SARE Project LNE91-28

Proceedings of the Northeast Farmer to Farmer Information Exchange

Strawberry Meeting

1992 and 1993

edited by Margaret Christie

Northeast Organic Farming Association
University of Massachusetts Cooperative Extension System

with the support of the
Northeast Region Sustainable Agriculture
Research and Education (SARE) Program

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Introduction

The Northeast Farmer to Farmer Information Exchange

The Northeast Farmer to Farmer Information Exchange, a project of the Northeast Organic Farming Association and the University of Massachusetts, held two-day meetings of small groups of farmers in the winters of 1992 and 1993 with the support of the USDA's Sustainable Agriculture Research and Education Program. Each group focused on one of five commodities for which there are significant barriers to organic production in the Northeast: apples, sweet corn, greenhouse bedding plants, livestock herd health, or strawberries. All of the participating farmers were interested in management methods which can be used on organic farms, but many of them are not organic growers and do not intend to use only organic methods.

At the request of the farmer participants, resource people were also invited to attend. These included researchers, faculty, IPM specialists and Extension agents from land grant universities, professional organic farming technical advisors, representatives of state departments of agriculture, and farmers recommended by others because of their experience and knowledge. Each meeting had a facilitator who assisted farmers in setting and following an agenda and moderated the discussions. Resource people sometimes made informal presentations but primarily were participants in discussions.

The Farmer to Farmer Information Exchange gave participating growers, and others reading these proceedings, a chance to become very familiar with the farming practices of a group of farmers. Farmers have an enormous amount of experiential knowledge about growing crops, raising livestock, marketing, managing labor, and all other aspects of running their farms. Farmers trying to grow crops using new or unusual methods may have experimented with techniques that few others have tried. In most cases, the results of these informal experiments never leave the farm to be shared with the larger agricultural community. Through these meetings and the written proceedings, the experiences of both farmers and researchers working on these crops can build upon each other.

A wide variety of activities has been generated by the meetings. Several growers in the sweet corn group set up trials in insect and weed control on their farms, with the help of Ruth Hazzard, Vegetable IPM Specialist at the University of Massachusetts and co-coordinator of the Farmer to Farmer project. At the urging of growers in the strawberry meeting, the Strawberry IPM Program at the University of Massachusetts did a scouting workshop in Vermont, at the farm of one of the Farmer to Farmer growers. Due to the interest of many of the livestock producers in alternative herd health remedies, a two-day homeopathy workshop was organized in Vermont. Several of the groups are continuing to meet in 1994, although the funding support from the USDA has ended.

These proceedings are a summary of the information provided by growers and resource people at the 1992 and 1993 meetings. They include discussion of specific production methods, marketing, and philosophy, and are intended to make available the expertise that was shared at the meetings to a wider group of farmers, researchers, and other interested people. They are not intended to provide complete information on how to produce these crops, nor to discuss only those production practices which have been verified by the research community. Additional sources of information on production and research-based information can be found in the list of sources at the back of the proceedings.

Participating Institutions

The Northeast Organic Farming Association

The Northeast Organic Farming Association (NOFA, formerly the Natural Organic Farmers Association) provides education and services for farmers, gardeners, consumers, and others interested in organic agriculture. NOFA has chapters in seven states: Connecticut, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The activities of state chapters vary, and include such things as organic certification, conferences, farm field days, country fairs, and cooperative purchase of farm and gardening supplies. Together, the state chapters hold an annual summer conference, publish a bimonthly newsletter, *The Natural Farmer*, and engage in regional projects such as this one. Information on becoming a NOFA member is provided on the inside back cover.

University of Massachusetts Vegetable IPM Program

The University of Massachusetts Cooperative Extension System conducts Integrated Pest Management (IPM) Programs in many commodities, including three that were part of this project: vegetables (including sweet corn), strawberries and apples. The purpose of these programs is to assist farmers in reducing pesticide use in their crops, and to develop alternative pest management methods such as biological and cultural controls. Increasingly, IPM programs seek to integrate all aspects of crop and pest management into whole systems, and to direct research efforts into "bio-intensive" methods, many of which are compatible with organic farming practices. Farmers have always played a key role in using, evaluating and helping to develop IPM methods; this project provided further opportunities to build links between IPM programs and organic farmers across New England, and to understand how both researchers and farmers can benefit from direct information exchange.

Sustainable Agriculture Research and Education Program

Mandated by Congress in the 1985 Farm Bill and first funded in 1988, the Sustainable Agriculture Research and Education Program (SARE, formerly LISA) funds research in sustainable agriculture. The program encourages projects in which several institutions cooperate, including non-profit groups and other non-university institutions. In addition, the program promotes farmer involvement in planning and carrying out research, and in 1993 began giving "mini-grants" directly to farmers. In 1993, the Northeast Region SARE Program awarded grants to 35 farmers, totalling $94,347, and 13 projects of research and education institutions, totalling $1.3 million. Further information about the Northeast Region SARE Program can be obtained from:

Northeast Region SARE
Hills Building
University of Vermont
Burlington, VT 05405-0082
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Acknowledgments

The proposal for the Northeast Farmer to Farmer Information Exchange was developed by Margaret Christie, Alex Stone, and Enid Wonnacott at the request of the Northeast Organic Farming Association (NOFA) Interstate Council. Input for the proposal came from a range of farmers and researchers who attended planning meetings and a pilot meeting of the Apple Growers Group organized by Alex Stone. Several Extension personnel, including Ruth Hazzard of the University of Massachusetts Vegetable IPM Program, Dan Cooley, Sonia Schloemann, and Arthur Tuttle of the University of Massachusetts Apple and Strawberry IPM Programs, and Vern Grubinger of University of Vermont Cooperative Extension, provided input and agreed to help with the project.

Funding from the Northeast Sustainable Agriculture Research and Education program allowed the project to begin in 1991. Meetings were held in the winters of 1992 and 1993. Margaret Christie and Ruth Hazzard coordinated the project, while Enid Wonnacott and Alex Stone acted as workshop coordinators and helped to provide project direction. Ed McGlew managed the money and complicated billing procedures, and the NOFA Council, under the leadership of Bill Duesing, provided valuable oversight. Jack Kittredge accomplished the final printing of the proceedings.

A number of additional people helped to make the project successful. Thanks are due to the researchers who agreed to attend the meetings, particularly to those noted above, who helped to plan and facilitate the sessions and provide research and training help requested by growers between meetings. The cooks at Rowe Camp and Conference Center kept us exceptionally well fed at our meetings. Most especially, we want to thank the participating growers, who were willing to share both their successes and failures. Not only did they supply the bulk of the information presented here, review the proceedings, and provide useful editing suggestions and corrections, but their enthusiasm and humor made for wonderful meetings. Although much of the information presented at the meetings is available here, the pleasure of the company of the grower groups is impossible to reproduce on paper.

