
Proceedings of the
Bioregional Farmer/Scientist Workshop
in Organic Agriculture
(Maine & Maritime Provinces)



Held at Fredericton, New Brunswick, November 18-20, 1988

**Bioregional
Farmer/Scientist Workshop
in Organic Agriculture**

(Maine & Maritime Provinces)

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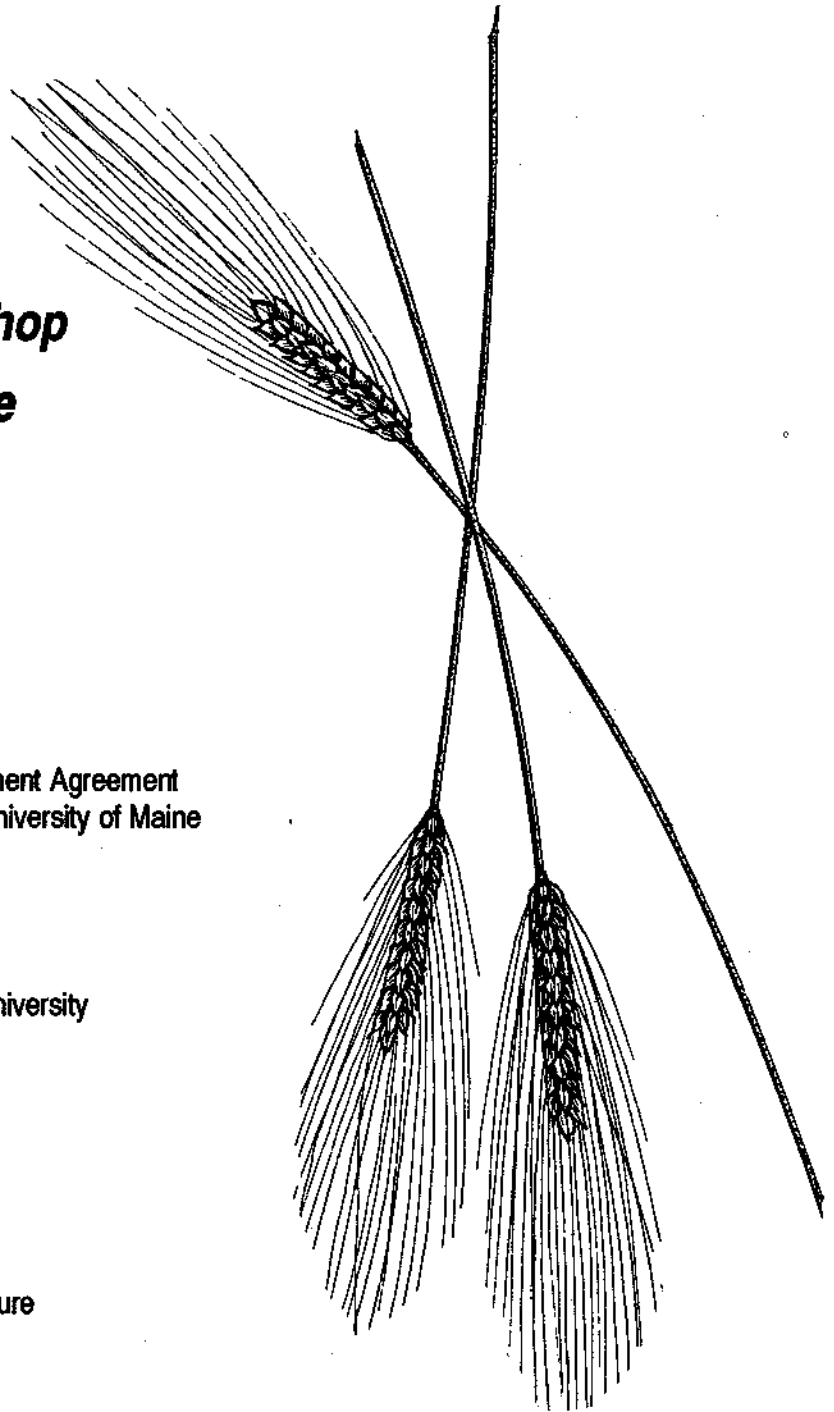
Organizing Committee:

Katherine Clough (P.E.I. Department of Agriculture), David Cozac (OCIA-NB, Fredericton), Jim Gerritsen (farmer, Bridgewater, Maine), Charles Hubbard (farmer, Oxford, N.S.), David Ling (farmer, Winsloe, P.E.I.), David Patriquin (Dalhousie University, N.S.), Susan Tyler (farmer, Penobsquis, N.B.) and Larry Zibilske (University of Maine at Orono).

Workshop Host:

The Organic Crop Improvement Association of New Brunswick

Report of Proceedings Editor: Gary Schneider
Illustrations: Katherine Poole



Preface



The concept of holding a Bioregional Farmer/Scientist Workshop was born in the spring of 1988, somewhere in the course of visits with farmers and scientific colleagues in Maine and New Brunswick. OCIA-NB was about to enter its second year of certifying farms and the process of certification had helped to formalize a lot of our thinking about organic agriculture, as well as to bring its practitioners together. "We really ought to have a regional conference", someone said, and soon we were planning it.

