Transition to Organic Farming for California Field Crops

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Introduction

My father started farming at this location in Pleasant Grove, California, in about 1947, and in the early 1980's we were interested in reducing our chemical use. We started experimenting with different crops and different techniques, and we began farming organically in 1985 with 45 acres of popcorn. Presently, about 95 percent of our farm is in organic production.

One of the things that I like about farming the way we do is the fact that we can get things to grow so wonderfully with no added fertilizers. Our farm is distinguished from other farms in the area in our use of cover crops. Our main cover crop is a mixture of triticale and purple vetch; the triticale is actually a volunteer crop from the previous year where it was harvested for grain. We are also using it as a cover crop for popcorn. A lot of farmers are very excited about walking through high yielding fields of wheat or corn. I get excited about walking through chest high cover crops, and then digging out the roots and finding nodules and earthworms.

Cover Crop Management

We use a heavy flail chopper to chop the cover crop before we incorporate it. We like to use a heavy disk instead of a plow, so that the organic materials can be mixed evenly within the top eight inches of soil. The composition of the cover crop, whether it has a lot of grain stems in it or whether it's mostly purple vetch, will determine the number of cultivation passes that will be required to prepare a seedbed. It takes about two weeks to get to the point of planting after the first incorporation; that doesn't mean that we're intensively working the soil for two weeks. We've worked it, then we've gone on to other fields. During that time, the soil decomposes all of the residue very quickly, and often times, we only have a little bit of residue left on the surface.

Corn Production and Weed Control

For corn production, we supplement the green manures with composted manures. In California, there are quite a few hauler and spreader businesses that specialize in hauling and spreading different amendments. Our source of manure at this time is from poultry houses, and it's a mixture of partially composted poultry manure and rice hulls.

The system we've worked out, so far, is to incorporate the cover crop and to work the soil down so that we can form beds, to plant and then to irrigate. In most situations, this is the worst way to do it in terms of weeds because you start the crop and weeds at the same time. We've been able to overcome the weeds with very precise mechanical cultivation.

Here in California we have a Mediterranean-type climate. We usually do not get any rain from May until October or November, and we irrigate crops such as corn six or seven times per year.

We try to do a good job of weed control. One of our problems is unseasonable rain in late May before we can get in to cultivate, and then, a lot of weeds will become firmly rooted. We have some problems with that, although we've been very surprised about the resilience of corn and how much weed pressure it can take under the canopy and still yield a crop.

Rice Production and Residue Management

We also grow rice in rotation. We can often get a very good fertility response in rice without any added compost. By just using a green manure crop, we can get very clean stands.

Weeds were a major problem during our transition, but we really don't have any major insect problems. We grow about 600 acres of organic rice a year on six or seven fields, and each year a few fields are in excellent condition and a few fields are very poor. So we're still fine tuning, but

our average yield has been okay. While we are able to control weeds in the rice paddies themselves, we have border areas on the levees to the fields, and we are using sheep as a grazing animal to help control weeds and weed seed production on the levees. The sheep are controlled with electric fences.

For years it was standard practice in the Sacramento Valley to burn residues from rice production after harvest. Presently, there is legislation in progress to phase out burning. By the year 2000, I think the majority of rice burning will be eliminated, thus, farmers are faced with the question of what they are going to do with their straw.

Since we are faced with the same question, we've been experimenting with several methods of handling and utilizing the straw. One method is to sow purple vetch seed into a flooded field just prior to draining. After harvest, when the canopy is removed, the vetch gets more sun and it starts to grow up over the rice straw. We either summer fallow the following spring or we let the vetch go to seed and then harvest the seed for use in other fields.

In the other method, we try to work the straw into the soil with a heavy disk. Later we'll sow vetch seed which germinates with the winter rains and produces green manure. The extra nitrogen will help to decompose the incorporated rice straw. We are presently cooperating with the University of California Extension Service on a field experiment to study the effects of using purple vetch as a green manure for the decomposition of soil-incorporated rice straw. We have devoted 15 acres to this study which consists of half-acre plots.

Seed Cleaning and Marketing

One of the main considerations for selection of crops in a rotation is what we can market. When we first grew popcorn, we sent it to a mill to be screened and bagged. Then we decided that we should do this ourselves, which allowed us to access a lot of other markets.

We run popcorn and yellow corn used for food through a seed cleaner. We also clean our own legume seed. We started with used equipment on a cement slab outdoors; we've since gone into a building with a little better equipment. We also sell, you might say, our diversity in cropping and in the amounts we sell. We sell anywhere from a 25-ton truck load of organic yellow corn for food use to two small pallets of any organic corn or beans (about a thousand pounds at a time) to natural food distributors.

