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Name of Principal Contact Person: David Moodie

Telephone: 715-341-1622 Fax Number:

E-Mail or WEB Address:

Submitted by: Jonathan Smith Date: 8-4-02

Department Contact: DATCP – Ag. Development -ADD Grants
PO Box 8911
Madison, WI 53708-8911
Tel: (608)224-5137
Fax: (608)224-5111

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Commercial Organic Cranberry Production in Wisconsin

A guide for the expansion of organic cranberries in Wisconsin.

By: Jonathan D. Smith, Ph.D. and David Moodie

Executive Summary

Cranberries are the number one fruit crop in Wisconsin, totaling over 17,000 acres. Up until 1999, there was not enough fruit to satisfy demand in the marketplace. However in the past few years, growers have planted and harvested more fruit than the juice market can bear, and prices have plummeted. In an effort to diversify their market, growers have researched organic culture and found very little information.

Cranberry production is an ideal candidate for organic culture on both an economic as well as environmental platform: 1) Cranberries are native to Wisconsin and have few pest problems, 2) Cranberries are typically grown near ecologically sensitive wetland habitats, and 3) organic cranberry fruit is in high demand.

There is a demand for large acreage of organically grown cranberry fruit. Most organic fruit is sold on the fresh market for up to $4.00 per pound. There is not enough production in the U.S. to satisfy an organic cranberry juice brand, but several juice processors have incentives of up to $1.20 per pound for certified organic fruit. Conventional process prices hover around $0.20 per pound (2001 pricing).

In this project we set out with two separate plans of work: 1) build a new organic cranberry bed and 2) convert an existing conventionally grown cranberry bed. In this first year we met our objectives and have gathered a wealth of information that will provide many growers with the basic insight for organic cranberry production.

Grant funds from the Wisconsin Dept. of Agriculture, Agricultural Diversification and Development program greatly assisted the growers involved with this project. There is significant risk involved with learning new growing techniques on a crop. With such a high-valued crop as cranberries, the risk for a grower is even more significant. It costs approximately $35,000 per acre to establish a cranberry bed. Having the Dept. of Agriculture involved with the guidance of this project gave growers the necessary support and confidence necessary to achieve their goals.

We were very successful with establishing the baseline standards needed for organic cranberry production. We made sure that the experimentation was based on an 'industry-wide' viewpoint, as opposed to just a property specific perspective. The information included in this report will benefit all Wisconsin cranberry growers that wish to grow organic cranberries.

This project was not without its own set of challenges. Starting an organic cranberry bed from seed continues to be a project that, on a small scale is rather successful. Implementing this growing technique on a larger scale is much more difficult.

Although this is only the first year of a two-year project, you will find the information in the report accurate, complete, and an excellent baseline for any grower interested in organic cranberry culture. When the project is finished, we feel that this information can be distributed via several cranberry growing channels such as magazine, newsletter, and field day demonstrations.

This project was successful in knocking down some of the major hurdles involved with organic cranberry production. The biggest reluctance to converting to organic culture is the lack of experience and information. This project provides both, and will be the backbone for an entire organic cranberry industry in Wisconsin.

Introduction

This report is written based on the assumption that the reader has a working knowledge of cranberry production and wishes to either build a new organic cranberry property in Wisconsin or convert their existing acreage. If you are relatively new to cranberry production, I advise purchasing the book " The American Cranberry" by Paul Eck, published by Rutgers University Press. The only information readily available on organic cranberry production is a 6-page report developed by ATTRA (Appropriate Technology Transfer for Rural Areas). This report outlines general guidelines on a national basis, and can be found at www.attra.org.

Certified Organic

It is important to realize that anybody can grow crops organically, but to sell them to consumers the crop must be properly documented and organically certified. The organizations that can certify acreage in Wisconsin include, but are not limited to, MOSA (Midwest organic Services Association, Viroqua, Wis) and WI OCIA #1 (Wisconsin Organic Crop Improvement Association, Viroqua, Wis). I would advise joining one of these organizations immediately to get all the required information needed for documentation. When you join one of these organizations, you become involved with a nonprofit group called OMRI (Organic Materials Review Institute). OMRI is an organization that evaluates all products that can be applied to certified organic crops. If the product you wish to use is listed in the OMRI directory, it will pass certification standards.

Our big question: Conversion of Conventional acreage or development of new organic acreage?

