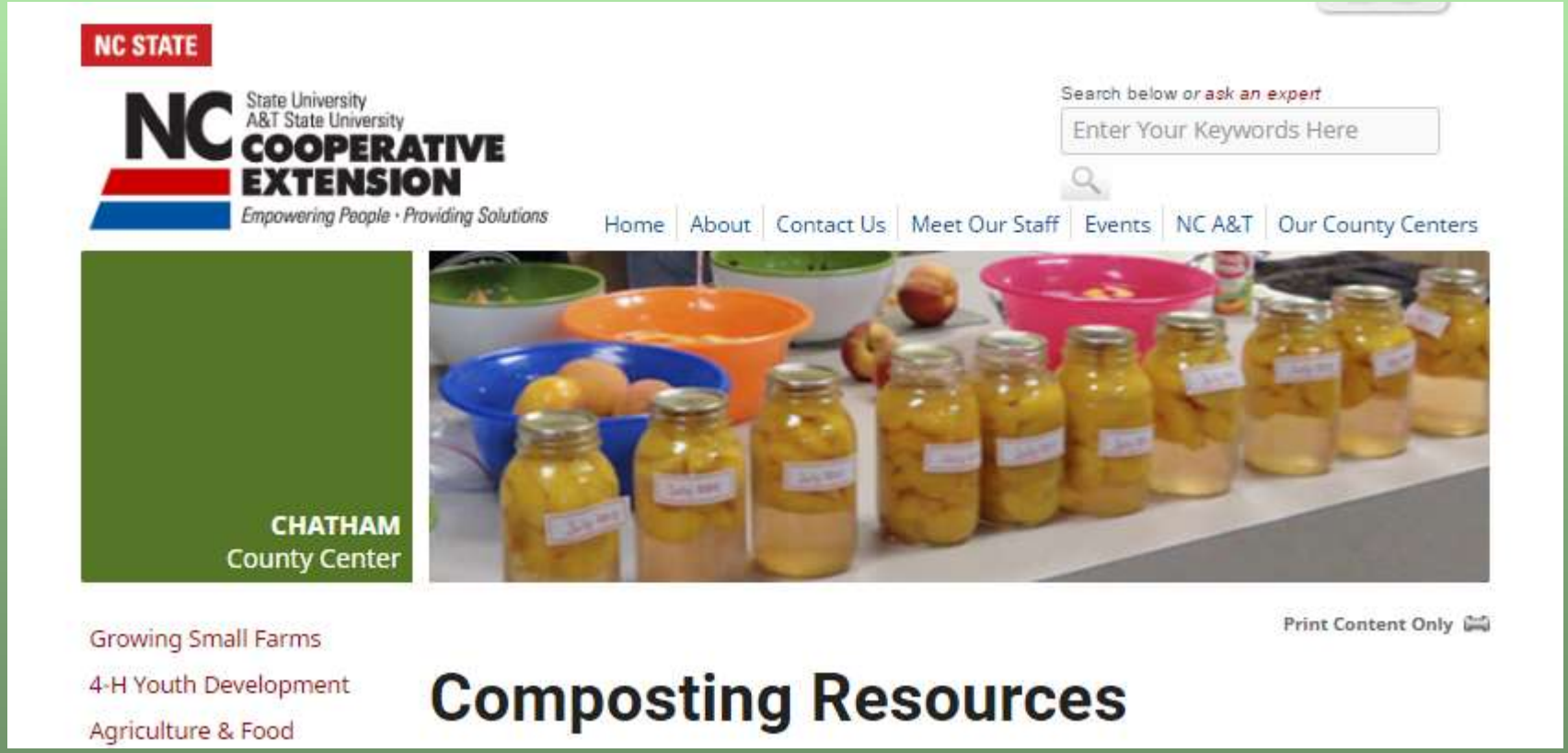
COOPERATIVE EXTENSION
Empowering People · Providing Solutions

