**Small Farms News**

An early morning walk is a blessing for the whole day.

~Henry David Thoreau (1817-1862)

**The Scientific Foundations for Companion Planting**

**Trap Cropping**

Sometimes, a neighboring crop may be selected because it is more attractive to pests and serves to distract them from the main crop. An excellent example of this is the use of collards to draw the diamond back moth away from cabbage.

**Symbiotic Nitrogen Fixation**

Legumes—such as peas, beans, and clover—have the ability to fix atmospheric nitrogen for their own use and for the benefit of neighboring plants via symbiotic relationship with Rhizobium bacteria. Forage legumes, for example, are commonly seeded with grasses to reduce the need for nitrogen fertilizer. Likewise, beans are sometimes interplanted with corn.

**Biochemical Pest Suppression**

Some plants exude chemicals from roots or aerial parts that suppress or repel pests and protect neighboring plants. The African marigold, for example, releases thiopene—a nematode repellent—making it a good companion for a number of garden crops. The manufacture and release of certain biochemicals is also a factor in plant antagonism. Allelochemicals such as juglone—found in black walnut—suppress the growth of a wide range of other plants, which often creates a problem in home horticulture. A positive use of plant allelopathy is the use of mow-killed grain rye as a mulch. The allelochemicals that leach from rye residue prevent weed germination but do not harm transplanted tomatoes, broccoli, or many other vegetables.

**Nurse Cropping**

Tall or dense-canoped plants may protect more vulnerable species through shading or by providing a windbreak. Nurse crops such as oats have long been used to help establish alfalfa and other forages by supplanting the more competitive weeds that would otherwise grow in their place. In many instances, nurse cropping is simply another form of physical-spatial interaction.

**Beneficial Habitats**

Beneficial habitats—sometimes called refugia—are another type of companion plant interaction that has drawn considerable attention in recent years. The benefit is derived when companion plants provide a desirable environment for beneficial insects and other arthropods—especially those predatory and parasitic species which help to keep pest populations in check. Predators include ladybird beetles, lacewings, hover flies, mantids, robber flies, and non-insects such as spiders and predatory mites. Parasites include a wide range of fly and wasp species including tachinid flies, and Trichogramma and ichneumonid wasps. Agroecologists believe that by developing systems to include habitats that draw and sustain beneficial insects, the twin objectives of reducing both pest damage and pesticide use can be attained. For detailed information on establishing beneficial habitats, refer to the ATTRA publication **Farmscaping to Enhance Biological Control**.

**Security through Diversity**

A more general mixing of various crops and varieties provides a degree of security to the grower. If pests or adverse conditions reduce or destroy a single crop or cultivar, others remain to produce some level of yield. Furthermore, the simple mixing of cultivars, as demonstrated with broccoli in University of California research, can reduce aphid infestation.

**Information taken from ATTRA – Companion Planting: Basic Concepts & Resources**
Indicators for Soil Quality
Information from USDA Natural Resources Conservation Service

What are indicators?
Soil quality indicators are physical, chemical and biological properties, processes, and characteristics that can be measured to monitor changes in the soil. Types of indicators that are most useful depend on the function of soil for which soil quality is being evaluated and include:

- Providing a physical, chemical, and biological setting for living organisms
- Regulating and partitioning water flow, storing and cycling nutrients and other elements
- Supporting biological activity and diversity for plant and animal productivity
- Filtering, buffering, degrading, immobilizing, and detoxifying organic and inorganic materials
- Providing mechanical support for living organisms and their structures

Why are indicators important?
Soil quality indicators are important to:

- Focus conservation efforts on maintaining and improving the condition of the soil
- Evaluate soil management practices and techniques
- Relating soil quality to that of other resources
- Collecting necessary information to determine trends
- Determine trends in the health of the nation’s soils
- Guide land manager decisions

Indicators of soil quality can be categorized into four general groups:

Visual indicators may be obtained from observation or photographic interpretation. Exposure of subsoil, change in soil color, ephemeral gullies, ponding, runoff, plant response, weed species, blowing soil, and deposition are only a few examples of potential locally determined indicators. Visual evidence can be a clear indication that soil quality is threatened or changing.