In this project, I was determined to learn if it is easier to convert conventional cranberry acreage or develop new organic cranberry beds from beginning. I learned that neither process is easier, with each having challenges and advantages. It is because of this large degree of difference that we needed to focus on each project separately.

Part I. CONVERTING EXISTING ACREAGE TO ORGANIC

I assume that most of the acreage destined to end up organically certified in Wisconsin will come from existing acreage. There are several advantages: 1) There is a thick vine canopy over the bed which gives the grower a jump on weed pressure and 2) the grower has a working knowledge and history on the property, and with this information one can more easily determine which management control is limiting. There are challenges of converting an established cranberry bed. First, weeds, diseases, and insects are most likely already in the bed and cannot be excluded, as with new bed development. Second, most all beds in Wisconsin are a monoculture of only one type of cranberry cultivar, which makes pests more difficult to manage.

An Organic Checklist

During this project I have discovered that you must do some investigative research to learn whether your property is conducive to growing organically certified cranberries. I would advise going through the checklist to learn if you should even attempt the growing process on your land.

1. Production: Is the canopy thick and healthy with deep vines?
2. Entomology: Are all pest pressures low, with very little need for pesticides?
3. Weeds: Are weed pressures low, with very few weeds establishing each year?
4. Diseases: Do you have high amounts of fruit rot?
5. Moisture: Are your beds naturally moist?
6. Water source: Is your water from a clean source?

Determining what is most important

Each property is different, so it is critically important to determine which question on your checklist will cause a problem. With organic cranberry production, one problem can be the difference between success and failure.

#1 Start with a thick, healthy vine canopy. It is important to begin with a healthy and vigorous vine canopy. You want to begin with a bed that yields well, because there will be additional cost inputs per acre, and yield returns must justify the expense. Secondly, high yielding beds typically are vigorous and healthy. It is important to have a thick canopy to shield out weeds. This cannot be understated. In our plots we found that, if you can see the soil as you look through the vine canopy, you don't have enough vine cover. A thick canopy is the best defense for weed emergence, thus it is important to make sure vines stay healthy. You must also pick a bed that has high yields. Organic culture is much more expensive, and as a result a genetically low yielding cranberry bed will not provide enough return for the additional investment, even with a certified organic premium.

#2. Pest Pressure. The biggest problem that I've experienced in this project has been management of pests. If there is one thing that is critically important to learn early in your discovery process, it is the natural pest pressures on the property. When converting to organic culture you will build up natural populations of beneficial insects, but it will not provide enough protection if your pest problems are bad. Even in conventional culture, you still have beneficial insects helping to control your pest problems. Thus, it is important to determine your level of pest pressure without conventional chemicals. There are several biological insecticides on the market today, and they will be highlighted later in this report, but in no case should you attempt to rely on them to control a pest problem.

#3. Weed Pressure. Depending on your location, weed pressures can choke out your crop over a short period of time. There are many things that can affect weed pressure. It is most important to assess the types of weeds you currently find in your existing beds, and try to determine where they originate. For most growers, a majority of the weeds in the bed originated with the sand that was used to construct the bed. Many weeds were also planted accidentally because they were mixed in with the cuttings when the bed was first built. However, weeds can also be distributed by the irrigation system. In my studies I found that weed seed such as cottonwood and poplar were carried on the reservoir water, eventually sank, and were caught in the irrigation water. Irrigation systems that pull their water from a wetland reservoir will have a continual influx of weed seeds every time they irrigate.

#4. Diseases. In Wisconsin we are very lucky to have low levels of diseases, and most of them are not yield limiting. However, it is a good idea that you never assume, and watch your newly established organic fields for disease pressures. It shouldn't be a problem in

Wisconsin, but several diseases are present naturally in the soil and can cause problems if the crop is stressed or weakened.

#5. Moisture Levels. I have learned that a successfully grown organic bed should have higher natural moisture levels in the beds. Higher natural water levels reduce the need for excessive irrigation. Secondly the biologically based fertilizers break down easier in a moist root environment, requiring less fertilizer inputs. Third, plants are healthiest when the soil is 20-30% water. Soil moistures less than 15% usually result in weaker, less vigorous plants, which lead to higher weed and insect pressures.