Review these slides and learn more:

http://go.ncsu.edu/compost-resources

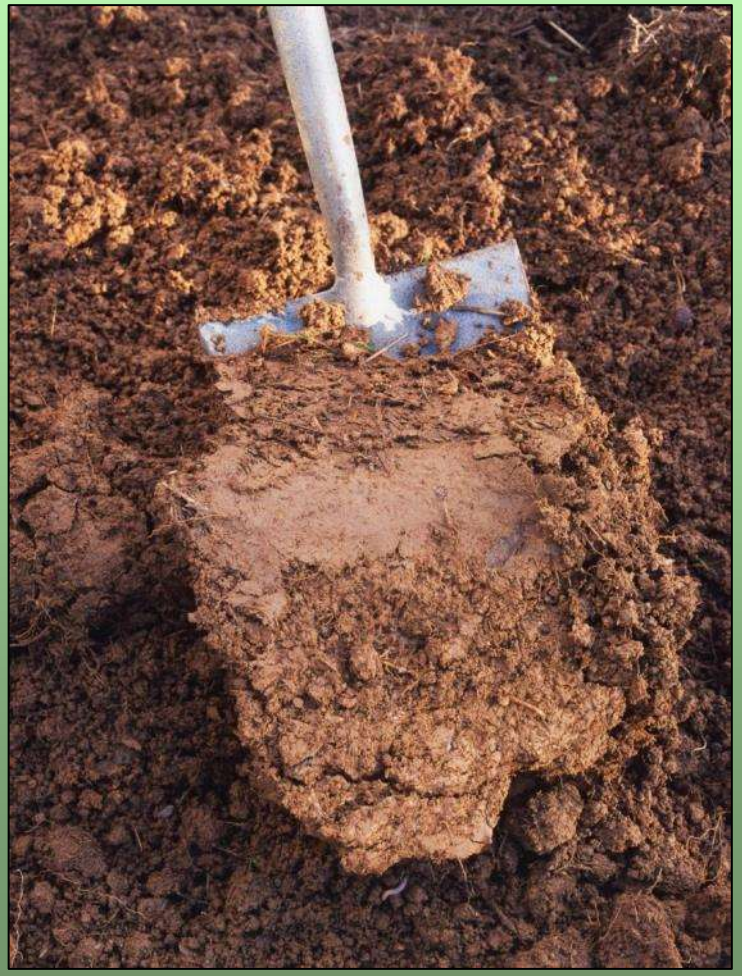


Why Compost?

- **Recycle organic materials**
  - Food scraps/yard waste comprise ~ 28% solid waste stream (EPA)
- **Create beneficial soil amendment**
  - Provide nutrients
  - Boost soil beneficial microbes
  - Improve soil structure
- **Grow healthier plants naturally!**

Adding Compost to Soil

- **Improves number and distribution of large and small pores in soil structure**
  - Increases infiltration
  - Improves drainage
  - Increases water holding capacity = one of best defenses against drought!
- **Also increases nutrient holding capacity, adds nutrients and beneficial microbes**



What is composting?

Using the natural process of decay to change organic wastes into a valuable humus-like material called compost

What do you need to make compost?

- **Decomposers**
  Microbes (mainly bacteria and fungi) that do all the work for you
- **Food for decomposers**
  The organic materials to be composted
- **The right amount of air, water, and warmth**
  to keep the work crew happy

Composting

A compost pile or bin allows you to control:

- Air (oxygen)
- Water
- Food, and
- Temperature

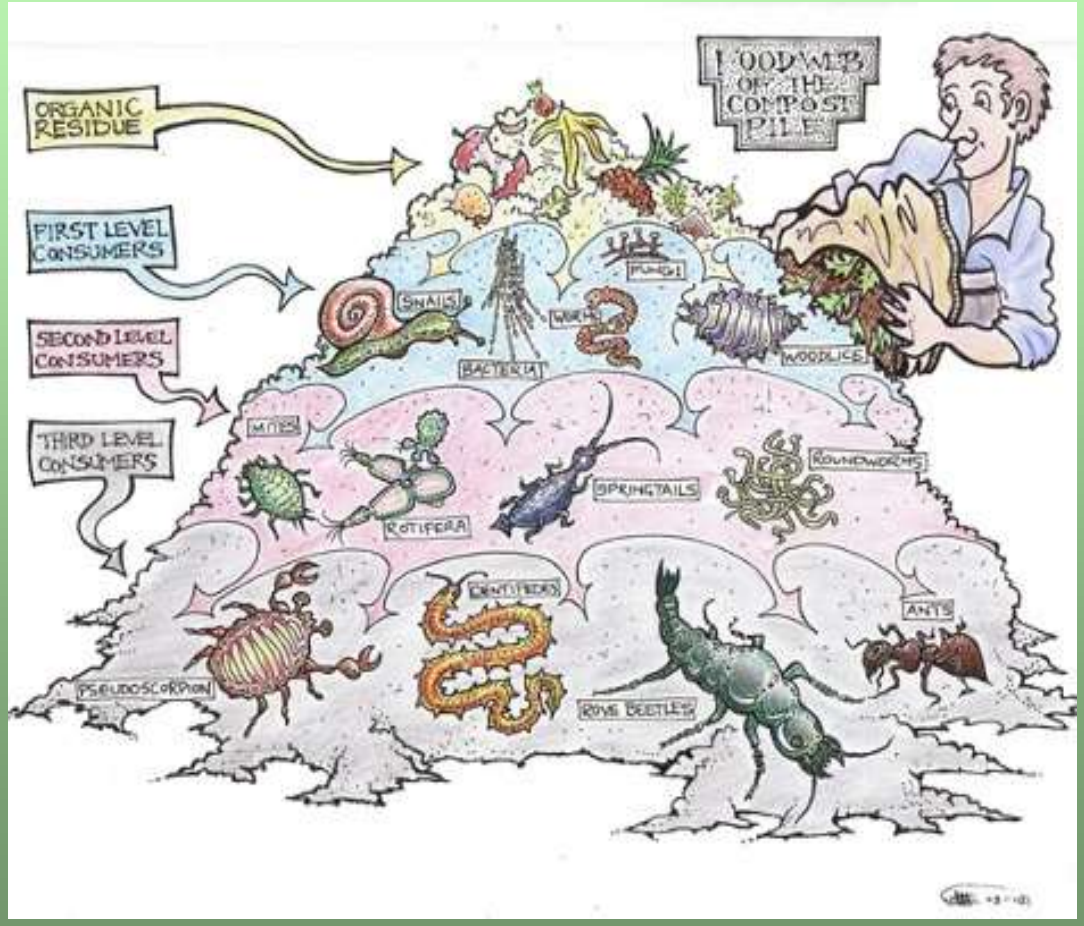
By managing these factors you can speed up the otherwise slow natural decay process

Where do the decomposers come from?

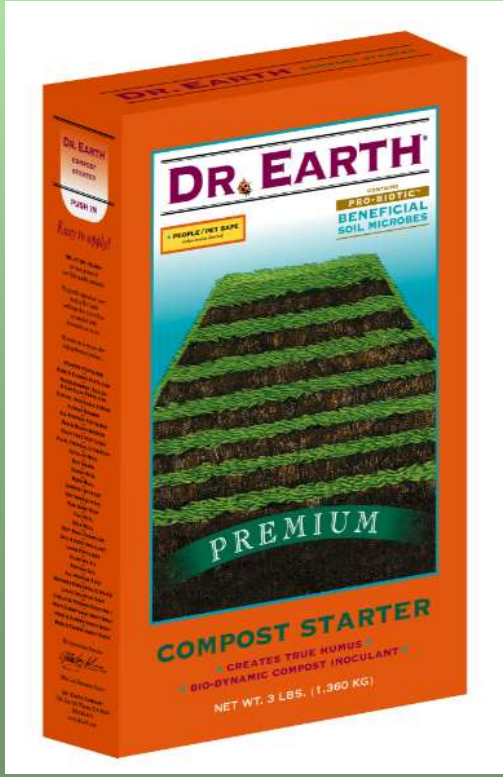
If you build it, they will come…

- **Soil**
- **Leaves**
- **Food scraps**
- **Manure, and**
- **Finished compost**

Each of these will add microbes to the compost pile



Numerous additives and starters are available but are not needed for good or rapid composting



What is the best food for decomposers?