There were lots of good things happening in the region: the Minister of Agriculture in PEI had come out strongly in support of organic farming, the University of Maine was implementing a Sustainable Agriculture Program, SAVE (Sustainable Agriculture for the Valley Ecosystem) had spawned OCIA-NB which included a diverse array of small, medium and large farmers with interests in organic agriculture, and in Nova Scotia an organic grower was getting his products into some of the supermarkets. An organizing committee, consisting of one farmer and one non-farmer from each of the three Atlantic Provinces and Maine was formed (Katherine Clough, PEI Department of Agriculture; David Cozac, Aura Foods, Fredericton and on the executive of OCIA-NB; Jim Gerritsen, farmer from Bridgewater, Maine and member of both OCIA-NB and MOFGA; Charles Hubbard, farmer from Nova Scotia; David Ling, farmer from PEI; David Patriquin, of the Biology Department at Dalhousie University; Susan Tyler, farmer from N.B. and Larry Zibilske of the University of Maine). We roughed out a program which would include workshops with short presentations by farmers and scientists, and "focussed discussion" by panel members and participants-at-large on issues identified in background papers and arising during the course of the workshop. Then we began to look for some funds.

By mid-summer, we weren't doing very well; hopes for support from Agriculture Canada had faded and so had those for support from a major supermarket chain. I went to see George Schuyler at the International Education Centre of St. Mary's University in Halifax for suggestions. He said, "Look David, this is a good thing and people will want to support it, but money is tight...ask for small contributions from a lot of organizations." He gave me some names and \$300 to prepare a flyer and send it out, and I hit the road. \$100 here... \$200 there... \$1000... Katherine got some major backing from the PEI Department of Agriculture. In N.B., David Cozac enlisted the support

of Co-op Atlantic, and in Maine we had good support from the University of Maine and the Maine Experimental Station. Soon, thanks to all of our sponsors big and small, we had what we needed to get started and hopefully would break even. When the doors opened on Friday night, November 18, 1988 we were embarrassed but pleased by the line-ups and soon passed the break-even point. But better than that, what we wanted to happen, happened: an uninhibited discussion between farmers, scientists, business people and consumers about the successes, problems and needs of organic farming in the region.

More than half of the participants were farmers and they carried better than half of the discussions. There were big farmers and small, dyed in the wool organic practitioners and intensive farmers trying out some organic production for the first time. The nicest thing about it was that there was never any argument about what we were talking about, a break from the incessant obsession with defining "sustainable agriculture" which still seems to be with us. We were talking about "organic" and we knew what that meant. It was a matter of direction and of evolution - an evolution that would take time and a community/regional effort. No one claimed to be there with all the answers and no one minded from where one started. Debbie Russell and David Cozac prepared an unforgettable organic banquet to top it all off.

If there was one failing, it was mine, and that was not getting the proceedings out "by the time the plow hits the ground" as I had promised. With the help of my daughter, Maria, I gave it a good go in the summer of 1989 but didn't quite make it. The conference had generated a lot of other demands on my time during the summer. Had we known that we would generate enough funds to hire someone to bring it forth immediately, we could have done so. But we didn't and so weren't prepared. Stu Fleischhaker said in his usual wisdom..."Don't worry, David, you'll get it out in a couple of years and it will be a good record." Time went on. Finally in late January of 1991, in anticipation of the Sustainable Agriculture meeting in Truro coming up in April, I said "That's it. It's now or never." I was on my way to Colombia, however. I called on Gary Schneider - he is one of those valuable people we are lucky to have a few of in the region, those who tend to what "should be but aren't" priorities of most of us. I figured he could complete it, and he did, out of devotion to the region and to things organic in a very fundamental sense of the word.



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The original intention was that the proceedings would provide an up-to-date perspective on organic agriculture in the Bioregion. A lot has happened since November of 1988 and in some cases happened and then not happened (support and markets having waxed and waned). Gary solicited updates from each of the regions. I had also intended to try to get some response to all of the focal questions (the questions were submitted by participants before, during and after the workshop); that was a bigger task than we could handle. But I think the questions themselves are valuable in that they provide useful guides concerning the types of research that needs to be done for organic agriculture. We did get comments on many of them that will be of interest to farmers and researchers. Part of the concept of the workshop was that it would be an experiment in communication, based on the premise that farmers and scientists have complementary roles to play and that communication between the groups needs to be very much a face-to-face and two-way process. It was, I think, a success, but it is an experiment that can be, and I am sure will be, improved upon.

David Patriquin
Dalhousie University
Halifax, Nova Scotia
March 20, 1991

A Note from the Editor: In hindsight, these proceedings could have driven me crazy - I'm sure they have weighed on David for the last few years. Everyone seemed to be "out of province" or "out of country" and of course spring is the worst season to be asking farmers of any stripe to find the time to answer questions or send lists of certified growers. And the printer is probably tapping his fingers impatiently even as I write this.

Yet having attended the conference in 1988 and being part of a very positive learning experience, I too was interested in seeing the proceedings published. There is a great deal of valuable expertise and insight in the following pages. This report is mostly a product of those people who worked on the summaries - David, Katherine Clough, Larry Zibilske, Stuart Hill, Rod MacRae, Ron Loucks, Stu Fleischhaker and Matt Liebman, and those who took time out from busy schedules to respond to questions - Katherine, Karen Davidge, Stu Fleischhaker, Daphne Harker, Debbie Russell, Alan Stewart and Eric Sideman. Special thanks to Katherine Poole for doing the illustrations.