#6. Clean source of water. Many cranberries are grown in central Wisconsin where one owner's beds may be adjacent to another owner's beds. You must understand early in the discovery phase whether your farm can be certified. Contamination from your neighbor's chemical overspray will nullify a certification. Likewise, if your water supply travels through a farm that uses non-organic products, your water source may be deemed contaminated, thus denying certification. I recommend having an organic crop consultant look over your property prior to starting the certification process. You can hire a crop consultant through either of the service organizations I listed at the beginning of the booklet.

Drawbacks of converting existing acreage

When one thinks of the philosophy of organic culture, it encompasses a natural balance in the ecosystem based on biodiversity and conservation. Technically, conventionally built cranberry properties lack the basic requirements of diversity and conservation. Conventionally grown cranberry plants are all one particular cultivar, thus a monoculture that lacks diversity. Secondly, most of these beds are built on a pure sand base with less than 1% organic matter. Sand culture does not promote conservation because nutrients can easily pass through the system and into the water table that resides less than 12" from the bottom of the root zone. Most certification agencies will allow converted acreage to keep their status if they can demonstrate that they are diversifying as well as adding additional organic matter to the soil.

Solving the drawbacks

In our research study we worked to overcome the limitations that kept us from becoming organically certified. We discovered that cranberries also prefer biodiversity. When conventional herbicides were eliminated from the test beds, seeds that were left over from

the previous seasons' harvest were germinating and beginning to grow. Each seed is essentially a new cultivar, and over time the converted organic bed will increase its biodiversity. Increasing the organic matter concentration in the soil was a larger challenge. We decided that it would be most prudent to add organic matter to the soil at the same time we were conducting our winter sanding program. We developed the best organic mixture while working on the other portion of this project. In the next section, we'll outline how we developed acid organic matter compost that could be easily applied to the cranberry beds with conventional equipment.

Weed Management

In the cranberry industry, we must realize that we are dealing with a perennial crop that cannot be cultivated nor rotated. Once weeds establish, the only effective method for control is manual hand weeding. We experimented with several "wipes" using vinegar derivatives, citric acid, and found that these herbicides would merely burn off of our perennial weeds, without slowing growth. In the cranberry industry, a majority of our weed problems are perennials such as poplar, maple, and willow. We also have problems with brambles, cinquefoil, and loosestrife. Annual weeds only appear to be a spotty problem and can easily be hand weeded. Most of the organic bio-herbicides were developed to manage annual weeds, thereby making them ineffective for use in our industry.

At this time, there is nothing on the organic market that can selectively kill perennial weeds, except for hand weeding. Hand pulling weeds is labor intensive and expensive. Our costs for hand weeding an established bed averaged $1500 per acre for our established cranberry acreage. We hired laborers to pull weeds, and we soon discovered that it is most important to train them to pull out the root, as well as the shoot. To increase speed, some workers only broke off the stem, leaving the active root in the soil. Within 4 weeks, it wasn't even noticeable that the area had been weeded!

Insect Management

The Wisconsin cranberry industry has four primary pests, Black Headed Fireworm (BHFW), Cranberry Girdler (CG), Sparganothis fruitworm (SFW), and Cranberry Fruitworm (CFW). For more information on these insects, contact the University of Wisconsin extension for the latest fact sheets.

Any of these four primary pests can destroy a cranberry bed within one season. It is extremely important that you assess your potential insect problems prior to converting to

organic culture. I have found that there are two ways to assess existing pest pressures: 1) monitor pheromone traps (as used by most IPM scouts). If moth counts are higher than average for the four major pests, you will have a significant challenge managing these pest insects. I recommend that the organic grower work closely with a professional IPM scout to closely monitor pests and assess management strategies. Secondly, you can take a bed and eliminate the chemical sprays for a season and allow the pests to continue through their cycle without pesticides. Based on the damage you receive that first year, you should have a good idea whether you can tolerate pest damage. Although growers many not like to use this method of determination, it is much more cost effective to only lose one bed in the learning process instead of the entire property.

In the Wisconsin cranberry industry, we have organically certified management tools for BHFW and SFW. Mating disruption lures manufactured by MSTRS in Ames, Iowa (www.mstrs.com), can successfully reduce pest populations after the first season. These disruption lures release a pheromone that mimics the female attractant. The male moths use this pheromone to find the females. However, because the bed is saturated with this pheromone scent, the males never find the females, and no eggs are laid. We used these lures, and they appear to work effectively if you distribute them according to the manufacturer's specifications. They cost nearly $8 each, and you need a minimum of 15 per acre.

