Principles and Practices of Organic Farming

Part I
Introduction

Organic farming refers to the method agricultural products [food and fiber] are grown and processed. Organic farmers aim to produce healthy food from a balanced, living soil. Organic agriculture is sustainable, keeping soils productive and alive, and helping to minimize contamination of the earth’s water supplies. Strict regulations, known as standards, define what organic producers can and cannot do. These regulations place strong emphasis on protecting the environment.

The United States Department of Agriculture Economic Research Service (USDAERS) and industry groups report that organic product sales have grown by 20 percent or more each year since 1990 (USDA, 2003). The market research firm, Packaged Facts, estimated U.S. sales of fresh and processed organic foods at $6.5 billion in 1999 and $7.8 billion in 2000, while The International Trade Centre estimated 2001 U.S retail sales at $9.5 billion (NASDA, 2003). According to Packaged Facts, 2008 sales of natural and organic food and beverages will continue at a double-digit growth rate to reach $32.9 billion (Palmer, 2008).

One of the fastest growing segments of U.S agriculture for over a decade has been organic farming. The U.S. had under a million acres of certified organic farmland when Congress passed the Organic Foods Production Act of 1990. By the time USDA implemented national organic standards in 2002, certified organic farmland had doubled, and doubled again between 2002 and 2005. Organic livestock sectors have grown even faster. In 2005, all 50 states in the U.S. had some certified organic farmland. In 2005, U.S. producers set aside over 4.0 million acres of farmland—1.7 million acres of cropland and 2.3 million acres of rangeland and pasture—to organic production systems (USDA, 2003).
What is Organic Farming?

Codex Alimentarius (2007), defines Organic Agriculture as a holistic production management system, which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles, and soil biological activity. It emphasizes the use of management practices in preference to the use of off farm inputs, taking into account that regional conditions require locally adapted systems.

Organic farming refers to the way agricultural products [food and fiber] are grown and processed. It excludes the use of chemical fertilizers and pesticides, plant growth regulators, and livestock feed additives. Genetically modified organisms (GMOs) are not allowed in organic farming. As far as possible, organic farmers depend on crop rotation, green manure, compost, mulching, biological pest control, and mechanical cultivation to maintain productive soil and control pests (Diver, 2000). In the case of livestock, antibiotics are forbidden, and instead preventative measures for keeping animals healthy and productive are used.

Organic farming is based on the limited use of off-farm inputs and on management practices that restore, maintain, and enhance the environment (Kuepper and Gegner, 2004). It is not only concerned with a product, but also with the whole system used to produce and deliver the product to the consumer. Organic agriculture practices cannot by themselves ensure that agricultural products are completely free of all contaminants. However, it is sometimes impossible for agricultural activities to avoid pollution from air, soil, water and other sources (Gold, 2007).

Organic Farming Practices

1. **Crop Rotation**
   
   Crop rotation involves planting different crop species at different times and locations on the same field. Rotating crops improve the tilth or structure of the soil. This practice reduces soil erosion and pest build up, promotes soil fertility and spreads out financial risk in case a crop fails. Crop rotations result in an increase in soil microbial activity, which may increase nutrient availability, including phosphorus. Yields are usually 10 to 15% higher with the practice of crop rotation than monoculture (Frick and Johnson, 2006).

2. **Cover Cropping**
   
   A cover crop is any crop grown to provide a cover for the soil. They can be annual, biennial, or perennial herbaceous plants grown in a pure or mixed stand during all or part of the year. This practice helps loosen compacted soil through root growth, improves water filtration, and prevents soil erosion by wind and water. Cover crops also help suppress weeds by keeping the sun from reaching weed seeds and reduce insect pests and diseases (VanTine, and Verlinder, 2003).

3. **Green Manures**
   
   A cover crop that is tilled into the soil while it is still green is referred to as a green manure. It helps to add organic matter and nutrients to the soil. When a green plant is incorporated into the soil, it contains high amounts of nitrogen and moisture and becomes a food source.
for soil microorganisms and earthworms. Additional advantages from using green manures include the suppression of weeds and soil borne diseases (VanTine and Verlinder, 2003).

4. **Animal Manures**
Manure can be applied to the field in either a raw or composted form. Raw manure contributes nutrients to the soil, adds organic matter, and encourages biological processes in the soil. Some manure may contain contaminants therefore, it is important to know what is in the manure. Composting of manure is best, since the heat created during composting may kill most of the contaminants, thus the risk of pathogens related to food safety is minimized or eliminated. Farmers should have the soil tested before adding either raw or composted manures (VanTine and Verlinder, 2003). Composting reduces biomass volume thus facilitating ease of transportation. For organic certification, manure from factory animal production units will not be permitted. USDA standards require a 90 to 120 day period from the time manure is applied to the time of harvest (Biernbaum, 2003).

5. **Weed Management**
Prevention should be the foundation of a weed management program. A decline in weed population can be achieved by improving the soil health. Crop rotations, removing weeds before seed set and reproduction, and not allowing weeds onto the farm, can also be used to reduce weed populations. Mulches help suppress weeds by preventing light from reaching them or by drastically decreasing the amount or quality of light reaching the weed seed or leaf. Certain mulches with naturally occurring chemicals can help prevent the germination of weed seeds (VanTine and Verlinder, 2003).

6. **Pest Management**
Maintaining an ecological balance is the main goal under the organic system instead of complete eradication of pests. Ecological balance is maintained through the use of beneficial insects, predatory or parasitic mites, and spiders to keep pest populations down. "Beneficial" insects include lady beetles and various wasps, as well as certain nematodes that are used for insect control. Where severe infestations occur farmers can use non-toxic pesticides that are not as harsh as conventional pesticides. These non-toxic pesticides include soaps, pheromones (used as bait for traps and to disrupt mating cycles), botanical plant extracts such as neem, and sulfur for control of foliar diseases and in some cases, mites (VanTine and Verlinder, 2003).

7. **Livestock Management**
Animals must be organically managed from the last third of gestation; poultry from the second day of life; and milk must be from animals under organic management at least one year before production. Livestock feed must be completely organically produced, including pasture and forage, contain no urea or manure, and should have no animal slaughter by-products. Provide suitable housing, pasture conditions, and sanitation practices to animals to reduce the occurrence and spread of diseases and parasites. Reduce the occurrence and spread of parasites and diseases by providing suitable housing, pasture conditions, and sanitation practices to animals. Move animals regularly to fresh pasture and use other preventative methods rather than routinely dosing the animals with drugs to control parasite in farm
animals. Livestock may not be treated with antibiotics, any animal drug, and any animal drugs used to promote growth, including hormones. Animals must be provided with access to the outdoors, shade, shelter, exercise areas, fresh air, and direct sunlight based on the type of animal, stage of production, climate, and the environment (Granatstein, 2009).

References

Author:

Annette A. James, PhD
Assistant Professor and Research Scientist
Cooperative Agricultural Research Center
aajames@pvamu.edu
Phone: 936.261.2531
Fax: 936.261.2548

The Cooperative Extension Program serves people of all ages regardless of race, color, national origin, sex, religion, disability, political beliefs, and marital or family status. (Not all classes are protected by legal statutes).