To all those whose names are misspelled or left out, my apologies. The participant list was old and incomplete and printing deadlines and financial restraints made calling everyone quite impossible. Thanks again for all your help and for making the conference itself such a big success.

Gary Schneider, Baldwin Road, P.E.I.

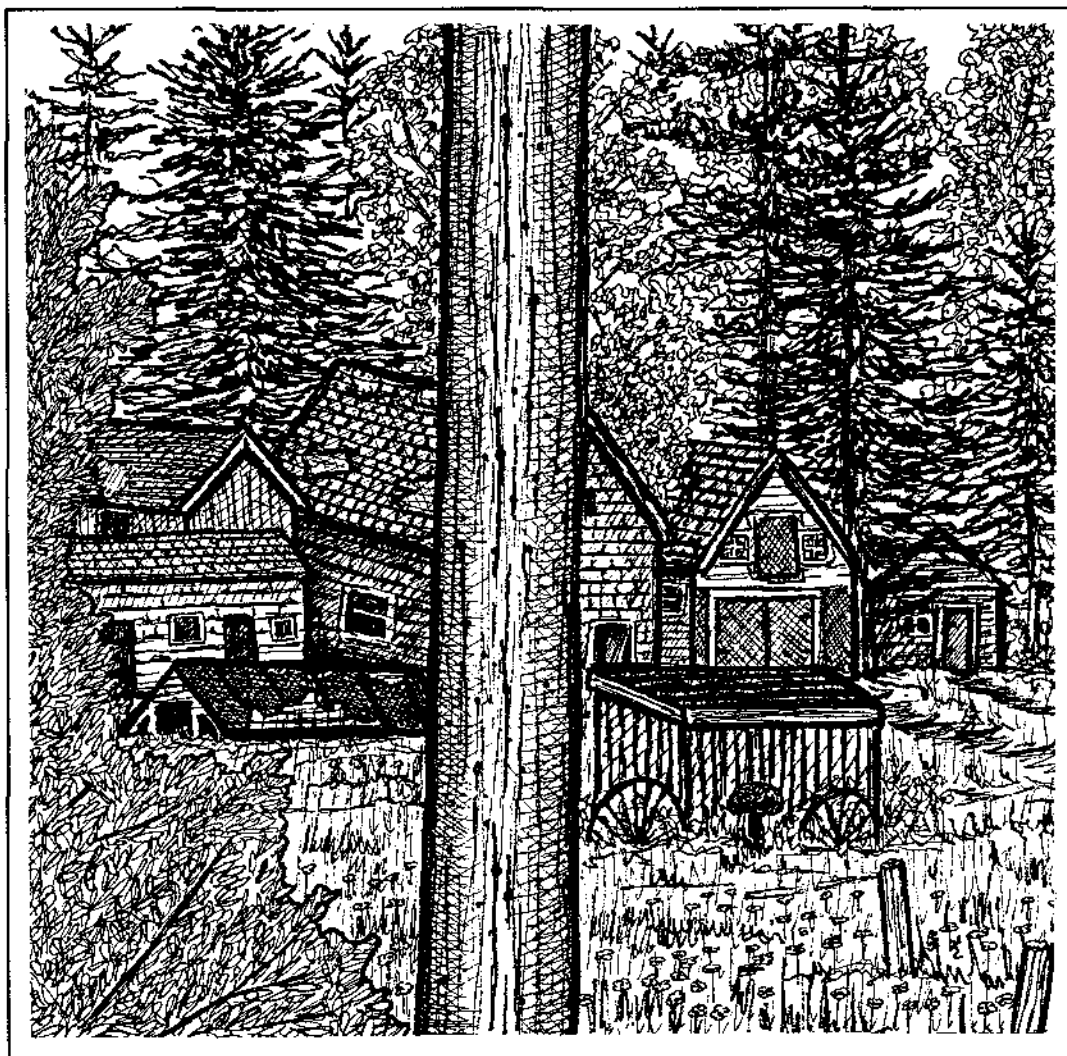
Voices of our elders

It was appropriate to begin the Bioregional Farmer/Scientist Workshop on Organic Agriculture by sharing the wisdom of two elders. Jim and Kay Bedell have been active in peace, development and environmental issues for many years. They were also farmers a few years back, two of the very few organic

farmers at that time. Although no longer farming, the Bedells envisioned a community-supported ecological agriculture project on their Keswick Ridge property. The land (25 acres with 20 cleared), was offered to the Conservation Council of New Brunswick to develop a Consumer/Producer Organic Food Co-op which would be responsible for operation of the farm.