With respect to the mating disruption lures, it is most important to realize that they manage FUTURE pest infestations, not the current larvae problem. If you are thinking about converting your acreage to organic and you have marginally high levels of either BHFW or SFW, you may want to implement mating disruption techniques along side conventional control measures for a season prior to converting to organic certification status.

For most growers, the primary pest problem in Wisconsin will be Cranberry Fruitworm. Mating disruption pheromones exist but are cost prohibitive at this time. Cranberry Fruitworm can easily be controlled with conventional chemicals, but when left unchecked, can devastate a crop within a single season. The unconventional feeding characteristic of CFW makes it difficult to control, even with bio-insecticides. During the primary hatch of CFW during bloom, our studies focused on alternating bio-insecticides on a regular basis to manage the pest. There are two primary bio-insecticides: Bt's and insect growth regulators. Bt's, or *Bacillus thuringensis*, is a stomach poison that is effective on CFW, if they eat enough of it. There are many companies producing this product and we couldn't identify through comparative research which one is better. This will need to be a follow-up study completed by an academic institution with adequate checks and controls. We evaluated Agree, Dipel, and Zentari with very little noticeable difference. It takes several days for insects to succumb to Bt products, so evaluation was

difficult. Just to be safe we decided to use a different product at each spray. There is a new bio-insecticide that was released in 2002 with OMRI certification. It is an insect growth regulator called Aza-Direct. It is made by Gowan company, and although more effective at controlling CFW, it is also three times more expensive. In our preliminary tests this season we found that, if we applied Aza-Direct twice a week, and Bt's three times a week, for the first three weeks after bloom, we could reduce damage from very high concentrations of CFW. For more moderate pest pressures, one Bt and one Aza-Direct insecticide each week for three weeks was adequate. We found that none of these bio-insecticides appear to last long on the plant, and so they must be reapplied continuously while there is a threat.

Flooding for Cranberry Pests

One unique tool that cranberry growers can use for insect management is flooding. Flooding used to be the primary method for insect control up until the early 1940's. Based on the physiology and growth of the plant, there are only two times you can use a flood for insect management. The first timing for floods is in late May or early June, immediately after the cranberry upright buds begin to elongate. At this time, many pests such as loopers, fireworm, and spanworm have all hatched and are feeding on the leaves. We found that, in our studies, early flooding is an excellent method for controlling these early season pest infestations. Based on the completeness of control, this method of management could also easily be used in conventional culture too.

Cranberries cannot be flooded during the bloom period, which covers four weeks from mid-June through mid-July. Any open flowers will be destroyed when flooded. We learned this in 2001 when some growers received 15" of rain and flooded their beds during early bloom. Only blooms that were open were destroyed. From the insect management perspective, there is typically very little pest activity during this period of time anyway, so very little needs to be done while the plants are in bloom.

After the bloom is completed there are two potential options for management of insect pests: 1) bio-insecticides or 2) flooding. Unpublished research work in the late 1980's by Frank Graziano, a grad-student in Dr. Stang's laboratory, conducted extensive studies on mid-season flooding and its effect on plant productivity. His research showed that quick floods less than 36 hours in length would not impact plant productivity, but it was vitally important to get the water off the beds as quick as possible. His research demonstrated the need for flooding up at night, having plants submerged completely during the day, and removing water with complete drainage at night. We used this information as the basis for our studies in pest management. We decided that we did not want to hurt the

plant or the fruit, so we had to work within those guidelines to determine if flooding was a good alternative for organic insect management. In our first season, we found that floods in duration of 24-30 hours worked best. When flooding cranberry beds, the biggest trick to success is getting the water on and off as fast as possible. When the vines are completely submerged, they will not be damaged. However, when the shoots are exposed to sunlight, it is critically important to make sure that the roots are not in saturated soil, or fruit rot will develop.

Our studies showed that mid-July floods right after bloom did not manage pest populations effectively. Most of the insects did not hatch yet, so we did not drown them. Secondly we found that the fruitworm pests invaded the first fruit very rapidly and sealed their entrance into the fruit, making flooding ineffective. We determined that bio-insecticides should be used on the newly hatched fruitworm larvae as they enter their first fruit. Hatch takes place for approximately two weeks after bloom is completed.

We completed this study in early July, so future studies will determine if late season flooding helps manage the larger CFW and SFW pests.