Participants in the Strawberry Farmer to Farmer Group

Farmers

Aurise and **David Batchelder** live in Stratham, New Hampshire, near Portsmouth, on a 100 acre farm they bought from David's grandfather in 1980. They have 10 acres of vegetables in rotation, about a half acre of flowers, 2 acres of strawberries, 25 acres of hay, and 6 to 8 acres of sweet corn. They also grow greenhouse tomatoes. Their soils range through sandy, silt, and clay loams. Concern about the appearance of their soil, despite good rotations and use of winter cover crops, led them recently to make the transition from conventional to organic management; their farm is certified organic by the state of New Hampshire. Strawberries are a particularly important crop for them, bringing in more than 10% of their gross sales from only 4% of their acreage. The berries are sold almost entirely as pick-your-own, although they bring some to their stand, where most of the rest of their produce is sold. Mill Valley farm is close to a large market; a quarter of a million people live within 30 miles of the farm. Some of these people become members of the farm each year, paying a membership fee which entitles them to a discount on their purchases. David and Aurise plant strawberries in one foot matted rows, 3 feet on center, spaced 8 inches apart in the row. They do not spray for insect pests in their strawberries, and have not had serious insect problems; their strawberry fields are separated by almost 1000 feet. They have used rye and buckwheat cover crops and repeated cultivation to combat witch grass. They also grow rye for seed and straw mulch.

Bob Gray began selling excess garden produce eighteen years ago, and now produces 30 acres of vegetables and fruit at Four Corners Farm in Newbury, Vermont. Ninety percent of his produce is sold directly from the farm. Bob grows most of his vegetables organically, while sweet corn, potatoes, flowers and strawberries are produced with some use of materials which are not acceptable for organic production. He has 6 acres of strawberries, with a little more than half of them going to pick-your-own, a quarter wholesale, and the rest to the stand. In 1991 he had an average yield of about 8000 quarts per acre. His fertility program is based on manure, but he is increasing his use of compost after finding it to be very effective for fertility and disease suppression in greenhouse tomato beds and on a poor field of berries. His berries are planted in a narrow matted row, less than four feet on center. Four Corners Farm is in the Connecticut River valley, and there is often a heavy morning fog, which contributes to some leaf disease problems.

Joey Klein grows two to three acres of wholesale vegetables and one to two acres of strawberries at Littlewood Farm in Plainfield, Vermont. He has been farming for 20 years, and has been on this farm since 1987. His farm is certified organic by Vermont Organic Farmers. Rotation options for his strawberries are limited by the need for good access to the road for the pick-your-own public, and strawberries have been grown in Joey's strawberry field for 20 years. Joey has had serious clipper and tarnished plant bug problems. If the Vermont certification program allowed partial farm certification, he would grow low spray strawberries and organic vegetables. He estimates that about half of his pick-your-own customers care that his berries are organic. The soils on the farm vary widely from riverbottom loam to sand. Joey plants berries in a narrow matted row, 5 feet on center, on raised beds. He uses manure, bagged fertilizer, and rock powders for fertility, and has sometimes had serious weed problems which he attributes in part to weedy manure. He has

overhead irrigation and uses straw mulch. He estimates that his 1991 yield was 5000 pounds per acre, and was perhaps 25% below average. In 1992, he had almost a complete crop loss to plant bug and clipper. Joey is working on long-range farm management plan which would allow him to plant an acre of berries each year, and to complement these with a vegetable crop with a short harvest season, in order to limit his busiest work times.

Mark and Helene Lucard farm at Ray Road Farm in Henniker, New Hampshire. They began farming in 1978, and were completely organic for five or six years, but have gradually incorporated more synthetic pesticides and fertilizers in pursuit of solvency. They have two acres of strawberries and seven acres of mixed vegetables. The strawberries are all pick-your-own, and the vegetables are mostly sold wholesale, with an increasing percentage being sold at farmer's market. Their strawberries are on a 4 acre leased field, which limits their ability to rotate or to grow as many strawberries as they would like and could sell. The strawberry field is right on a river, and is used as a flood control field, so they sometimes lose some berries in a low spot, but they have good irrigation. The soil is light and well-drained, and they have no soil disease problems.

David Marchant bought his farm near Burlington, VT in 1991. Previously, he farmed at the New Alchemy Institute in Falmouth, MA, and worked for the Strawberry IPM Program at the University of Massachusetts. His farm is good bottomland and has a sandy soil. David preceded his 1992 strawberry planting with a cover crop of rye and vetch that he plowed in in the spring before planting. He planted Jewel, Blomidon, Cornwallis, and Annapolis. In the future, David would like to experiment with using Sudex or marigolds as a cover crop before strawberries. David also planted 7 acres of winter wheat to use for mulch. Even paying for bailing, he figured growing his own straw would be less expensive than buying it.

Rick McWilliams began selling berries in 1988. He uses a bagged organic fertilizer, cow manure, and cover crops for fertility on his silt loam soil. Weeds are his biggest problem, particularly chickweed and clover. He concentrates on keeping the field clean in the first year to give plants a good start in order to get two years production. He finds that he can keep up with the weeds on about 2500 plants, or about a half an acre, each year, so he usually has just under an acre in production each year. He plants disease resistant varieties and has not had much disease problem, and finds that rotating crops and separating his strawberry fields helps to slow up the insects. He also uses some botanical insecticides and sulfur for disease control. He has started planting berries closer together (four feet on center) and in narrower rows, in order to have more edges with higher production. Half of his berries are sold pick-your-own and the rest from his stand. Rick also sells peas, both pick-your-own and from the stand, finding that they complement the strawberries well and are a good cash crop.

Eric Sideman, of Ridgeside Farm in Greene, Maine, grows a half acre of pick-your-own berries. He also produces lamb and spring vegetables, selling only vegetables which can be harvested during strawberry season so he doesn't have customers at the farm all summer. Eric's berries are planted in a narrow matted row, 4 feet or more on center. Weeds are his biggest problem. Eric's strawberry fields are separated by 1000 feet, and he feels that this distance significantly decreases his insect pest problems. Generally, he gets about 5% clipper damage in the first year and 10% in the second year, and at most 5-10% plant bug injury, without spraying. Eric has a very sandy soil and does not have disease problems. Eric put in irrigation after losing 90% of his berries to frost one year, but because his water supply is

limited, it usually must be saved for frost protection. In dry years, he regrets not having water for irrigation after planting. After clearing more land, Eric would like to have a four year strawberry rotation, with one field planted, one in first year berries, one second year berries, and the fourth fallow. He estimates that his yield of 7000 pounds per acre in 1991 was about average, but notes that his yields vary widely, from 3000-10,000 pounds per acre. Eric reports that the Maine Organic Farmers and Gardeners Association (MOFGA) once did a survey of organic strawberry growers and found that many of them had stopped growing strawberries because of the variation in yield and income from year to year. Eric also works as the Director of Technical Services at MOFGA.