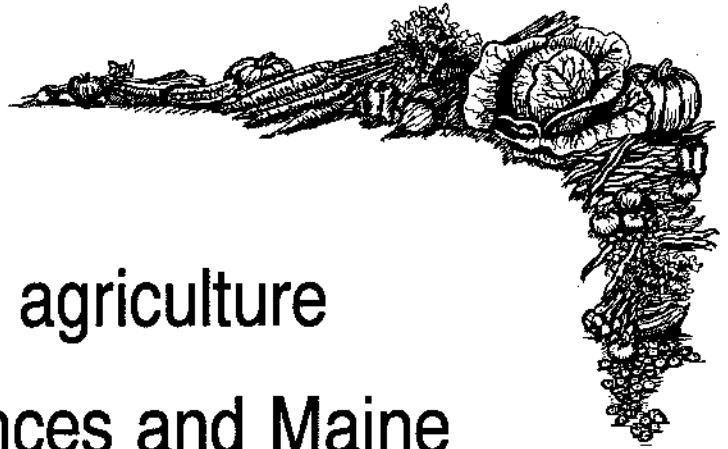
The Harvest Share Co-op was formed in the winter of 1987/88 and a successful summer of growing organic vegetables followed. The long-term vision is to develop the land as a demonstration of sustainable agriculture methods through the TOOLA PROJECT, which will be managed by the Conservation Council. The project is named after a region in Nigeria where the people long ago developed a sustainable form of agriculture and which Jim and Kay visited some years ago.

Kay talked about the role of women in agriculture in Canada and internationally, beginning with some revealing statistics: females do up to 70% of the labor in agriculture, earn 10% of the world's income, own less than 1% of the



world's property, and receive 1% of the world's credit. Women head 1/3 of families in 74 developing countries; they represent 2/3 of world's illiterate people. Noting the small number of women in our House of Commons, Kay remarked that "to benefit women, 'development' must be defined by women." She closed by citing several examples of women-oriented agricultural projects in the Third World (which she preferred to call 'economically deprived areas').

Jim spoke of the uniqueness of each farm and of each farmer, but noted that there is still enough in common that farmers can get together to help each other. Agricultural technology has not always been an unmixed blessing. In ancient times, technology allowed construction of great irrigation systems which greatly increased food production, but also made the food supply more vulnerable and less secure. In our times, technology based on cheap fertilizers and pesticides has likewise greatly increased production, but we also have the feeling that food security may be quite severely impaired.



The status of organic agriculture in the Maritime provinces and Maine

Summary by Dr. Katherine Clough
(with updates as noted)

PARTICIPANTS:

Chairperson: Dr. David Patriquin, Associate Professor, Biology Department, Dalhousie University, Halifax, N.S.; Eric Sideman, Director of Technical Services at Maine Organic Farmers and Growers Association (MOFGA), Maine;

David Cozac, Fredericton, New Brunswick, former health food store owner, organizer of the Organic Crop Improvement Association (OCIA) of New Brunswick;

Phil Ferraro, Kingston, Nova Scotia, farmer, seed producer and horticulturalist;

Dr. Katherine Clough, Charlottetown, Prince Edward Island, Crops Supervisor, Department of Agriculture.

INTRODUCTION

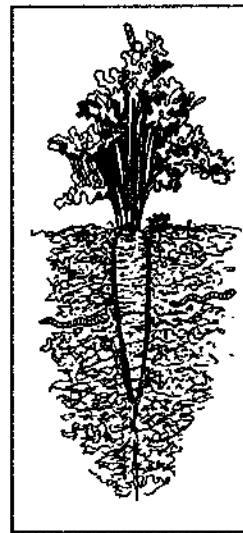
The session on the status of organic agriculture consisted of presentations by representatives of the three Maritime Provinces and the state of Maine. There are many similarities between these areas.

In each, there is a small but growing group of organic farmers. In many cases their activities have become formalized through the process of certification. OCIA chapters have been formed in each of the Maritime provinces.

Institutional acceptance and response to organic agriculture is also increasing. This is least true for Nova Scotia, where provincial and federal departments of agriculture continue to ignore its existence. In Prince Edward Island, the provincial Department of Agriculture has acknowledged organic agriculture and geared a small proportion of its programs towards it. In Maine, research on some of the special problems facing organic production has been initiated as part of the University of Maine Sustainable Agriculture program.

SUMMARY OF PRESENTATIONS:

Eric Sideman, of Maine



Many more farmers farm organically than those certified by MOFGA. MOFGA is currently doing a survey of these people to get an idea of what they are doing. MOFGA certifies 41 growers farming a total of 618 acres. The breakdown is: vegetables, 152 acres; pasture, 365 acres; grain, 23 acres; strawberries and raspberries, 5 acres; blueberries, 42 acres; and apples, 18 acres. This year for the first time, 140 lambs and 200 beef animals were certified.

Vegetable farms range from 2 to 30 acres. The main crops being greens, broccoli, potatoes, garlic and beans. Most is sold locally to farmers markets and restaurants but a couple of growers grow for supermarkets and sell to organic wholesalers. Demands exceed supply and Maine is facing the challenge of conversion of conventional growers and expanding existing organic operations to meet this need. Maine is well-situated for marketing to major population centers.

The Maine Department of Agriculture has no programs supporting organic production but certain individuals and staff do support our work and MOFGA has received a small amount of financial support. The University of Maine has a new program in Sustainable Agriculture with eight core courses. It is supported by a number of research projects.

A number of commercial products in Maine lend themselves to use in organic agriculture - fish compost, paper mill ash and sludge combined to form BIO-ASH.

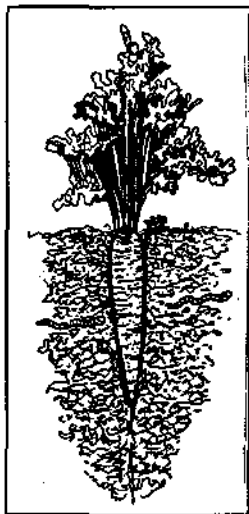
However, these products sometimes contain toxic by-products. Liquid seaweed and fish meal are also available.