All organic materials will compost,
but not all should be added to a backyard compost pile

Organic wastes that <u>should</u> be composted include:

Also
- **Used potting soil**
- **Manure**
- **Sawdust**
- **Hair**

Materials to avoid…

- **Oil, fat, grease, meat, fish or dairy products, unwashed egg shells -** tend to attract pests
- **Hard to kill perennial weeds/roots -** eg. bermudagrass, mugwort, nutsedge
- **Weeds that have gone to seed -** could infest garden area when compost is used
- **Black Walnut leaves/twigs**

Materials to avoid…

Cat or dog waste

attracts pests, could spread disease

Diseased or insect ridden plants – pathogens/pests may survive compost process

Materials to avoid…

- Lime
  - increases compost pH and promotes ammonia odor problems
- Wood Ash
  - add sparingly to the pile. Will add some potash to compost but will increase pH and ammonia odor problems
- Charcoal

Decomposers Need a Balanced Diet

- **Mix of carbon rich and nitrogen rich materials:**
  - Carbon rich known as "browns"
  - Nitrogen rich known as "greens"
- **Amount of carbon versus nitrogen:**
  - **2 parts brown to 1 part green**

Browns

- Decay very slowly
- Coarse browns can keep pile aerated
- Tend to accumulate in the fall
- Tie up nitrogen in soil if not fully composted
- May need to stockpile until can mix with greens

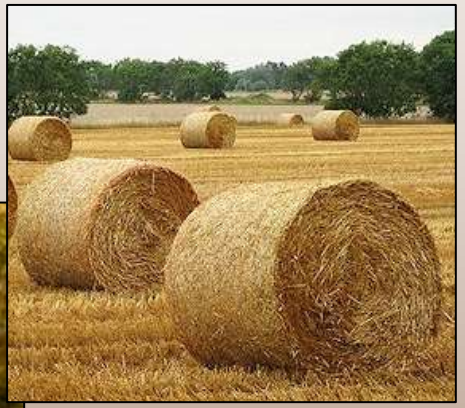
Greens

- Decay rapidly
- Poor aeration – may have foul odors if composted alone
- Tend to accumulate in spring and summer
- Supply nitrogen for composting
- Best composting if mixed with browns

Browns

High carbon materials such as:

- **Leaves**
- **Straw**
- **Paper** – small quantities only
- **Sawdust**
- **Animal bedding** mixed with manure



Greens

High nitrogen materials such as:

- **Vegetable scraps**
- **Coffee grounds**
- **Grass clippings**
- **Manures**: cow, horse, poultry, rabbit

Source Manure Carefully

- Some herbicides used in pastures and hayfields can carryover from animal manure, hay and grass clippings into compost
- **Persist 2 years+**
- See: Herbicide Carryover in Hay, Manure, Compost and Grass Clippings

Distorted, curled/cupped, and strapped leaves are symptoms of herbicide injury

Should I Shred Materials?

- **Smaller particles decompose faster**
- Chipping or shredding coarse brown materials will speed up the rate at which they decompose
  - Twigs, stems over 1” in diameter
  - Oak leaves
- Don’t overdo it - some coarse materials are needed to maintain moisture level

Do I Need a Bin?

No, compost can be made in open piles

- **3’- 5’ x 3’- 5’ best size**

Why Use a Bin?

- keep piles neat
- retain heat and moisture
- more appropriate in urban settings

Inexpensive Bins

Modified Garbage Can

Wooden Pallets

Wire Mesh

Large Bins

Concrete Block

3 Compartment Bin

Manufactured Bins

Tumblers/Rotating Bins – more expensive

Enclosed Bins

How Do I Compost?

Two Basic Styles:

- **Active/Fast/Hot**
  - Actively manage the pile for faster break down
  - Turn regularly
  - Compost in 2 - 6 months
- **Passive/Slow/Cool**
  - Make the pile and leave it to decompose naturally
  - Can take 1 – 3 years

Fast/active composting generates heat

Composting

Two Methods:

- **Continuous pile**
  - Add materials as they become available
  - Only materials low in bin are fresh compost
- **Single batch**
  - Materials added only once to form a pile
  - Most efficient, quickest results
  - Revolving drums/tumbler bins or 3-bin system are best for this

Single Batch Composting

Layer materials:

- 4-5” brown layer
- 2-3” green layer
- Repeat

- Can add thin layer of soil between layers to boost microbe levels

- Water as you build the pile if materials are dry

Water

Rapid decomposition requires optimum water content

- If too dry, bacterial activity will slow or cease
- If too wet, loss of air in the pile will lead to anaerobic conditions

Ideal pile water content
40-60%

- As wet as a squeezed out sponge
- **If too dry**, add water as you turn the pile
- **If too wet**, add browns and/or turn the pile