Ann and **Pooh Sprague** have been farming in West Lebanon, New Hampshire since 1976. They both grew up on dairy farms. They grow 13 acres of sweet corn, 8-10 of mixed vegetables, and bedding plants and greenhouse tomatoes in 14 greenhouses. Most of the produce is sold at their farmstand, and some goes wholesale to another farmstand. Pooh and an apple grower cooperate to produce 10 acres of strawberries, sold pick-your-own and retail. They began growing strawberries in the mid-seventies using organic methods, but lost almost the entire crop to tarnished plant bug in 1979, and began using synthetic chemicals in 1980. Since then, they've been working to reduce their use of pesticides. The soil in the strawberry fields is very sandy. Pooh makes compost for use in his vegetable operation, but has found it very difficult to find a reliable manure source large enough to allow him to make compost for the strawberries. Their berries are grown in a narrow matted row, four feet on center.

Kathleen Sweeney has been farming at Malven Farm in Smyrna, New York for 5 years. She grows an acre of field corn, an acre of oats, 15 acres of hay, two acres of apples, and four acres of mixed vegetables in addition to their strawberries. Malven Farm is horse-powered, and in addition to their horses, they also have 13 Dexter cattle for breeding and beef, a flock of 35 ewes, chickens and ducks. Farm products are marketed to community supported agriculture (CSA) members, at farmer's market, and wholesale through Finger Lakes Organic Cooperative (FLO) and a New York City distributor. Katie also intends to expand into pick-your-own berries. In 1992, she had just a small area of strawberries in production, but they picked a half acre in 1993 and will have an acre and a half in 1994. She uses rotted manure and compost for fertility, and plans to experiment with guinea fowl for insect control and geese for weed control in strawberries. Katie grows berries in narrow (3 foot on center) rows. Field preparation and cultivation is done with horses. She has a very wet site and heavy soil and does not irrigate.

Resource People

Dan Cooley, Sonia Schloemann, and Arthur Tuttle of the University of Massachusetts Strawberry IPM Program played an important part in the strawberry meetings. They helped to plan the meetings and wrote a survey which allowed participants to learn about each other's operations in advance and to think about what they wanted the meetings to accomplish. Dan, Sonia, and Arthur were available for most of the 2 days of meetings in both years to report on their research, provide information about pest life cycles, monitoring and control methods, and to learn about the farms and growing methods of the participating growers.

Dan is an Assistant Professor of Plant Pathology at the University of Massachusetts. His work centers on applications of plant disease ecology to plant disease management.

Sonia, an Extension Specialist, is the Coordinator of the Massachusetts Strawberry IPM Program and represents Extension on the Board of Directors of the Agricultural Composting Association. She is also involved in the creation of an Agroecology Extension/Research Program at the University of Massachusetts. Arthur, an Entomologist, is the Massachusetts Coordinator of the Northeast Sustainable Agriculture Research and Education (SARE) Small Fruits Project and is a cooperator on related projects. Their work with strawberries includes developing and implementing sustainable cropping systems in the following areas: alternatives to soil fumigation (soil-born disease management), use of biological control organisms to help manage insect and disease pests, use of composts in disease management, use of resistant cultivars, and use of cover crop rotations for disease and weed management. They also publish SARE small fruits and apple newsletters, *Integrated Pest Management for Strawberries in the Northeastern United States,* the *New England Small Fruit Management Guide,* and various shorter works.

The University of Massachusetts researchers note that the direction of their research and Extension programs is being influenced by the advice and input of growers at meetings such as these. Arthur Tuttle, for example, has started to evaluate the efficacy of materials available to organic growers for tarnished plant bug and strawberry bud weevil management. The Farmer-to-Farmer meetings provided a much-needed and appreciated opportunity for the researchers to hear the first hand experiences of the growers.

Facilitators

Margaret Christie facilitated the strawberry group meetings in 1992 and 1993. She was coordinator of the Second-level Apple IPM Project at the University of Massachusetts from 1989 until 1993, and is co-coordinator of the Northeast Farmer to Farmer Information Exchange. She is currently a student in the Rural Sociology Department at the University of Wisconsin, Madison.

Alex Stone initiated a pilot farmer-to-farmer meeting of apple growers interested in organic production practices at the New England Small Farm Institute in 1991. She was one of the designers of the Northeast Farmer to Farmer Information Exchange, and facilitated the strawberry grower group meeting in 1992. Alex managed an organic market garden in Belchertown, Massachusetts for five years, growing vegetables and annual and perennial bedding plants. She is now working on the use of compost as a disease suppressant in the Plant Pathology Department at Ohio State University.

Fertility

Eric Sideman follows soil test results, not adding any amendments unless his tests indicated they are called for. In some years, he has added colloidal rock phosphate at 1/4 to 1 lb. per acre at first plowing. Phosphorous won't release at a neutral ph, so Eric puts it on with a rye cover crop, which can tolerate a low ph and will pick up the phosphorous. He then limes the field in the following year. He uses sul-po-mag at 200-300 lbs./acre at planting, and applies sheep manure compost at renovation. Eric tests his soil for potassium, phosphorous, and magnesium, and adds rock powders as indicated at renovation. He also applies bonemeal at 100 lbs./acre when he removes mulch in the spring, because little phosphorous is available in the spring if you're relying on organic matter for phosphorous. Eric thinks that legume cover crops and sheep manure would provide sufficient nitrogen if he could deal with weed competition.

Rick McWilliams applies fresh cow manure to a cover crop a year or two before planting. Four weeks after planting, he applies Pro-gro (5-3-4) at 10 lbs./1000 square feet, and he repeats this application at renovation.

Joey Klein applies compost at 10-15 tons per acre before planting. He adds phosphorous to the manure (Vermont Organic Fertilizers 0-13-0) because his soils are low in phosphorous. At renovation, he applies North Country Organics Pea-Nite (10% N) at 500 lbs. per acre; half the nitrogen in this mix comes from quick-release Chilean nitrate and half from slow-release peanut meal. Joey adds solubor to his spray materials because his soils are boron-deficient. He doesn't put in too much boron and has not experienced burning. Another grower suggested that boron could also be added with irrigation by putting a "T" on the suction side of the irrigation pump.

Pooh Sprague uses both soil and foliar testing to determine fertility needs, although having many little fields makes this expensive. He has used a variety of soil amendments: a 15-8-12 fertilizer at planting or renovation, horse manure when he can get it, and wood ash from a wood to energy plant, which he uses in place of lime. The wood ash is free and easy to use, but Sprague is concerned about its chromium content, since these plants often use a lot of poplar, which is high in chromium. He has also considered using sludge from a nearby sludge composting facility, but again is worried about its chromium and cadmium content. He is very interested in generating biomass through on-farm green manure crops, interseeded crops, and plow downs.