Priorities for further research are as follows: systems research, the use of recycled waste, nitrogen supply through, for example, annual legumes, and weed and pest control (preferably through cultural practices).

(Eric sent in the following update for March, 1991.)

MOFGA Certified Organic Production, 1987-1990

| | 1987 | 1988 | 1989 | 1990 |
|---------------------|-------|--------------|------------|--------|
| Number of Farms | 21 | 41 | 68 | 94 |
| Vegetable Acres | 101.4 | 151.1 | 219.7 | 281.6 |
| Acres of Berries | 40.1 | 45.2 | 79.8 | 133.9 |
| Acres of Tree Fruit | 26.8 | 41.1 | 30.7 | 36.8 |
| Acres of Grain | 17.1 | 21.6 | 77.1 | 52.5 |
| Acres in Herbs | 0.2 | 13.7 | 6.1 | 8.1 |
| Acres in Flowers | | | | 3.5 |
| Total Crop Acres | 185.6 | 272.7 | 413.4 | 516.4 |
| Hay Acres | | | | 14105 |
| Pasture Acres | | | | 502.7 |
| Acres in Production | | | | 2429.6 |
| # Lamb & Sheep | | 120-144 | 155-165 | 167 |
| # Beef and Veal | | 72 | 65-76 | 50 |
| # Chickens | | 50 | 50 | 0 |
| Other Items | | 25 turkeys | 10 rabbits | |
| | | 7 dz eggs/wk | | |



David Cozac of New Brunswick

In New Brunswick, the organization of organic agriculture dates back to 1985 when S.A.V.E. was formed.

In 1987, there were 7 farms with 300 acres certified. In 1988, 10 farms with 400 acres were certified. This included grains, 50 acres; mixed vegetables, 25 acres; potatoes, 10 acres; tree fruits, 3 acres. There were also small amounts of soft fruits and herbs. Processed foods, i.e. maple syrup, apple cider and 12-grain bread, were also certified. No livestock

was certified because of the lack of organic feed.

The markets are expanding into Sobey's, Save-Easy and Co-op, as well as the traditional outlets for organic food, such as farmers markets. As in Maine, demand exceeds supply and interest in becoming certified is increasing. There is also much interest in organic grains for both feed and food purposes.

There are no programs within the New Brunswick Department of Agriculture but there are individual contacts with certain staff and organic farmers. One government

employee, John MacMillan, has recently been designated as a liaison with organic farmers. We have also received funding for tours and speakers.

The N.B. Agri-food Agreement has funded a project to demonstrate organic potato production. There are also individual farmers promoting organic agriculture in conventional farm groups. Commercial fish meal products from New Brunswick are used by organic farmers, however the main market for these products is Japan. The conclusion is that organic agriculture is viable in New Brunswick.

(Mrs. Karen Davidge, President of OCIA-NB, provided an update on the province's situation as of March, 1991)

The province of New Brunswick has historically been the Maritime leader in organic agriculture. However, in the last two years we have been slipping to the bottom. The pace of government acceptance and action to provide the farmer with information on the organic system of management has slowed considerably. But let me stress that there are a few Department personnel that work hard providing workshops when possible and giving OCIA solid back-up on crop improvement. To name the most active - Francois Boulais (Newcastle office), Gerry Chevrier, Karl Michalica and John MacMillan (Fredericton office).

OCIA has good communications with the New Brunswick Federation of Agriculture. This organization has helped to provide producer pressure on the government for:

- 1) soil tests to include an organic matter content test when requested (not allowed as yet except for certified organic farmers);
- 2) the need for a compost turner to be available to all producers (two have been purchased for use starting in 1991, including information on making compost;
- 3) regulating the Department to have a qualified individual in a position called Sustainable Agriculture Co-ordinator (so far this has been denied).

The OCIA organization has been nearly doubling the number of certified farms each year since its beginning in 1987. In 1991, it appears the number will be about the same as 1990. The lack of increase probably reflects the stress on and loss of producers in general. Without sufficient information being available to chemical-oriented farmers, these remaining producers are afraid to change.

In 1991, some OCIA certified growers are forming a growers co-op to more easily meet the market demands for a consistent supply and quality. The market is not saturated as yet but statistics for N.B. don't exist.

OCIA is actively involved with the Canadian organic community and with OCIA-International (Karen Davidge is 2nd Vice President of OCIA-International).

This chapter does the bulk of information dissemination to fellow producers in New Brunswick and the Department continually refers people to us. This is good but time-consuming for our producers.



Katherine Clough of Prince Edward Island

This is an overview of what is happening in the province in sustainable, ecological or alternative agriculture, which includes organic production.

It is often commented that Prince Edward Island is so far behind, it is ahead. This holds true for certain sectors of the farming population - small and medium-scale livestock, and milk producers who grow their own feed. Practices such as sowing mixed grain and underseeding are

all sustainable remnants of the pre-chemical era of farming. Conventional wisdom has urged them to switch to more intensive cropping systems and many have, but there remains a core of farmers who still swear by these more traditional practices. They can not be called organic farmers since they use chemical fertilizers, often in combination with manure and most use a herbicide in grain for broad-leaved weed control. But they do demonstrate relatively resource-efficient agricultural production.