Physical indicators are related to the arrangement of solid particles and pores. Examples include topsoil depth, bulk density, porosity, aggregate stability, texture, crusting, and compaction. Physical indicators primarily reflect limitations to root growth, seedling emergence, infiltration, or movement of water within the soil profile.

Chemical indicators include measurements of pH, salinity, organic matter, phosphorus concentrations, cation-exchange capacity, nutrient cycling, and concentrations of elements that may be potential contaminants (heavy metals, radioactive compounds, etc.) or those that are needed for plant growth and development. The soil’s chemical condition affect soil-plant relations, water quality, buffering capacities, availability of nutrients and water to plants and other organisms, mobility of contaminants, and some physical conditions, such as the tendency for crust to form.

Biological indicators include measurements of micro- and macro-organisms such as earthworms and nematodes, their activity, and byproducts. Respiration rate can be used to detect microbial activity, specifically microbial decomposition of organic matter in the soil. Measurements of decomposition rates of plant residue in bags or measurements of weed seed numbers, or pathogen populations can also serve as biological indicators of soil quality.

Let’s focus on soil pH as a chemical indicator of soil quality. Soil pH is a measure of the acidity or alkalinity in the soil. It is also called soil reaction. The most common classes of soil pH are:

- Extremely acid: 3.5 – 4.4
- Very strongly acid: 4.5 – 5.0
- Strongly acid: 5.1 – 5.5
- Moderately acid: 5.6 – 6.0
- Slightly acid: 6.1 – 6.5
- Neutral: 6.6 – 7.3
- Slightly alkaline: 7.4 – 7.8
- Moderately alkaline: 7.9 – 8.4
- Strongly alkaline: 8.5 – 9.0

What is the significance of pH?

Availability of nutrients
Soil pH influences the solubility of nutrients. It also affects the activity of micro-organisms responsible for breaking down organic matter and most chemical transformations in the soil. Therefore soil pH affects the availability of several plant nutrients.

A pH range of 6 – 7 is most favorable for plant growth because most plant nutrients are readily available, with the exception of plants such as those found in the Ericaceae family (Rhododendrons, Blueberries, etc).

Soils that have a pH below 5.5 generally have a low availability of calcium, magnesium, and phosphorus. At these low pH’s, the solubility of aluminum, iron, and boron is high and low for molybdenum.

At pH 7.8 or more, calcium and magnesium are abundant. Molybdenum is also available if it is present in the soil minerals. High pH soils may have an inadequate availability of iron, manganese, copper, zinc, and especially...
of phosphorus and boron. Iron deficiency can be seen as chlorosis in acid loving plants housed in alkaline soils.

**Micro-organisms**

Soil pH affects many micro-organisms. The type and population densities change with pH. A pH of 6.6 – 7.3 is favorable for microbial activities that contribute to the availability of nitrogen, sulfur, and phosphorus is soils. It is very common for folks to try and increase their soil microbial activity through cover cropping and other forms of soil conditioning. Having adequate microbial activity in your soils is very beneficial in helping plants better acquire available water and nutrients.

**Pesticide Interaction**

Most pesticides are labeled for specific soil conditions. If soils have a pH outside the allowed range, the pesticides become ineffective, changed to an undesirable form, or may not degrade as expected, which results in problems for the next crop period.

**Mobility of heavy metals**

Many heavy metals become more water soluble under acid conditions and can move downward with water through the soil, and in some cases move to aquifers, surface streams, or lakes. You may even see aquatic damage after an acid rain event because of all of the soluble metals, such as aluminum, being leached into surface water.

**Corrosivity**

Soil pH is one of the several properties used as a general indictor of soil corrosivity. Soils that are either highly alkaline or highly acidic are more likely to corrode steel. Soils that have a pH of 5.5 or lower are likely to be highly corrosive to concrete.

**So what controls pH?**

The acidity or alkalinity in soils have several different sources. In natural systems, the pH is affected by the mineralogy, climate, and weathering. Management of soils often alters the natural pH because of acid-forming nitrogen fertilizers, or removal of bases (potassium, calcium, and magnesium). Soils that have sulfur-forming minerals can produce very acid soil conditions when they are exposed to air. These conditions often occur in tidal flats or near recent mining activity where the soil is drained.

