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Organic Rice Production

Current Topic

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In general, rice planting dates, seeding rates, preferred varieties, and harvesting methods vary among regions, but they are largely the same for conventional and organic systems. The state or county Cooperative Extension Service provides such general information. This publication focuses on the special considerations relevant to *organic* rice production.

Organic Production

Organic systems avoid the use of synthetic fertilizers, pesticides, and growth regulators. Instead they rely on crop rotations, crop residues, animal manures, legumes, green manures, off-farm wastes, mechanical cultivation, mineral-bearing rocks, and biological pest control to maintain soil health, supply plant nutrients, and minimize insects, weeds, and other pests.

While anyone can choose to *grow* organically, federal regulations now control the *labeling and marketing* of ***all*** organic products. If you plan to represent your farm products as organic, you must be certified. To learn about the steps toward organic certification, see ATTRA's *Organic Farm Certification and The National Organic Program*.

Weed Suppression

Weed control and soil fertility are the principal challenges associated with organic rice production. Primary weed-control practices include crop rotations, land leveling, seedbed preparation, water management, and rotary hoeing.

To reduce weed pressure, lengthen the standard two-year rice/soybean rotation to a three-year rotation of rice/soybeans/grain crop (sorghum, wheat, corn, etc.). The longer rotation allows additional time to break weed life cycles and reduce the number of weed seeds in the soil. Other weed-control options center on the use of field flooding to suppress weeds directly and to give the crop a competitive advantage. Flooding will be more effective if fields are precision leveled. Leveling makes the water depth uniform and facilitates rapid flow onto and from the field (1).

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Case Studies In Weed Control

Organic and reduced-input producers have developed some innovative means for growing rice without chemicals. Some examples follow:

- An Arkansas organic rice producer rotates his crops in the following sequence: rice/soy-beans/winter wheat/summer fallow. His weed-control plan includes timely water management, precision-leveled fields to ensure uniform flooding depth; levees on a 1.0- to1.5-inch drop; and a pumping system that floods and drains fields rapidly. After applying composted barnyard manure and drilling rice seed, he floods to 4 inches to drown weeds. The water is allowed to stand for 10 to 12 days. He controls water weevils either by draining and drying the ground until it firms up or by a fresh water flush. This producer has been raising organic rice for 18 years. He declined to serve as a contact person and prefers that we not use his name.

- The Lundbergs of Richvale, California, are large-scale organic rice producers who use a purple vetch green-manure crop as their nitrogen source (2). They mow the vetch in spring to 6 inches and drill rice seed directly into the vetch mulch (3). Following planting, they flood the field to kill the vetch and germinate the rice seed. Following germination, they drain the field and allow it to dry, and then the field is re-flooded for the season. Weed control is based primarily on water-level control. Some weediness is tolerated, reducing yields in some years. Water weevils seldom present a problem, since the Lundbergs practice dry planting. The Lundbergs harvest their rice at 17% moisture, disk the straw down, and fallow the ground for a year. Permanent levees are maintained with a sickle mower.

- Arkansas grower Steven Rutledge uses a wheat/rice relay intercrop that reduces his input costs $50 to $70 per acre and requires no land preparation or herbicides (4). By applying pre-flood fertilizer with a ground rig, he saves an additional $4 to $8 per acre over aerial application costs. He plants (by airplane) between 140 and 180 pounds of seed per acre of a short-season rice variety, into standing wheat at the milk stage. He then floods the field to sprout the seed. After germination, he drains the field to allow the rice to peg down, and to dry the ground for wheat harvest. Rutledge believes that flooding the wheat in the milk stage does it no harm. By wheat harvest, the rice is only a few inches high—too low for damage by the combine header. After wheat harvest, he applies nitrogen fertilizer by ground rig—of course, this fertilizer application would not be allowed in an organic system. A major advantage to his system is the weed control provided by the wheat straw. Rutledge has used this system since the late 1970s and has never failed to get a rice stand.

- Rice growers in Arkansas (5) are capturing winter rainwater and allowing it to stand in their fields. They close the levees in early November and don't drain the fields until early February or March. The benefits of this include more rapid decomposition of stubble, less soil erosion, increased habitat for waterfowl, and some control of red rice, a major weed problem. Other Arkansas growers are trying to suppress red rice by water- seeding their rice crop into tilled fields that have been flooded. Water-seeding suppresses red rice germination by keeping the soil anaerobic. The final seedbed must be prepared immediately prior to flooding to kill those red rice seeds that have already germinated. The University of Arkansas recommends using only

pre-germinated rice seed when water-seeding (6). Wintering ducks are also a major factor in managing red rice. An Arkansas study showed that duck foraging resulted in a 97% reduction of red and white rice seed in a winter-flooded field (1). Ducks and geese also feed on such weeds and seeds as barnyard grass, smartweed, beggar tick, crabgrass, panicum, and other agronomic pest species.