In 1988, the Marketing Branch of the Department of Agriculture did a survey of farms to determine how much land was being farmed organically and what crops were being grown. Of our one million acres of farmland, 602 acres were considered to be eligible for certification. This included cereal and forage production, 521 acres; potatoes, 21 acres; blueberries, 40 acres; and small acreages of vegetables, herbs, edible flowers, strawberries and tree fruits. Nineteen farmers were in this group - only five had over 50 acres in production.

As well as organic farmers, the survey collected information on farmers in transition. Fifty farmers indicated that they were interested in or practicing some forms of ecological agriculture techniques such as composting, mechanical weeding and reduced pesticide and chemical fertilizer use. It is estimated that there could be between two and three thousand acres in transition. Potatoes are Prince Edward Island's most significant crop, but there is little evidence of a shift towards ecological production techniques in this commodity.

The Prince Edward Island Department of Agriculture is focussing some of its extension education and support programs towards a more sustainable agriculture. Department policy identifies sustainability, which it defines very broadly, as one of its objectives. It also recognizes the existence of a lucrative market for organic products and has responded in a number of ways. Department training

events, conferences and workshops have covered topics such as composting, organic strawberry production, vegetable production, dairy production and certification. There is always a good turnout at these events and a demand for more.

Within the Department the staff's capacity and willingness to respond to requests on organic agriculture is increasing. In September, 1988, a dozen extension specialists and ag reps toured organic farms in Quebec and two others attended the Sustainable Agriculture Conference in Ohio. There is also a Sustainable Agriculture Assistance program, which provides financial assistance to demonstrate and test ecological farming techniques. This program was new this year, in 1988. Finally, a chapter of the OCIA has recently been founded on the Island. The presence of such a farmer-run organization will do much to further organic production on Prince Edward Island.

(Katherine sent in the following update for March, 1991)

Since the proceedings of the November, 1988 conference a number of projects in ecological agriculture have been carried out and yielded results.

The highlights are as follows:

- introduction of organic treatments into provincial production management trials for cereal varieties
- technology evaluation for finger weeders
- on-farm composting projects and demonstrations
- evaluation of mussel mud as a soil additive
- acquisition of resources such as books, journals and videos
- training sessions for staff and farmers
- funding of an on-farm research project on fertility and intercropping sponsored by the ecological farmers group of the National Farmers Union
- facilitating access to ecological agriculture consultants by Prince Edward Island farmers
- pilot project on large-scale composting of cull potatoes
- marketing assistance for organic producers

These projects were funded by Prince Edward Island Department of Agriculture programs such as the Sustainable Agriculture Assistance Program and the Atlantic Livestock Feed Initiative.

(Daphne Harker, Co-ordinator of OCIA-PEI, also provided an update on the Prince Edward Island situation as of March, 1991)

OCIA-PEI is in its third full year of certification. In 1989, our first year, 10 producers certified 122.63 acres. In 1990, 10 producers certified 403.4 acres. The increase is mainly due to second-year producers bringing more acreage from transition into certification.

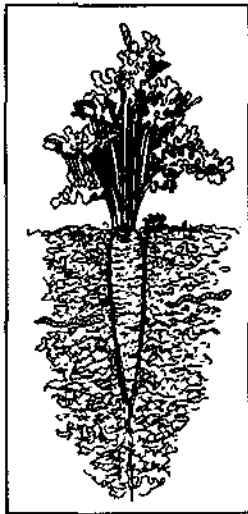
Chapter membership has increased to 35 full members and 10 associates. This is mostly due to the availability of a paid, part-time co-ordinator able to do the necessary

promotional and follow-up work to encourage membership and organize the certification program and other projects which have brought the chapter much into the public eye in the past two years.

The Prince Edward Island Department of Agriculture has, in 1990, given heavy financial and in-kind support to the chapter, including:

- grant for co-ordinator and administration expenses
- two project grants
- in-kind services of printing and distribution of newsletter and mass mailings
- purchasing of promotional materials (brochures, information sheets, rubber stamp, display signs, etc.)

Despite the above, there is an impression that the Department should be doing much more to support the work of the organic farming constituency. This would include training, extension services and marketing support.



Phil Ferraro of Nova Scotia

Nova Scotia has been certifying for two years. One farm has five draught horses and does all cultivation this way. There are several vegetable farms under 10 acres and two people experimenting with the Fukuoka concept.

Most farming occurs in the Annapolis Valley, where 135,000 kg. of agricultural chemicals are put onto the soil annually. The drinking water is increasingly contaminated, allergies increase and environmental concern is growing.

In 1988 there were 40 acres of organic produce, mostly vegetables but including 12 acres of grain. There is a

loosely-knit group of organic farmers which has swelled from six to about 30. Examples of long-term organic markets are lacking in Nova Scotia. Demand exceeds supply and markets are easy to find. Inexperience means inefficient production and therefore an expensive product.

We need to improve our efficiency. The monthly meetings of the group consist of business and an educational presentation. Requests to Agriculture Canada have remained unanswered.