In 1992, Katie Sweeney explained that in the fall she applies 10-20 tons/acre sheep and hay bedding, which has been in the barn about a year, onto an oat or rye cover crop. She noted that the big problem with this fertility source is weed seeds from the hay, but that making large quantities of compost is difficult without a tractor and a bucket. She was considering applying the manure before a year of cover cropping to decrease weed problems. In 1993, Katie reported that she had seen a composting system at Eric and Anne Nordell's farm in Pennsylvania that she hoped to emulate. When cleaning out their sheep and cow pens, the Nordells put the manure into one of two hog pens with their hogs. The hogs root through the manure in search of grain; when the manure gets deep, the Nordells dig holes with a rod and put grain into the holes to encourage the pigs to dig deeper. The pigs produce a quick and weed free compost. When one bin is full, they switch the animals to

the second pen. Katie applies compost at 3 tons/acre at renovation but hopes that a hog composting system might enable her to make more compost.

When preparing new ground, David Batchelder plows in a heavy clover/grass sod the year before he plans to plant strawberries. In the past, he's kept this land clean cultivated through the summer to control quack grass, then planted winter rye, but he thinks a summer cover crop might provide better and less labor-intensive weed control. David applies 20 tons per acre of a semi-finished compost made from horse, goat, and chicken manures, vegetable scraps, leaves, and seaweed to the rye before plowing it down. He adds Plant-rite or Pro-gro to beds that need more nitrogen. In 1991, he top-dressed the berries with cottonseed meal as they started to run in July, but found it very powdery and hard to deal with. Another grower suggested a spinner made by Coon which makes it possible to spread powders.

Bob Gray relies on manure from a nearby dairy as the basis for his farm's fertility, but no longer uses raw manure or slurry because he doesn't like the effects of the soluble nitrogen on fruit quality. He always uses a fertilizer at planting for insurance, but he's not sure whether it's necessary; he'd like to leave an unfertilized field to see if there's a difference. He was very pleased with the effect of compost on a poor field of berries. He applied it in the fall and raked it off in spring, and although he had weed problems, the berries were great. He's now experimenting with the best way to use a semi-compost at renovation. Top-dressed compost also provides great aeration because earthworms come up to get it. Bob feels that sod is the best fertilizer; he has now broken all the sod on his farm but would like to put fields into a cover crop for two years before planting berries.

Mark Lucard said that compost, in contrast to synthetic fertilizers, has given him a couple of years of good growth from his berries, especially on his light soils. He has composted chicken manure and sawdust in the past, but has lost his sources of these materials, and would rather not compost on-farm anyway. In 1993 Mark and Helene planned to buy 30 tons of Mass Natural compost. He notes that the compost is considerably more expensive than the 10-15-15 he has used in the past. With either material, he'll topdress with calcium nitrate at renovation.

The growers speculated about setting strawberries into plastic or newspaper mulch applied to sod the previous year; voles under the mulch might be a problem with this system.

There were a variety of opinions regarding foliar feeding among the participating growers. Several growers urged foliar feeding only if tissue tests indicate a micronutrient deficiency. If the ph is right and you have organic matter in the soil, they argue, production is almost always limited by macronutrients, weeds, insects, or disease, not micronutrients. Another grower adds boron and seaweed to his spray mix, feeling that they contribute to fruit formation and plant health. Sonia Schloemann noted that when she does tissue tests, boron and zinc consistently are found at low levels, but she's not sure how these deficiencies affect yield, size, or disease.

Opinion also differed about the importance of soil and tissue testing. Several growers said they test their soils only because the tests are required for organic certification. Others use soil tests to plan their soil amendments. Pooh Sprague feels tissue tests are more reliable

than soil tests. He tests in mid-August, a few weeks after renovation when there's some new growth. There was considerable interest in learning more about the role of micronutrients through tissue testing.

Cover Crops and Rotations

- rye/hairy vetch: this mix will grow a lot between May 1st and May 15th. It can be up to 6 feet tall by early June in Massachusetts, and should be left to grow to almost that height if possible. It can be mowed, left to dry for a few days, and then plowed in, or can be plowed in directly with a moldboard plow, depending on the field and the available equipment. Vetch has a lot of hard seed and can become a weed problem if it goes to seed, but this shouldn't happen until mid to late June. Frank Mangan found in trials at the University of Massachusetts that a stand of hairy vetch and rye, when left to grow until mid to late May, produced enough nitrogen to give the same yield in sweet corn plots as plots that received conventional fertilizer. University of Massachusetts researchers recommend a bushel of rye (56 lbs.) and 20-40 lbs. of vetch. Some growers use a hairy vetch/rye mix because of rye's weed and disease suppressive qualities.
- crimson clover: it's expensive, but you don't need much per acre. Eric Sideman likes it because it winterkills, so does not become a weed problem.
- oats: Oats will winterkill but are inexpensive, so can be planted thickly following late crops to hold the soil. Eric Sideman said that he found that winterkilled oats slowed spring vetch growth in an oats/vetch mix, but noted that other Maine growers like the combination.
- sweet clover: This will grow in poor soil, at a low ph, and is a phosphorous scavenger. You can't kill it until it flowers in the spring.
- marigolds: There was interest in using marigolds to suppress nematodes, but no one in the group had tried this. One grower noted that researchers in Connecticut have found that marigolds may not suppress, but do not support, nematodes.

Eric Sideman prepares new land by planting sudan grass, which provides a tremendous amount of organic matter and intense weed competition. On his farm, it's particularly useful in combatting quack grass and milkweed. He notes that sudan grass requires good fertility to produce well. Eric bush hogs or flail chops the sudan grass. He used to use a sickle bar mower, but the stalks are too long. Some people, he notes, bail sudan grass and use it for mulch, but Eric thinks it's very hard on bailing equipment. New land on Eric's farm is seeded as follows: a winter cover of rye, followed with sudan grass, then rye again, then a legume followed by oats, and berries the following year.

Several growers agreed that in an ideal rotation strawberries follow a sod cover that has been undisturbed for at least two years. One grower began raising replacement heifers in order to support hay land which could be rotated into strawberries. He has not had problems with white grubs in strawberries which follow hay. Katie Sweeney noted that biodynamics emphasizes rotating into sod.

Many growers rotate strawberries and vegetables, especially corn. Joey Klein suggests intercropping clover with corn and leaving the clover for a year after the corn and before the berries to improve this rotation. Since strawberries and solanaceous vegetables share some diseases, rotation with these vegetables is not the best practice, but is fairly common.

Growers noted that pick your own strawberry rotations are constrained by the need for proximity to roads, stands, and parking areas.

Planting

Eric Sideman and Katie Sweeney both put in strawberries by hand. Eric plants 4 feet on center. He runs a string down the row as a marker and hires a group of high school students for a day to put in 2000 plants. Katie makes a furrow to mark the row. She's looking for a planter.

Mark and Helene Lucard have a double row transplanter, mounted on a 4" diamond bar tool bar. The machine makes a furrow with two shoes. Four people work on the transplanter, 2 per row, each putting in every other plant and making sure that the crown is at the right height. The transplanter buries the plants. Mark has everyone walk back along the row to check the depth of the plants.

Some people use a Buddingh cultivator to completely cover the crowns, and then irrigate to wash off excess soil. There was some discussion of setting up a double row of buddingh spiders so that you could do two rows, and of running a Lilliston cultivator between two 30" rows.