Almond Production

We established an almond orchard on 100 acres from about 1985 through 1989 in the same location where my father started an orchard in 1960. It's just now coming into production. In the earlier orchard, we used nearly all the chemicals known to man on those almonds, and we still had a significant amount of worm damage. When we began the new orchard, we did not use herbicides, and we used reduced tillage underneath the trees. We found that we had less worm damage than when we were spraying; this result was also demonstrated to a large degree by Lonny Hendricks, a Cooperative Extension Agent in Mercer County. Basically, we really don't have any insect problems on almonds.

Our main problem is brown rot blossom disease which is worse when unseasonable rains occur during the spring bloom period. We're also interested in nutritional effects of fertilizers on the trees to enhance their resistance and in copper applications, which are allowed under the current California organic standards.

Because we don't use herbicides in the orchard we have some specialized equipment. A weed badger with a mower head attached hydraulically articulates around trees with sprinklers in the tree row. If we do a good job, we get a good set of almonds. Unfortunately, with a good first set of blooms tightly packed together, unseasonable rain can cause some severe disease problems.

Crop Rotations and Soil Types

We are trying to find a rotation that works for us. We let one of the rotations (triticale and vetch

mix) go to seed for grain use. So, besides individual methods for controlling weeds or enhancing soil fertility, we have been attempting to devise a crop rotation scheme which will inherently control pests and maintain fertility. Crop selection is determined, of course, by what is appropriate for our climate and our soils, and also by our existing equipment resources, our labor resources, and our available marketing opportunities.

We farm three different soil types ranging from well-drained soils to loams to heavy adobe clays. On the good soils, we grow more corn, wheat and oats, and we grow more rice on the heavier soils. For instance, on the well-drained soils, a six year crop sequence may be corn, wheat, corn, oats, rice, and then a vetch fallow. On our heavy soils that favor rice, an eight-year sequence may be rice, vetch, rice, vetch, rice, vetch, corn, wheat. So we're sort of scratching our heads trying to figure out the best rotation, and it's interesting. Maybe, we'll come up with a ten-year rotation. But how many cycles of a ten-year rotation do we have to go through to know that it really works. I think that it's an ongoing program.

One of the other criteria that we consider is the net value per acre per pound of N and P removed. It's easier for us to grow legumes, but with corn which is a high user of nutrients, especially nitrogen, we look at such things as how much is the crop removing from the soil and how much is left for subsequent crops.

With that in mind, we are growing dried beans this year. We will probably be replacing much of our yellow corn acreage with dried beans if, in fact, we can develop skills to grow and to market them organically. Basically, we are doing a sort of a seat-of-your-pants trial and error farming, using our best "guesstimates" of what will work for us.

New Technologies and Studies on EM

We are looking for new technologies that could help us fine-tune the rotations, or maybe tighten them up so as to have more productive crops in sequence. When I talk about new technologies, they might be old technologies, to some, but new to us.

We put out about three or four plots where we applied EM. We applied EM prior to incorporating the chopped triticale and vetch mix, and we also put EM on soil prior to rice. Presently, we are starting to harvest, and we will be taking yield data from these plots where possible.

We are looking for new technologies concerning equipment. We use a no-till drill in rice production. We use two methods of rice production: one is a no-till method where we just chop a cover crop and then cut a slot through the cover crop and drill the seed in; the other method is the conventional method where we completely till the cover crop, flood the fields, and then aerially seed. In the conventional method, we can control our weeds with deep water, as long as we don't have one particular bothersome species. One of the worst is called rice field bulrush, a type of aquatic sedge. It can grow through whatever water depth you might provide. Where it is a problem, we use a no-till drill which seems to limit it's germination.

Sustainability of Farm Families

I would like to introduce my wife, Wynette. People ask me about my relationship with the University of California Cooperative Extension Service. Well, I just tell them that I married the County Farm Advisor. Wynette's specialty with the Extension Service was tomatoes, wheat and corn. She came to work full time for the farm in 1989.

We've talked a lot about sustainability today, but one consideration we have to think about is keeping families on the farm. In our area, urban development continues to encroach upon our community, and good farmland is being lost from agriculture forever. This is sad because it means that farm families are also being displaced from the land, and that many young people who want to farm will never again have that opportunity. Somehow, farm families need to become more sustainable themselves, along with the goal of achieving a more sustainable agriculture.