The pH of a soil should always be tested before making management decisions that depend on the soil pH!

**How is pH measured?**

A variety of kits and devices are available – in fact North Carolina is one of, if not the only state in the US that still offers free soil testing through the NCDA Agronomic division.

Soil pH can change during the year with changing temperature and moisture conditions, and can vary to as much as a whole pH unit during the growing season. Since H is a measure of the hydrogen ion activity \[H^+\], many different chemical reactions can affect it.

**How is soil pH modified?**

Liming is the common method used to increase soil pH. The reaction rate for limestone increases when soil temperatures are warm and moistures levels are high. The finer the limestone is, the faster the reaction. The amount of limestone to apply depends on the amount of organic matter and clay as well as the pH. Fertility testing laboratories that have local experience make determinations.

A soil pH that is >8.0 is considered high and are often calcareous, meaning the soils have a high content of calcium carbonate. The pH of these soils will not change until most of the calcium carbonate is removed. Acids can be added to dissolve the carbonates and lower pH. If the content of calcium carbonate is >5%, acid treatments are generally uneconomical, and because phosphorus, iron, copper, and zinc are less available in calcareous soils, nutrient deficiencies are often apparent. It is more economical to apply these nutrients than to try lowering the pH.

Application of anhydrous ammonia as nitrogen fertilizer contributes to lowering the pH. In some parts of the county, applications of ammonia lower the surface soil pH from ranges of 6.6 to 7.3 to below 5.6. This reduction can be easily overlooked in areas of no-till cropping unless the pH is measured in the upper 2 inches.

Chemical amendments that contain sulfur generally form an acid, which lowers the soil pH.

More information on soil indicators and pH can be found at [http://soils.usda.gov](http://soils.usda.gov). Please remember that there are folks available to help you understand your soils and give you advice on how to correct and condition your soils. If you want more information, visit your local Soil and Water Conservation District, Natural Resources Conservation Service or Cooperative Extension Office.

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Simplifying Farm Recordkeeping with QuickBooks, Workshop Series

September 27, October 4, October 11 from 9:00am – 12 noon.
Location: BCCES, 94 Coxe Ave. Asheville

Are you struggling with bills, invoices, income and expense? There may be a computer program that will help you wrestle all your paperwork problems into order. Come learn about QuickBooks and how it may work with your farming business. We will work with the free edition of QuickBooks Simple Start and learn how to manage checking accounts, invoices, bills, receipts, payroll, etc. If financial management is stressing you out then this is the class for you. Please let us know if you will be bringing a laptop or need to use a teaching laptop. Space is limited to 15 participants. Registration is $20.00 which will include a copy of QuickBooks for Dummies. To register or for more information contact the Buncombe County Cooperative Extension Office at (828) 255-5522 or email Melinda Roberts at melinda_roberts@ncsu.edu.

NCSU “Pickle School”
August 3 – 5, 2011 in Asheville!
Acidified Foods Processing and Packaging, Better Process Control School

For North Carolina Entrepreneurs
Packaging in Glass and Plastic Containers
Registration deadline July 27th

This is required for anyone wishing to produce pickles, chutneys, salsas, hot sauces and tomato products (etc...). It will qualify commercial operators to meet the requirements of the umbrella GMP and the specific GMP for acidified foods (21 CFR Part 114). Registration is August 3 from 8:00 – 9:00 am. Class hours are daily 9:00 am – 5:30 pm. Help sessions and demonstrations may be scheduled for evening hours, depending on need. Fee is $450/person. Registration information can be found at the website listed below or by contacting Lisa Gordon, Department of Food, Bioprocessing and Nutrition Sciences 919-515-2956 or lisa_gordon@ncsu.edu.

Join us for the Buncombe County Friends of Ag Breakfast

Maria Wise with the Buncombe County Soil and Water are myself are hosting the 3rd Friends of Ag Breakfast in hopes of drawing a broad group of folks. We want all folks interested in connecting with others in agriculture to come and eat some good – FREE – food. I know that August is a busy time for farmers, but hope that time allows you to participate. The breakfast will take place at WNC Ag Center in the Virginia Boone Building bright and early on the morning of May 9 (7:00 am - until) and will feature as many local products as possible (donations welcome). This breakfast will not feature a specific speaker but will give folks more one-on-one and public networking time.