Looking back over our growth, the statistics are as follows:

| | | |
|------|------------|-----------------------|
| 1986 | 3 growers | 10 acres |
| 1987 | 7 growers | 20 acres |
| 1988 | 14 growers | 40 acres |
| 1989 | 28 growers | 160 acres (projected) |

It was noted that standards are one thing but stewardship is also important. The Nova Scotia group feels that standards with respect to allowable products require revision. Currently, the group relies on consensus. OCIA standards were chosen because they allow local autonomy.

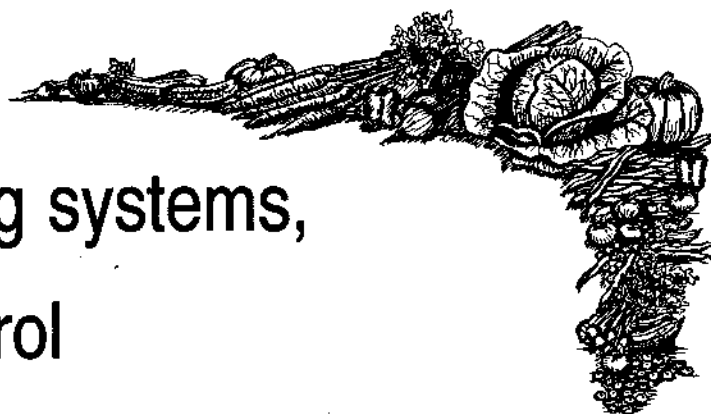
Other issues we are dealing with are hydroponics, organic seed production and its trade versus sale. Finally, it was expressed that idealism is required in the promotion of organic agriculture.

(Alan Stewart, OCIA-NS, also provided an update on the Nova Scotia situation as of March, 1991)

Alan said he expects about 15 growers to be certified in 1991. More apple growers in the Valley are coming on-stream. He is quite comfortable with OCIA's relationship with the provincial Department of Agriculture. Government is becoming more aware of organics and some people in the Department are quite supportive. They have also put on conferences on sustainability. Alan feels it's up to growers to show that organic agriculture can work.



Workshop on cropping systems, tillage and weed control



Summary by D. G. Patriquin

MATT LIEBMAN is coordinator of the Sustainable Agriculture Project at the University of Maine in Orono. The University offers a BSc in Sustainable Agriculture. Underway for just one year, the program now has 12 undergraduates full time, with others taking certain classes. There are five+ graduate students working on various sustainable agriculture projects; much of what Matt reported on was their work. Using slides, he gave several examples of the types of research they are doing.

The first example involved growing cereals and dry beans in rotation. Fall cover crops of rye or winter wheat were established in 1987. In May 1988, beans were direct seeded into standing rye, which was then rotary mowed to kill the rye and produce a mulch. (If mowed at flowering, the rye will 'mowkill'). There was a very thick cover of rye, but even so, the beans came through. The system gave impressive control of broad leaf annuals. There were some problems with dandelions and volunteer timothy (from previous pasture); he is working with an engineer to develop a heavy residue cultivator which would enable them to come through with sweeps between the rows to set back perennials. Experimentally-released Mexican bean beetles (pest) were about half as numerous, and predatory insects were four to ten times more abundant on mulched plots compared to unmulched plots.

Another way this mulch system may be beneficial is by encouraging Carabid beetles which feed heavily on weed seeds. The beans exhibited an initial period of chlorosis in the mulch system, apparently because the rye residues sequester nitrogen. They are looking at including a legume (Austrian Winter Pea) with the rye to reduce this effect. Matt noted that early in the season, soil water is lower in the rye system because growing rye takes up a lot of water, but later in the season, the mulch conserves water.

Other examples of using crops to control weeds were presented and of how crop weed competition is influenced by soil and fertility management and choice of cultivar. The first dealt with Matt's previous work on interactions of barley and peas (feed crop) with mustard (weed). He went on to describe experiments in progress on undersowing legumes in barley. They are trying annual (Berseem and

Crimson clovers) and perennial types of clover and alfalfa. Red clover and alfalfa gave particularly good cover late in the season; next year (1989) these will be followed by nitrogen-responsive crops to determine their nitrogen-supplying benefits.

Matt outlined research by colleagues at the University of Maine on mid-summer sowing of cold tolerant brassicas to feed sheep late in the season. They are using a mixture of brassicas (Typhon, a shoot and root cultivar of rapeseed; rapeseed for leaf; and purple top turnip). There is good regrowth after one grazing if it is fertilized. With this system, sheep can be fed into December - after bringing animals off of rotationally-grazed pastures. Research is also being done on the influence of Voisin grazing systems on productivity and floral composition of pastures.

Next, two farmers spoke. Both had at one time farmed conventionally. - Thomas Schaefer, from New Brunswick, had converted recently; Dave Reibling, from southwest Ontario, 17 or 18 years ago. They talked about problems or lack of them in conversion.

THOMAS SCHAEFER has been certified for two years now. He has a mixed farm of 320 acres with hogs and a ten-cow dairy herd. The switch was a gradual one. In 1985 he applied about eight tons of fertilizer; the next year, three tons; and no fertilizer in 1987. In grains, he grows mainly oats, buckwheat and winter wheat, some milling wheat and he also grows potatoes. He uses winter wheat as pasture as well, sowing it in mid August, and in October turning cows in. He had a very good yield after that, and very few weeds. Thomas is also doing some strip grazing of kale. For fertilization, he uses cow manure and a little bit of liquid from pigs. Buckwheat is used as green manure and to suppress weeds. Grain is underseeded with sweet clover and vetch and the green manures are put in a couple of weeks after the grain so they don't compete too much. He composts his cow manure, uses free stalls and puts as much straw and mulch in as he can. For weed control in grain, he has used a spring tooth harrow, recently purchased a chain harrow with flexible tines. He harrows the grain a

few days after seeding until it is out of the ground, stops until it reaches the 3rd or 4th leaf stage and then harrows and underseeds.