Active Composting and Temperature

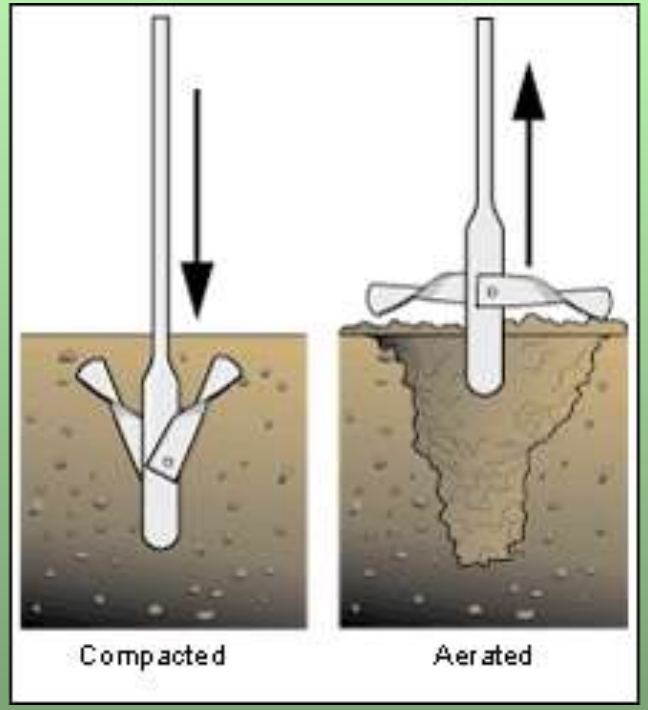
- Active composting occurs in the temperature range of 55ºF to 155ºF
- **Want pile temperature to reach 140ºF** – over this temp is too hot for most bacteria and decomposition will slow until temperature decreases again

- **A thermometer is a nice tool but is not essential for good composting**

Pile Aeration

Getting air to your work force

- Turning the pile mixes fresh air into the pile
- Turn weekly



- Turning tools can make the job easier; easier for small bins

Pile Aeration

Depends upon adequate porosity

- Porosity is the air filled space between particles
- “Browns” help to maintain good porosity in the pile
- A compacted pile has lost porosity, can be increased by turning

Aeration can be increased by inserting sticks, cornstalks, or perforated pipes into or under the pile

Active Composting

- **Turn the pile every 5 to 7 days**
  - move outer material to the pile center
  - add water if needed
  - Don't add new materials
- **During the first few weeks temp should reach 140ºF**
- **After about 4 weeks less heat will be produced and compost will maintain lower temp (100ºF)**

Active Composting

- After about 4 more weeks the pile will no longer heat after turning and volume will be about one third of original
- **Allow the pile to cure** (stand without turning) for 4 more weeks before using the compost

When is compost finished?

Compost is mature when:

- The color is dark brown
- It is crumbly, loose, and humus-like
- It has an earthy smell
- It contains no readily recognizable feedstock
- The pile has shrunk to about 1/3 of its original volume

Simple Tests for Finished Compost

Bag test: sealing compost in a plastic bag for several days should produce no foul odor

Germination test: will seeds germinate in the compost? (good test to use if compost will be part of a potting mix)

How Do I Use Compost?

- Soil Amendment
  - Cultivate into soil as deeply as possible before planting (6”-8” realistic depth)
- Topdress
  - Existing plantings with 1”-2” before mulching
  - 1” of screened compost over lawns
- Store for future use
  - Protect from rainfall to minimize nutrient leaching

Compost Tea

- Use to water plants or spray on foliage
- Beneficial microbes suppress pathogens
- a weak organic liquid fertilizer
  - Great for seedlings and new transplants

Making Compost Tea

In a 5 gallon bucket:

- Place 7-8 cups compost in mesh bag
- Suspend in bucket of water
- Keep in shade, 60-80 degrees
- To brew: Stir 12+ times over 48 hrs or run aquarium pump for aeration
- Use within 4 hrs
- Don’t spray on edible plant parts