Renovation

Mark Lucard is considering buying a multivator, which could be used for renovation and for cutting off runners, although it isn't substantial enough for field tillage. A multivator has little, gentle tines, and doesn't throw as much dirt around as a rotovator. Other growers commented that you can use a rotovator for renovation if you're careful. In renovation, you do want to throw soil on the crown. Since the beds become raised through cultivation you don't always get enough soil up onto them. David Batchelder spread compost over the top of his beds after renovation, using a manure spreader. It's important that the compost have heated up enough to destroy weed seeds. Another grower chisels between the rows to get lots of loose dirt, and then uses a Lilliston, set aggressively to cut away from the bed. One grower renovated down to a nine inch row and thought that was too little. Another routinely renovates to eight inches, noting that you must be careful with machinery to avoid losing the plants by mistake, and must water right away.

Weed Control

David Batchelder emphasizes weed control before planting. The year before planting, he plows his cover crop and disks the field a few times, then plants a winter cover. This system has helped to control witch grass, which had been his biggest weed problem. He begins cultivating with his Buddingh Model C, a rubber spider-type cultivator, a week or two after planting, and tries to get in every couple of weeks. The Buddingh won't knock out anything very big; ideally, he notes, you should use it before the weeds emerge. The fingers of the cultivator go right around the plant. They do hit it, but won't knock it out of the ground. David uses the Buddingh to push soil around the crowns if the planter didn't bury all the roots. If you cultivate every week for six weeks after planting, however, you can bury some of the crowns too deep. Hand hoeing helps to unbury the crowns. Mechanical cultivation is also more difficult on even a slight hillside, creating a lopsided bed so eventually the low side won't get cultivated.

Other growers commented that they have experienced some trouble with the Buddingh burying the crowns. Growers wished you could adjust the angle on the Buddingh. It was noted that you can buy Buddingh spiders on a steel shaft from Market Farm Implements and mount them on your existing cultivator. There was also discussion of a finger weeder on which the spiders can be moved in and out between the plants by a second person.

Mark and Helene Lucard really like Buddingh rolling baskets when the plants are tiny. They use them for two cultivations, until the plants start to send out runners. If you catch a runner with the baskets, it will pull out the plant. After that, they use a spring tooth harrow. In addition, they hoe between the plants and pull weeds by hand. Mark applies Devrinol in late October or early November, after the berries are dormant, for annual and volunteer weeds. He puts it on at the low end of the label rate. In some years they use Sinbar at renovation. They don't apply it every year because of concern about soil build-up. Their most problematic weeds are toxalis and bladderwort campion. Toxalis looks like a small clover with a little yellow flower. It grows right in the hill and the fruit sits down into it, making it more likely to rot and easier for pickers to miss. One year they tried applying 2, 3-D just before renovation, but the oxalis came right back. They hand weed bladderwort campion. Mark thinks rotation is the key for perennial weeds in strawberries. He has been trying to harrow repeatedly in the summer, then plant an oat winter cover crop in fields which are going into strawberries.

Joey Klein also uses Buddingh baskets until the plants run, then uses Lillestons cultivators to shape and limit the beds.

Katie Sweeney uses horses to do in-row cultivation. One horse is on either side of the row, and the operator uses her feet on foot pedals to move the cultivators in and out. Katie is also considering using weeder geese. Pooh Sprague has used them, and had problems with fencing, moving, and catching them. He notes that you have to take them out well in advance of opening for pick-your-own. Katie also uses a wheel hoe to cultivate. Because you walk behind these, germination of weeds in your footprints can be a problem. If you can stay on top of the weeds, a wheel hoe works well. Other growers are enthusiastic about scuffle hoes and the colinear hoe.

Eric Sideman relies on rotation into cover crops and hand weeding to deal with weeds, which he says are his biggest problem. He hires kids two or three times a year to weed the strawberries, and weed whacks just before opening for pick-your-own for appearance. After plowing in his berries, he plants a rye/vetch cover crop, following that the next summer with crimson clover, and planting oats in the second fall. He is interested in experimenting with strip tilling a thick winter-killed oat stand, leaving the oats in between the planted rows to act as mulch, and with planting directly into the oats without tilling.

Most growers agreed that weeds are by far the biggest problem for organic strawberry production. Although no one in this group produces one-year berries, most people have considered this option, which allows the grower to machine cultivate in the first year and hand weed only once in the fruiting spring. There was considerable discussion of appropriate levels of mechanization. Eric Sideman, for example, is debating about whether to buy a cultivating tractor or a wheel hoe for his quarter acre. Some growers believe that

you should mechanize as much as you can afford because hand weeding is so hard on your body.

Crab grass, galinsoga, chickweed, clover and vetch were problem weeds not included above but mentioned at the meetings.

Insect Management

Tarnished plant bug (TPB)

Sonia Schloemann of the University of Massachusetts provided information about monitoring the tarnished plant bug. She uses white sticky traps to determine when plant bugs first become active. Traps should be placed in the last week in April or first week of May. They should be hung in the row, just above the canopy, around the perimeter of the planting. The trap allows scouts to see what has happened over the past several days, so that even if they're in the field on a cold, rainy day when plant bugs aren't active, they can determine whether plant bugs have been active since they last visited the field. In addition, the traps catch other insects, such as strawberry rootworm, that a scout might not otherwise see. The traps cannot provide control of plant bug, however, because the insects' field of vision is very limited, so they will not be drawn to the trap from very far away. In addition, the traps cannot be used to establish a treatment threshold; they do not catch nymphs, so the level of trap catches does not correspond to the level of damage.

Scouting should begin when the flower cluster first pushes up out of the crown. Pull the flower tresses apart and tap them, holding a trap underneath to catch the insects. Don't confuse plant bug nymphs with aphids; the plant bugs move very fast. The University of Massachusetts researchers recommend sampling in a V shape, beginning in one corner of the field. The next time you sample, begin the V in the opposite corner. The participating growers felt strongly that sampling every day is important.

The threshold used at the University of Massachusetts is .25 nymphs per flower cluster or four or more infested clusters in a sample of 30 clusters. Sonia noted that there are lots of variables which might effect this threshold for a particular grower, including marketing requirements and effectiveness of treatment materials. A lower threshold may be needed for less effective materials. If the threshold is reached, sprays should be applied immediately, unless the weather is cold and the insects will not be active. Growers commented that they often do not sample or treat when the flower clusters are first emerging, but that they also often have high levels of plant bug. The timing of TPB injury is important. If they feed very early, at petal fall or just after, serious catfacing results. If green fruit are already present, TPB feeding may result in much more minor dimpling. TPB damage to later fruiting varieties is a bigger problem because both nymphs and adults are available to feed.