Current Grant and Money Opportunities are available on the Buncombe County Small Farms Initiative Website at: http://buncombe.ces.ncsu.edu.
**Upcoming Events**

**July 21** **Vegetable Production Workshop** 1:30 – 5:00 pm at the Mountain Research Station in Waynesville, NC. Registration is free and 1.5 pesticide credits hours are available (N, O, D, X). For more information call (828) 456 – 3943.

**July 25** **Regulations, Risk Management, & Food Safety for Farmers Market Workshop** 5:30 – 7:00 pm at the Asheville downtown public works building, 161 S. Charlotte St. Early registration required. For more information, contact Mike McCreary at (828)348-0340.

**July 26 – July 30** **Cullowhee Native Plant Conference** at Western Carolina University. For more information visit [http://www.wcu.edu/5044.asp](http://www.wcu.edu/5044.asp)

**July 27, August 24** **IPM Workshop Series – Identification of diseases, insects and weeds** 2:00 – 4:30 pm at the Mountain Horticulture Crops Research & Extension Center in Mills River, NC. Pesticide credits available. For more information contact Buncombe County Office at (828) 255-5522 or melinda_roberts@ncsu.edu. Classes $5.00 each.

**August 4** **Tomato Field Day and Pig Pickin’** 12:30 – 5:00 pm at the Mountain Horticulture Crops Research & Extension Center in Mills River, NC. Pig Picking will be at Lake Julian that evening beginning at 6:00 pm. For more information, visit [http://www.ncagr.gov/markets/commodit/horticul/tomatoes/](http://www.ncagr.gov/markets/commodit/HORTICUL/TOMATOES/)

**August 17, 18 & 19** **2011 Summer Green Show** Raleigh, NC

**August 29** **Pesticide Safety Training** 3:00 – 5:00 pm will be held in Brevard. This class is for individuals holding a private pesticide applicators license. If your recertification expires September 30 of this year, then you need two credits in categories V and X. This class provides two credits in category V. To pre-register, please contact the Extension office 838-884-3109

**September 8** **Pesticide Specialty/Safety Training** will take place at the Buncombe County Extension Office. Categories that will be covered at one of the two classes offered that day are V, AKBCWGHMDHNOX. For more information or to register contact the Buncombe County Extension office at (828)255-5522.

**September 13** **Non-Native and Invasive Forest Plants Workshop for Landowners** at The Crowne Plaza in Asheville. The workshop are designed for family forest landowners, but all forestland ownership types and professional forestland managers and advisers are welcome. Contact the NCSU Forestry and Environmental Outreach Program at 919-515-9563 or forestry_outreach@ncsu.edu to register or for more information. For General Workshop Agenda see: [http://www.ncsu-feop.org/NNI/](http://www.ncsu-feop.org/NNI/)

**CFC Accepting Applications for Ag Biz Planner**

Carolina Farm Credit is now accepting applications for the third class to participate in an e-learning financial and business planning course, which targets young, beginning, small, and minority farmers. Highlights of the program include modules that cover business and personal financial planning, understanding income statements, cash flow, and the smart use of credit on the farm. CFC will accept up to five participants for the program which will begin in October 2011. Applications, a course outline, and program information are available at [www.carolinafarmcredit.com](http://www.carolinafarmcredit.com). Applications will be accepted through September 1, 2011.
Buncombe County Small Farms Initiative

More and more farmers have been sharing with our agents their desire to continue farming, as well as the challenges they are facing in doing so. Farmers are desperately looking for ways to increase their income so they can keep their operation viable and their land preserved. Support given by our Buncombe County Commissioners and County Management has allowed the Cooperative Extension to develop a Small Farms Initiative program to aggressively work towards helping both seasoned and new farmers.

Melinda Roberts
Extension Agent
Agriculture-Small Farms

http://buncombe.ces.ncsu.edu

You can get this newsletter via email. Contact us either by phone at 828-255-5522 or email: Melinda_Roberts@ncsu.edu