Vermicomposting

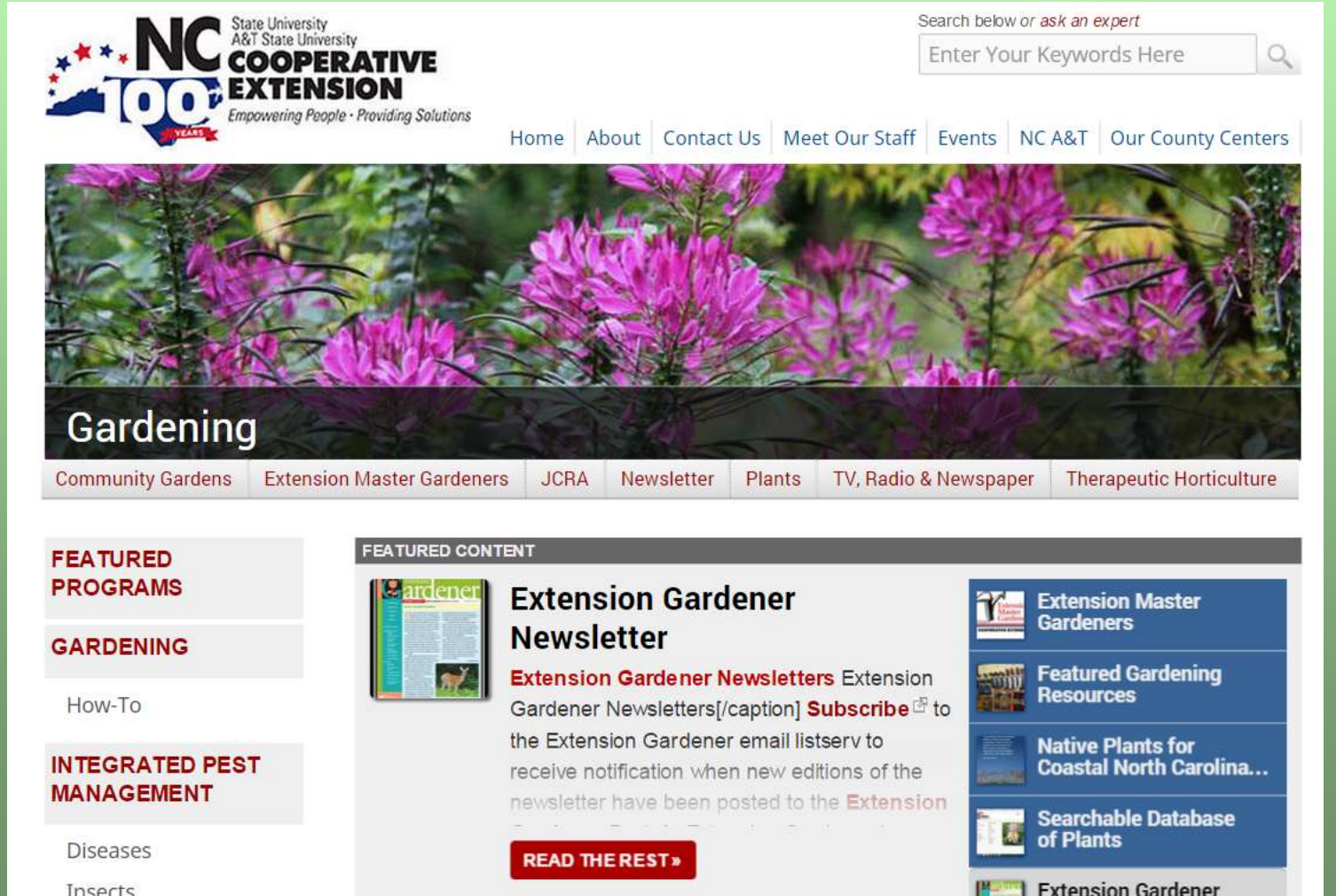
- **Composting with worms!**
- **In a bin, 1’ x 2’ or larger**
  - Holes in sides
- **Add bedding and worms**
  - Shredded newspaper/paper, moistened
  - 1 lb. red wigglers
- **Feed vegetable/fruit scraps**
  - 1-2 times week
- **Collect castings every 2 – 4 weeks**

Learn More!