Sprays should be targeted against egg-laying females. The females lay eggs around the base of the plants, or on the flower tresses. The nymphs go through four or five stages. At first, they're tiny and look almost like aphids. The smallest nymphs won't do as much damage as the larger ones. In some years, nymphs won't appear until you have mostly green fruit; at that time they're not causing much damage and aren't worth spraying. The

worst damage is done right around petal fall. The stage of the insect that is the primary problem varies from year to year and region to region: in New York, the nymphs are usually a greater problem than the adults, and in Maine, the adults do more damage than the nymphs. In Massachusetts, one may cause more severe damage in one year and the other in another year.

Sonia noted that knowing the history of the field is very helpful in planning your treatment program. If there has been high plant bug pressure in past, she recommends an early spray, before bloom, when the temperature gets up to 60-65° F in the daytime. This spray should also be effective against clipper if you use a material that's effective against both insects.

Plant bug is so prevalent and botanicals so short-lived that it is difficult to use them effectively for this pest. Joey Klein uses sabadilla, scouting first to make sure the insect is present, then wearing a full Tyvek suit, respirator and gloves when dusting using a backpack duster. He applies sabadilla early in the morning when the dew is still on the plants. He warns that it doesn't wash off well so it shouldn't be used when fruit are present. In 1991, Sabadilla cost him $100 for a 20 lb. bag, which will treat one acre three times.

Arthur Tuttle has used sabadilla as a wettable powder and notes that unless you make a slurry first and then dilute it you can get clumping and clogging of nozzles. After two years of including sabadilla in a replicated field trial, he got one significant result in 1993. As berries were harvested from each plot they were separated into grades and then counted and weighed. The berries in grade one (perfect) were significantly heavier in the sabadilla-treated plots than in the control plot or the malathion/methoxychlor-treated plots. This was true only on the third of three harvest dates, so it indicates some but not dramatic efficacy.

Eric Sideman uses the fields around his berry field as a TPB trap crop, mowing or grazing them early in the spring, then letting them grow from three weeks before bloom until fruit are ripe, so that TPB will not move out of those fields into the strawberries. It's not a great control, but he never has more than 5-10% plant bug injury. David Batchelder waits until well after strawberry bloom to cut his hay in order to minimize TPB damage in his strawberries.

At the 1993 meeting, there was some discussion of using foliar sprays to discourage strawberry insect pests. David Batchelder read an article in an old publication which suggested that a mix of fish and seaweed repels plant bugs or through microbial activity creates an environment not attractive to pests.

Dave Handley, a Maine entomologist, has done research indicating that Honeyoye and Sparkle are the varieties least susceptible to TPB. His treatment blocks, however, may have been too small, affording the insects more choice than they normally have. He plans to repeat the experiment with larger blocks of berries to see if these varieties will still be resistant if other options are not as readily available.

Clipper (strawberry bud weevil)

Some aspects of clipper biology are not well known. Most clippers probably overwinter in woods, then move into strawberry fields in the spring. Some, however, may overwinter in the field. When clippers first move into the field, they feed on pollen in the flower tresses, then begin laying eggs in the buds and clipping them off.

Scouting throughout the field can help to determine whether clippers begin along wooded borders or are more widespread early in the season. Sonia Schloemann reported that she begins looking for clipper when the flower tress first begins growing out of the crown. She teases the flower buds apart so that she can look inside for clipper. At that point, it is still too cold to spray because the clipper, if present, is likely to be down in the flower out of reach of a spray. Since she only scouts once a week, however, she doesn't want to miss early signs of clipper. Growers scouting their own fields could wait for slightly warmer weather; clippers usually become active during the first few days of temperatures above 60° F in May.

University of Massachusetts researchers recommend treatment during that first period of warm weather if clipper is present, especially if clipper has been a problem in the past. For conventional growers, one timely application of methoxychlor provides effective control of clipper; this material is not acceptable in organic management programs, however. Mark Lucard noted that he doesn't think it's worth spraying twice; the few berries which may be lost to clipper late in the season aren't worth an additional spray.

There was considerable discussion of how to use botanicals to control clipper. Most of the organic growers at the meeting felt botanicals are too short-lived to be effective against clipper; they use rotations to limit clipper populations, and accept some losses to the insect. However, everyone recognized that rotations are constrained by available land and the demands of a pick-your-own operation.

Rotenone and pyrethrum failed to provide control for one grower, who planned to try dusting 5% rotenone in 1993. Other growers were doubtful that it would provide control before breaking down in sunlight, but suggested that he try applying it at night, in order to get some action before the sun comes up. Several frequent applications might be necessary to achieve some control. One suggestion was to apply rotenone at night, following with a morning sabadilla application within 24 or 36 hours. Sabadilla does not photodegrade, but is nevertheless short-lived in the field. No one at the meeting knew whether clipper feed at night or during the day. Plum curculio, a related weevil, is a night feeder, but clipper is often moving around in the field during the day.

As noted above, growers at the meetings who rotate their strawberries into far-away fields find strawberry clipper a much more manageable pest than do other growers. They urged other growers to re-examine their rotation schedule and pick-your-own arrangements in order to try to separate their strawberry fields as much as possible.

Eric Sideman samples for clipper damage by looking at 40-50 clusters and counting the number of clips per cluster. In the second year of fruiting, he usually gets about 10% damage from clipper, which he considers to be economically tolerable. Immediately after harvest in that second year, he plows his berries under, aiming to destroy the clipper pupae

which are in the soil. His strawberry fields are separated by 1000 feet. David Batchelder's fields are separated by almost 1000 feet. He does not spray for plant bug or clipper.

A number of questions were raised about clipper. What attracts clipper to strawberry fields? Could some kind of lure be developed? Does the clipper walk or fly into the field? Could a flowering trap crop or a weedy field be used to control clipper? What effect, if any, would this have on tarnished plant bug populations? It was noted that research money is difficult to find when clipper can be controlled for fifteen dollars an acre with methoxychlor, a material which is relatively safe for humans, but is not acceptable in organic management programs.

Two-spotted mite

Two-spotted mites live on the underside of leaves, sucking out the chlorophyll and leaving a yellowish stippling which is visible on the top of the leaf. They are orange during the winter and pale yellow or greenish yellow in the summer. The two spots on their backs are much more prominent in females. Mite thresholds used by different state extension programs range between 5, 50, and 500 mites per leaf. At the University of Massachusetts they use 5 mites per leaf, noting that this is a reasonable threshold if you're using miticides. The University of Massachusetts researchers, however, note that they do not recommend miticides. Instead, they suggest that growers buy mite predators. For growers releasing predators, they recommend using a threshold of 2 mites per leaf if no native predators are found, and 5 mites per leaf if the release is intended to augment a resident population of predators. *Amblyseius fallacis*, a native predator, eats both adults and nymphs. They are available for sale and have been very effective for two-spotted mite control in strawberries. Some pesticides, particularly benlate and chlorpyriphos, are toxic to mite predators. If you're not using these materials, two-spotted mites may not be a problem.

One grower at the meetings had achieved successful control with purchased mite predators. Many of the participants, however, were not familiar with two-spotted mites and wondered whether they should worry about them. Sonia responded that if you had a mite problem, you would know it.