Soil Fertility

Maintaining soil fertility in organic cropping typically involves some combination of crop rotation with deep-rooted legume crops or green manure/cover crops, and applying rock minerals, animal manures, composts, and other approved organic amendments. Leguminous green-manure crops can supply 30 to 50 percent of the nitrogen needs of high-yielding rice varieties. The availability of green-manure nitrogen depends on the quantity, quality, and type of green-manure crop; the time and method of application; soil fertility; and cropping method (7).

USDA researcher Dr. Seth Dabney (8) studied rice production in two Louisiana fields that had been green-manured with subterranean clover. The sub-clover provided enough nitrogen to produce high rice yields without additional nitrogen at one location, but the other required 50 pounds of additional nitrogen per acre to achieve similar yields. He also demonstrated that the sub-clover would naturally re-seed itself following no-till-planted rice. The reseeded sub-clover stands were more productive than those that were manually seeded. These results verified what other Louisiana researchers had seen in re-seeded sub-clover stands—higher re-seeded-stand densities and earlier growth commencement in the fall. In addition, clover-planting costs were eliminated with the naturally re-seeded stand.

Insects and Diseases

Because rice is grown in flooded fields, insect pests are usually a minor problem. Fall armyworm and chinchbug populations can build up in the absence of flooding, but are easily controlled by a flush of water. Rice water weevil and rice stinkbugs are less affected by flooding. Timely planting, variety selection, and cultural practices to suppress weeds and encourage dense stands of rice will help control stinkbugs and water weevils (9).

Rice blast and sheath blight diseases are often controlled by appropriate variety selection. Excessive nitrogen levels, rarely a problem in organic production, can encourage sheath blight, kernel smut, and other diseases.

Economics

Organic rice is typically sold in niche and specialty markets, where it commands a price two to three times higher than that of conventionally grown rice (10). But while it sells at higher prices, organic rice also costs more to produce (11). Recent cost information, however, is difficult to find.

In 1992, the University of California Cooperative Extension Service calculated the costs of organic rice production in the Sacramento Valley for both water-seeded and no-till, drill-seeded rice (12, 13). The no-till, drill-seeded organic rice cost $653.65 per acre to produce, and the water-seeded organic rice cost $677.94 per acre.

More recently, Missouri grower Andy Turman calculated that organic rice cost $22 more per acre to produce than conventionally grown rice in 2000 (14). He attributed the difference to fertilizer

shipping costs, extra tillage, and labor for hand weeding. (Turman uses furrow irrigation, rather than flood irrigation, requiring 30% to 50% less water.)

Yields from organic rice production tend to be lower than conventional yields. Turman calculated his yield to be one-third that of a conventional rice crop. Similarly, Lowell Farms of Texas estimate their organic rice yield at 50% to 60% of conventional yields (15).

Marketing

While marketing organic products presents a challenge, there are some places to find buyers for your crops. Many "conventional" farm magazines and websites can be good sources of information on buyers of organic crops. The ATTRA publication *Marketing Organic Grains* identifies several organic grain buyers.

The Organic Consumers Association is a public-interest organization dedicated to building a healthy, safe, and sustainable system of food production and consumption. They act as a global clearinghouse for information and provide grassroots technical assistance. Their website includes information on a host of organic issues. Contact:

The Organic Consumers Association
6101 Cliff Estate Rd.
Little Marais, MN 55614
Tel: 218-226-4164
Fax: 218-226-4157
E-mail: info@organicconsumers.org
http://OrganicConsumers.org/

FarmWorld <http://www.farmworld.com/> was established as a worldwide trading site for information on agricultural commodities and products. The site offers free buy/sell/trade listings in a variety of categories, including grains.

Growers also can list their products in the Organic and Natural Foods News Industry Buyer's Guide, available online at <http://www.organicandnaturalnews.com/>.

Sustainable Farming Connection <http://www.ibiblio.org/farming-connection/links/home.htm> provides useful information on organic farming, including links to a number of marketing resources.

agAccess Information Services offers business, marketing, and strategic planning services as well as market research. Services are oriented toward specialty and organic producers. Contact:

agAccess Information Service
424 Second St., Suite B
Davis, CA 95616
Tel: 530-756-0778
Fax: 530-756-0484
E-mail: aginfo@ceresgroup.com
http://www.ceresgroup.com/ais/index.html

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Further Resources:

U.C. Cooperative Extension Rice Project
http://www.plantsciences.ucdavis.edu/uccerice

This website provides many online resources related to rice production, including diseases and pests, water quality and management, water fowl, cover crops, and weed management.

University of California
Agriculture & Natural Resources
http://anrcatalog.ucdavis.edu/

This website identifies a number of useful sources of agricultural information, including several publications on rice.

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