- **Extension Gardener Handbook**
  - https://content.ces.ncsu.edu/extension-gardener-handbook
  - **Chapter 2 is composting!**
- **Extension webpages:**
  - **Composting:** https://www.bae.ncsu.edu/topic/composting
  - **Vermicomposting:** http://www.bae.ncsu.edu/topic/vermicomposting

Gardening Portal

http://gardening.ces.ncsu.edu



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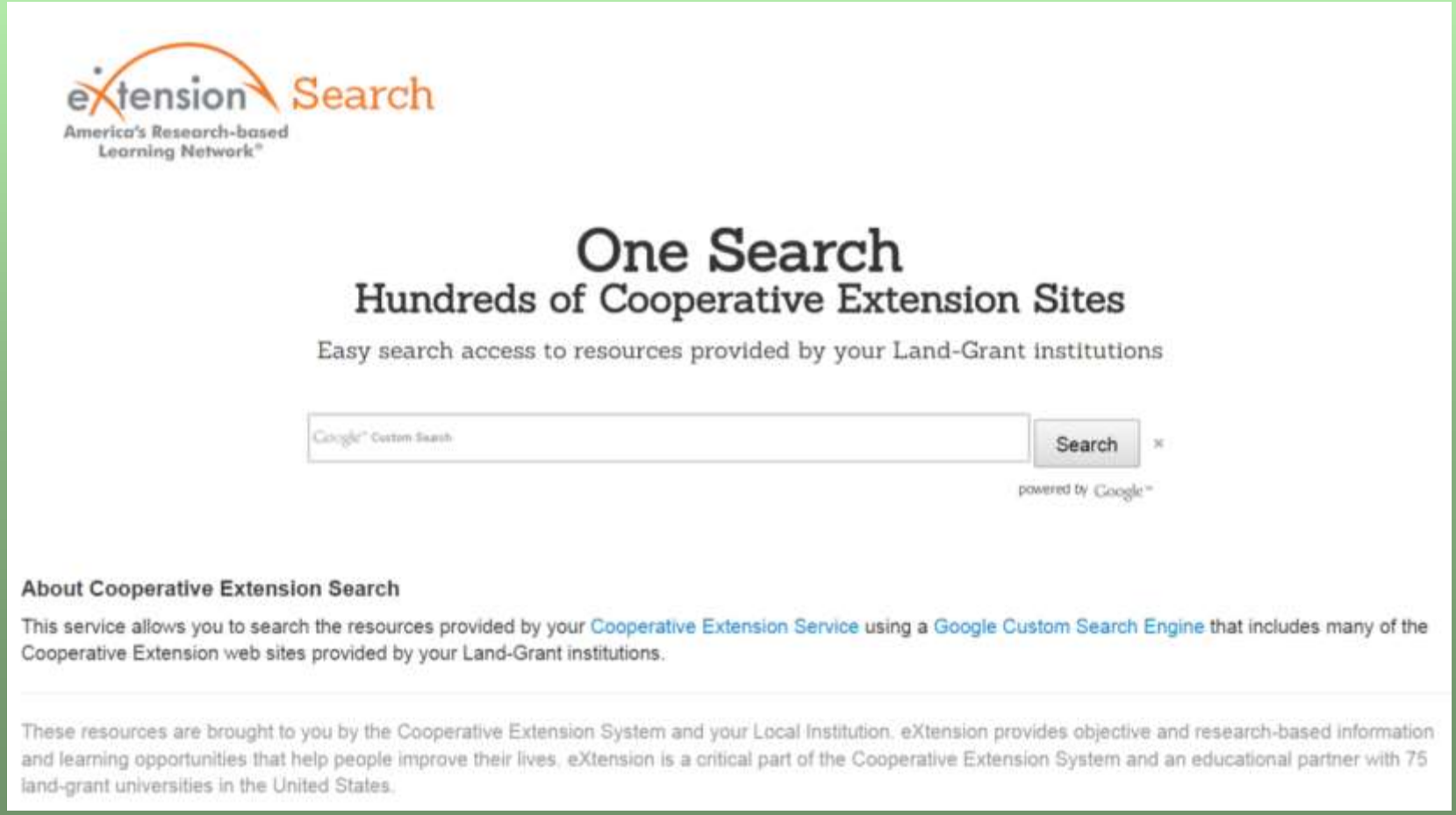

Answers to Your Questions, Solutions for Your Problems

Contact your local Extension office

- http://www.ces.ncsu.edu

In Chatham County,

- 919-542-8202
- charlotte_glen@ncsu.edu

Ask an Expert

- http://www.ces.ncsu.edu/ask-an-expert