Disease Management

Botrytis/grey mold

Conventional growers in Massachusetts generally control grey mold with one to three (occasionally zero) fungicide applications during bloom. Post-bloom, they don't apply fungicides except in very wet years. Mark Lucard follows the University of Massachusetts recommendation of applying fungicide at 10% bloom, and finds that in most years he only needs one application to eradicate grey mold. Grey mold gets started on the petals, so you should not wait to treat the berries.

The group discussed the use of organically acceptable fungicides. Copper, a protectant fungicide with some kickback, will control grey mold if it gets on the mold spore, but it is phytotoxic. It can be used in an early application, perhaps applied with a spray aimed at nipper. Growers were interested in dormant applications of copper, which

University of Massachusetts researchers had not tried but thought might work. They speculated that copper could be applied in November and again in the spring. It should be applied when drying will be rapid to decrease phytotoxicity. Sulfur, they thought, might be less effective against grey mold, but it is not as phytotoxic as copper, and strawberries like an acid soil. Liquid lime sulfur could be used as dormant application; during the growing season, use a 95% wettable powder sulfur.

Researchers at the University of Massachusetts found in one trial that flaming at renovation led to increased grey mold problems. They hypothesized that the flaming might have injured, but not destroyed, some infected leaves, leaving them vulnerable to infection. They worried that more intensive burning might damage the crown. They have also tried leaf removal at renovation, which had a positive effect, and mowing before applying fall mulch. Growers at the meeting discussed using animals for leaf removal, but were concerned that it would be difficult to prevent damage to the crown and to complete the renovation quickly in order to promote quick regrowth. Eric Sideman has successfully used sheep for renovation. He used mobile polywire fencing and moved the sheep down the row, fencing behind them to prevent them from going back to areas they had already been. He found that they loved the leaves and did not eat the crowns.

Growers at the meeting have varying experience with grey mold. Eric has lots of air movement and does not have grey mold problems. David Batchelder has grey mold problems in wet years, when they are exacerbated by too few pick-you-own customers. In the worst years he has lost up to 50% of his berries to grey mold. Joey Klein notes that cultural methods, such as wider row spacing and narrow rows, can reduce incidence of grey mold.

University of Massachusetts researchers reported on trials done by John Sutton and Gordon Braun, researchers at the University of Guelph, Ontario, who examined strawberry leaves to see what was living on their surface which might be antagonistic to *Botrytis*. They examined both yeasts and fungi, and are now looking at ways to apply these organisms to the field. They have tested a device which attaches to the front of a bee hive, so the bees pick up the organisms and spread them to strawberries as they visit the flowers. This was fairly successful, but bees are not essential to achieving good strawberry pollination and most growers don't have them. In addition, bees don't fly on cloudy, wet days when you most need the organisms that attack *Botrytis*.

John Sutton has also experimented with spraying a sugar solution to feed beneficial organisms which might compete with disease organisms. He found that applying a 10% sugar solution brought results as good as a captan treatment. Growers wondered whether fungicide applications might destroy beneficial fungi.

The meeting participants were interested in the potential for use of baking soda or peroxide as fungicides. These materials are not yet labelled, but trials have shown that they may have some effect on grey mold and on powdery mildew. Dan Cooley has seen some research done years ago on the use of peroxide. More recent trials in Pennsylvania were not successful, possibly because it was a very wet year and because spraying wasn't started early enough. Grey mold infection begins on the flowers, so it's important not to wait until the berries show infection to spray. Peroxide would need to be applied fairly frequently because

it would have a short residual activity. Perascetic acid is another possible material and is currently being evaluated at Hampshire College by Megan Millman and Brian Schultz.

Black root rot

Black root rot is a disease complex caused by a combination of soil-born pathogenic fungi (often *Rhizoctonia* spp.), lesion nematodes, and environmental stresses. The many possible causal organisms make it difficult to positively identify black root rot and to breed for resistance. Black root rot is a primary soil-borne disease of strawberries, although red stele has had more research attention because it's easy to identify and to work with. University of Massachusetts researchers are working to determine which commercial varieties are resistant to black root rot.

Black root rot contributes to a general long-term decline of plant health. The outside of the root is blackened, and beneath the dead tissue, the root is white. Root feeding of insects can contribute to black root rot. Plant stress is also an important contributing factor.

None of the growers at the meeting reported a serious black rot problem. Sonia Schloemann explained that some soils are more naturally inhibitive to black root rot than others. One grower at the meeting has a field which has been in strawberries for 11 years. He attributed the absence of black root rot to his very sandy soil, but Sonia noted that in research trials, black root rot will grow just fine in pure sand. The University of Massachusetts researchers are examining the interactions of soils, microbes, and composts in an attempt to identify factors which might inhibit black root rot.

Compost and disease control

There was considerable discussion in 1992 and 1993 of the role of compost as a disease suppressant. Sonia Schloemann, Dan Cooley, and Arthur Tuttle, who are evaluating the use of compost as a disease suppressant with the support of a grant from the Solid Waste Composting Council, provided information on the mechanisms of disease suppression. Organisms in the compost may be more competitive than disease pathogens, using carbon and nitrogen and thus replacing the pathogens. Compost organisms may also produce antibiotics, which may prevent pathogens from competing effectively, or may weaken the pathogen and allow other organisms to eat it. The organisms supported by compost may eat or parasitize the pathogenic organisms directly. Researchers don't know which of these mechanisms is most important in any given situation, or what other factors may play a role.

Compost may be the substrate that beneficial organisms live on, providing them with food. When suppressive soil is sterilized or fumigated, the suppressiveness is eliminated, but the soil can be re-inoculated with suppressive organisms by adding a small amount of suppressive soil. In the same way, using compost for disease suppression may not require large quantities of compost. If there was organic matter for the organisms to feed on, compost could be used just to seed the beneficial organisms.

Researchers are exploring ways to create an environment which tips the balance in favor of beneficial pathogens. One possibility may be to inoculate nursery plants or their growing medium with beneficial organisms, so they carry those with them into the field.

Compost could also provide food for pathogens, so learning to develop composts which contain beneficial organisms for specific plants will be important.

Growers discussed methods of producing compost on the farm. Most of the growers at the meeting who produce on-farm compost use a manure spreader and a bucket to make windrows, turning them with the bucket. One grower commented that the weed seeds in his compost had almost led him to eliminate compost from his operation, but that the discussion of disease suppression inspired him to work on ways to produce a better compost. Some growers commented on the difficulty finding continuous, guaranteed sources of materials for making compost, and about the tractor time needed to assemble, turn, and spread compost. Growers were interested in Eric and Anne Nordell's composting system, described above by Katie Sweeney.