Fertilizers

In this project, we did not focus our research efforts on fertilizers. There are a myriad of organic fertilizers on the market nowadays. Based on price and performance, a grower will only need to find a mixture that he/she likes. In my studies, I have concluded that granular organic fertilizers act more slowly on the crop, so lead times of 1-2 weeks need to be realized. We were successful with either chicken or turkey compost. The chicken compost was available in bulk from Creekwood Farms, Gays Mills, Wisconsin. Secondly, I found that liquid fish fertilizer is an excellent foliar fertilizer when applied at 3-5 gallons per acre. It is quick acting and efficiently feeds the plants without feeding the new weeds. We purchased a great product made by Dramm Corporation from Algoma, Wisconsin. Through these studies I found that the pounds of actual nitrogen required on the plots could be reduced by 50%, with the same growth and vigor of fast-acting synthetic fertilizers. I recommend that both granular and foliar fertilizers be used within the fertilization program. To find a listing of organic fertilizer retailers in your area, request the “Upper Midwest Organic Resource Directory” from your certification agency.

Part II. BUILDING AN ORGANIC CRANBERRY BED

In this project we attempted to build an entire bed within organic specifications. Since we were beginning from scratch, we could design the perfect organic cranberry bed with optimum biodiversity as well as soil organic matter content. Thus, the advantage of establishing new organic beds is incredible. We can maximize biodiversity by planting the entire bed with seed. We can put the seed on quite thick to provide a quick vine cover. We also eliminate the incorporation of weeds, diseases, and insects, which are typically harbored in the vine planting method. The immediate drawback from this type of construction is weeds! We found that if a property has a weed problem, it will continue to be a weed problem, even after cranberries are planted. There is no way to sterilize the soil and block out weed seed intrusion. Most of our weeds came from the water supply, wind, and deep unsterilized sand below our organic matter base.

Building a cranberry soil with organic matter

In this study we built a 4.5-acre bed of cranberries from seed. We needed to increase the organic matter in the soil. The available soil was essentially coarse sand, with only 0.1% organic matter. We evaluated several waste materials the year prior to the experiment because we were going to need large volumes for composting. We collected and conducted studies with bean and potato waste from Delmonte and McCain's with marginal success. The best product we found originated from cranberry processing. We decided to use cranberry pomace for this experiment.
Cranberry waste pomace was collected from Northland Cranberries juicing operation and incorporated into virgin sand excavated from the reservoir. The cranberry waste pomace had a pH of 2.8 and was readily available. Most of the pomace was rice hulls and cranberry skins. This pomace was mixed into the pile at a 30% volume concentration. Nearly 200 semi loads of pomace was hauled (at $100 / load) and mixed with sand to create a huge pile of the mixture. The pile started to compost, and using a thermometer, temperatures inside the pile maintained 190F for weeks. After 18 weeks, the piles cooled down and a composted sandy loam soil was created. It was also sterile with no weed seeds alive.

At the start of this project we used dump trucks to apply a 2" depth of this organic sand over the entire 4.5-acre bed. This loamy sand provided us with the soil structure we needed to grow the cranberry seeds and maintain a sustainable soil profile for long-term growth of an organic cranberry crop. The resulting soil mixture applied to the bed had an organic matter level of 5% with a pH of 4.6. The soil mixture held and retained water very well but also allowed excess water to percolate through the material. In hindsight I wish that the organic matter level would've been closer to 10% to increase moisture-

holding capacity, but we lost a lot in the composting action within the pile. The soil bulk density was at a very respectable 0.95 g/cc, which is slightly heaver than peat but significantly less dense than pure sand. This soil structure will allow even greater penetration of cranberry root systems, as is usually seen on very high yielding peat bogs.

This project required nearly 4000 yards of the soil compost to be evenly spread on the bed. Because sand is typically applied in the winter by trucks, it was necessary to alter our application methods and apply the sand using a belly scraper that wouldn't get stuck in the soft sand. A crew of 2 full time men spent nearly a week transporting the soil compost onto the bed and then using a dozer to level the bed.

Seeding a Cranberry Bed

Up until now, cranberry seeds were considered a waste product of the juicing industry. Geneticists used cranberry seeds to develop new cultivars, but they have never been commercially planted into a bed. We had several challenges to overcome. First we had to find viable seed that wasn't destroyed in the juicing process. Second, we had to learn how to plant it.