Mulch

Growing straw

A number of the growers at the meetings grow their own straw for mulch. The biggest advantage of growing your own straw is that you can cut it before the grain heads up or when it's in the pollination stage so that you're sure not to get weedy straw. Generally, they agreed that it's economically wiser to hire someone to cut your grain than to buy haying equipment only to make straw, although bringing in someone else can make it more difficult to get the straw cut just when you want it cut. A bush hog wouldn't be adequate to cut straw, although a cutter bar would work. It doesn't matter if it gets rained on so long as it's dry before you bail it.

There was also discussion of growing winter cover in between your strawberries. If oats were planted in early summer, by fall they would be tall enough to mow and use for winter cover. There was some concern, however, that the oats would compete with the berries for water, especially on a sandy soil. Marvin Pritts, a Cornell researcher, is testing this use of oats, and is also doing trials of an oat/vetch mix.

One grower cut rye straw from a field undersown with clover. He cuts the rye in mid-June, cutting a little high to spare the clover, which then stays in the field for another year. He was pleased with the system, which yielded 160 bales of straw off of 2 acres.

Applying mulch

At the 1992 meeting, one grower explained modifications he made to his manure spreader to adapt it for spreading straw mulch. In 1993, David Batchelder reported on his success with a similar modification. He put plywood over the beaters, resting on the side of the box and leaving about 2 inches between the beaters and the cover. This cover prevents the beaters from spitting out big chunks of hay. In addition, he built guide boards to keep the bale centered as it fed into the spreader, and a platform on top of the spreader which holds bales ready to be fed into the beaters. David explained that one person drove the tractor while he stood on the platform, feeding the bales of straw into the spreader. Other participants were concerned about the risk of falling into the beaters; David explained that that's why he was the one on the spreader. It took about 4 hours to mulch an acre, and

another hour to go back over the field with pitchforks spreading the hay out in places where it had been unevenly spread. This method saved time but, more importantly, was easier on the body than spreading the bales by hand. David spread about 200 bales of straw on 2 acres of berries, and wasn't entirely sure that was enough. Eric Sideman spreads 85 bales on his half acre. The University of Massachusetts researchers grow oats or rye for their straw mulch and gratefully borrow a straw shredder from Ev Hatch of Greenfield, Mass., for applying it.

Miscellaneous Notes

Birds

A number of the growers at the meetings have problems with birds. They agreed that pick-your-own customers are the best bird repellant, explaining that bird damage is worst in wet years when people don't come to pick. Scare-eye balloons, some found, only scare the birds a short distance down the field.

Irrigation

Growers with irrigation generally feel that this is an important part of their success with strawberries. When asked how much water to give strawberries, one grower answered: "More. Strawberries love water." The growers who do not irrigate, however, had heavy, wet soils, and felt that irrigation during the season would not benefit the plants very much. They noted, however, that they regret not having irrigation for frost protection and at renovation, when watering quickly is important.

One grower spoke highly of his Northern Hydraulics Homelite pump, which was priced moderately and does a lot but is inexpensive to run. He notes that you can put pumps in a series and can put 6-10 nozzles on the one pump. He recommends putting irrigation lines underground so they're out of the way and putting valves in several places so that a section of the irrigation system can be turned off without running all the way across the farm. Pooh Sprague feels that having a welder on the farm is worth it to fix irrigation pipe. He used to use solder and a propane torch, but found that insufficient. He likes his welder from Merriam Graves, and says he can produce welds which are "ugly but effective."

Winter cover and fruit size

There was some discussion of covering berries in the fall to encourage early bearing or to increase fruit size. Fruit size can be increased by covering the berries with reemay in the fall, and leaving the straw on as long as possible in the spring. David Batchelder has found that putting reemay on in the spring, as soon as the ground is thawed enough to cover the sides, will encourage early fruiting.

Cultivars

The following list includes comments on varieties made by growers at the meetings. Readers should note that the information is far from complete and that these comments may reflect the experience of only one grower. Results in another location or market might be very different. Cooperative Extension Fruit Agents and nurseries can provide more information on these and other varieties. David Handley, of the University of Maine, is especially knowledgeable about strawberry and raspberry varieties.

'Allstar'
- great taste, sweet
- orange, not red, and elongated.

'Annapolis'
- a good replacement for earliglow
- somewhat disease tolerant

'Blomidon' (note: 'Blomidon' is being discontinued due to genetic breakdown)
- late-blooming, but berries not correspondingly late
- sweeter than Honeyoye on light soil
- has big berries when everything else small
- good taste

'Earliglow'
- disease susceptible
- popular with customers
- low production

'Honeyoye'
- heavy yielding
- dependable
- resistant to disease
- resistant to tarnished plant bug
- good freezer and shortcake berry
- holds well in storage
- long fruiting season
- "pays the bills"
- taste is not outstanding in most seasons, especially on heavy soil

'Jewel'
- beautiful berries, especially king berry (some think others nondescript in color and taste)
- the most tolerant to black root rot in Massachusetts trials
- very vigorous
- needs to be babied during renovation
- some have found that size drops off after a couple of years--they might be especially good for one-year berries.

'Kent'
- Some have found these soft, even when picking; others have not
- Dave Handley found Kent very susceptible to tarnished plant bug but still high-yielding because it puts out so many large berries.

'Lateglow'
- tolerant of disease
- very susceptible to tarnished plant bug.

'Raritan'
- Hold up well, good wholesale
- beautiful, shiny, red
- nice flavor
- good size
- very high production in first two years, then declines--possibly a soil disease problem

'Red Chief'
- somewhat disease tolerant
- among the most susceptible to tarnished plant bug in Dave Handley's trials

'Sparkle'
- older variety
- king berry is very big, others are small
- customer recognition; some people can sell for higher price

Growers noted that size is important for pick your own. Look for red stele resistant varieties if you have a heavy soil.

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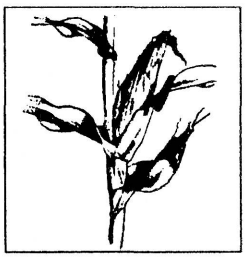
Dues: Student and Senior (over 65): $15, Student and Senior Family (2 adults): $20, Individual: $25, Farm Listing: $30, 2 adult family: $30 (each additional adult, $5), Business: $35, Patron: $100, Corporate Sponsor: $500, Lifetime: $1000

NOFA/Rhode Island: c/o Casey Farm, 2325 Boston Neck Rd., Saunderstown, RI 02874
Proceedings: $3.95 each plus 7% tax (28¢) plus $1.75 shipping for a total of **$5.98**.
Dues: Individual: $20, Family: $25, Supporting: $50, Lifetime: $250

NOFA-Vermont: PO Box 697, Richmond, VT 05477
Proceedings: $3.95 each plus 5% tax (20¢) plus $1.21 shipping for a total of **$5.36**.
Dues: Individual or Family: $20, Supporting: $35, Sponsoring: $75

Some participants in the grower groups came from Maine, where the Maine Organic Farmers and Gardeners Association (MOFGA) performs work similar to NOFA's. MOFGA's address is Box 2176, 283 Water Street, Augusta, ME 04330, (207) 622-3118.

Apples



Sweet Corn

Greenhouse

Livestock

Strawberries