Finding viable cranberry seed

Most juice processors have waste that contains seed. We found a person at a corn-drying mill who was able to collect the seed for us from waste generated from a processing facility. Using a screener, they were able to recover the seed and dry it to about 8% moisture. Working real close with our seed supplier, we were able to arrange that ½ of our seed supply came from Washington state while the other ½ came from Wisconsin. Our reasoning relates back to the fact that organic culture needs diversity to be successful. Wisconsin uses Stevens in nearly 85% of its acreage. Washington State has a number of different cultivars. Although it is impossible for us to determine the primary parent of each seed, we felt that collecting seed supplies from two different regions of the nation would increase our chances for diversity. The two seeds were evenly mixed in the hopper prior to application.

However, before we planted the seed, our first challenge was to determine if that seed could germinate. I devised up a simple germination technique for cranberry seed. I discovered that cranberry seed must be imbibed for several days to get it to germinate, or it'll rot in the incubator. I took cranberry seed and imbibed it by sticking it in a heated fish tank set at 85F. The cranberry seed needed to be imbibed for 6 days to get adequate germination in the Petri dish. I replaced the water daily. We discovered that the juice residue on the seed needed to be leached from the seed to permit germination. After the

seeds were imbibed, we counted and placed 100 seeds into a Petri dish that was moistened with a damp paper towel. After 7 days, we could easily count the seeds that had germinated and sprouted cotyledons. In our tests of the seed lots, our seeds from this supplier averaged 92% germination.

Amount of seed needed

Before we could think about how to plant the seed, we needed to know the amount of seed necessary. A fully established cranberry bed contains between 300 and 450 uprights per square foot. We conducted a small experiment to learn how much seed to plant. Our experiment evaluated four different planting densities: 500, 1000, 1500, and 2000 seeds per square foot. From a planting perspective, too high a density could cause crowding problems, but given that it is unknown how the seed will germinate and perform as an open pollinated selection, higher densities would be wise. We discovered that the highest rate looked like the best planting density. We decided to plant 2000 seeds per square foot. Using samples of seed from the supplier, we determined that we needed 100 lb. of seed per acre to achieve 2000 seeds per sq. foot. This equates to 87 million seeds per acre! In essence we are planting 87 million genetically different cultivars. Each seed weighed 521 micrograms.

Planting Seed

We looked for many different types of planters and settled on using a piece of equipment that nearly every cranberry grower has on their property, a fertilizer application boom. The equipment was calibrated and determined that at most, the fertilizer boom could apply only 25 lb. of seed per acre. The seed was so light and small, any heavier applications would plug the air system. To apply a total of 100 lb. per acre, the boom passed over the bed 4 times. Since we used an airflow boom to lay the seed evenly on the bed surface, the seed still needed to be incorporated about ½" deep to keep from desiccating in the summer heat. For that project we used a harrow to thoroughly mix the seed and the soil. It only took once over with the harrow to get adequate coverage. Some seed still remained on the top, but without drilling the seed into the ground with a seed drill, some losses would have to be expected. Overall, 90% of the seed was adequately incorporated into the soil with the use of a harrow on a 4-wheeler. Based on our studies, we determined that seeds should not be planted deeper than ¾ inch.

Difficulties with getting plants established

Our first commercial planting was started on August 24, 2001. By mid September we had good emergence and the plants were about ¾" long. They survived well until mid-November when they succumbed to drought during the hottest and driest November on record. The irrigation was pulled from the entire property and the fragile plants perished in the heat. In the future, we'll water the crop, even when they are dormant.

We regrouped in the early spring and planted the last week in April. Germination was very slow due to the cool ground temperatures, but by late May, plants emerged and began to grow. However once again, Mother Nature provided us with nearly 15” of rain in a 24-hour period, and the bed was at least 6 inches under water for 24 hours. The flooding caused all of the seedlings to float to the corners of the bed, where they died.

We really feel that we need to modify our planting technique for cranberry seed. It emerges and grows slowly until it is established. In saturated soils it floats very easily. It also can be destroyed by drought prior to establishment. In the next phase we are going to experiment with drilling in the seed and covering with a natural groundcover such as a live grass or mulch or straw. We feel that fall is the best time to plant cranberry seedlings because they will not succumb to heat and drought that is so prevalent for short periods in the summer time.

In our test plots, the seedlings are growing well. We must learn how to expand our planting to larger acreage, as is typically done with many seed crops. Once the technique is perfected, we feel that this will be a perfect avenue for establishing organically certified cranberries.