Problems - one is that harrowing rolls up a lot of rocks. Since it is not possible with a roller to put them back, there is a lot of rock picking to do. He did not have serious problems converting and yields have not gone down. The system is not weed-free, but Thomas felt that the weeds were not causing yield reductions. Oats have quite a bit of goldenrod in it, but it does not seem that serious. Thomas felt he had to tolerate some weeds and does not think the field has to look weed-free.

DAVE REIBLING started farming without chemicals about 18 years ago and said he was as confused now as he was then, but for different reasons. Transition seemed quite simple. Now, the questions are more complicated; what seemed to work in the early days is giving him problems today. At one point, he sold his moldboard plow. David Patriquin encouraged him to do some tests, and he is now rethinking it. There may be a place for it, not as the only heavy tillage tool but possibly in a tillage rotation. When you use a moldboard all of the time, you tend to plow too deep. You want to get the corn stalks down where you don't worry about them - for that a wide plow worked well. If he goes back he will go to a narrower bottom for shallower plowing, so it doesn't bring up the subsoil.

With crop rotations and so on, there are successes and failures and we ask questions only about failures. Possibly, there are some bad sequences. On the fertility end, he was initially concerned about how to get enough nitrogen. Now the problem seems to be how to use it up the nitrogen so that excesses do not cause weed problems.

Dave controls some weeds like Canada thistle with tillage. He uses a chisel with sweep, wears it down, then puts in buckwheat to smother out those that make it. But perhaps this involves too much tillage of the soil.

In 1975 he went into milling - he had a cleaning plant before that. Now it is coming into its own. There is a big market for oats (the demand is more than 100,000 bushels) and buyers are looking at all regions of Canada. They were short in 1988 because of the drought.

Some of the older varieties work well, bred during the days when fertility wasn't so high or they are adapted to slow spring release.

Dave emphasized need for systems-level, on-farm research.

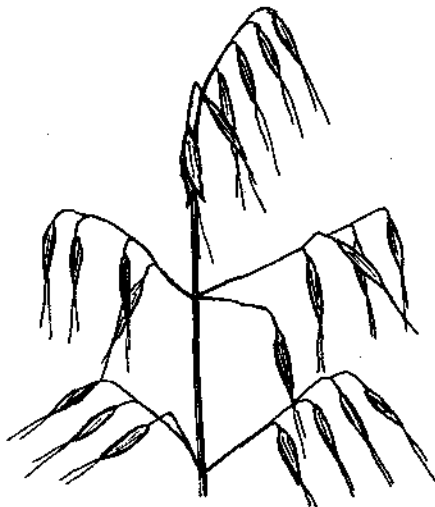
Finally, Roger Samson spoke. He is the President of REAP-Canada (Resource Efficient Agricultural Production),

an organization promoting low input agriculture through on-farm research.

ROGER SAMSON noted that there was a lot of bare ground in the potato country of southern New Brunswick. Ontario and Quebec have five million acres of row crops. An important question: how to reduce inputs in row crop dominant rotations?

Roger showed slides illustrating examples, mostly drawn from variants of a crop rotation they are developing as an alternative to continuous corn in southwest Ontario: CORN-grass cover crop-SOYBEAN-winter wheat cover-legumes seeded into wheat in spring-WINTER WHEAT-legume cover crop-back to CORN.

Slide #1 - winter wheat aerial seeded into soybeans at leaf drop, a technique developed by a farmer near Guelph, Ontario. No tillage and no herbicides are needed for the wheat. This has some elements of the Fukuoka approach.



Slide #2 - winter wheat in July with soybean stubble present and red clover broadcast (frost seeded) in March. Three different crops were represented here. He noted that in droughty 1988, the red clover did not do well. Also, red clover is slow in releasing its nitrogen to corn, so they are looking at some alternatives to it.

Slide #3 - one of the best alternatives is Hairy Vetch, sown into winter wheat when it was about 10 inches

tall. It really took off after harvest. They are hoping it will winter-kill (note from David Patriquin - it did), so that reduced tillage is possible going into corn.

Slide #4 - crimson clover. This legume was used in Ontario in the 1920's, but not after that. It does well on sandy loams and would probably be good in potato systems. In 1988 it produced more biomass than red clover in the winter wheat system.

Slide #5 - crimson clover in a spring grain field, using blind harrowing to incorporate the clover, got an excellent stand on the loam soil. In this case, sandy soil was a burn-out because of the drought.

Slide #6 - oil radish (after winter cereal). Dave Reibling introduced oil radish ten or more years ago and it is an excellent soil builder. Oil radish is 1/3 to 1/4 the cost of Roundup, does a better job on weeds and has other benefits as well. In low input agriculture we should be looking for things that solve several problems at once.

Slide #7 - red clover in spring grain gave a good ground

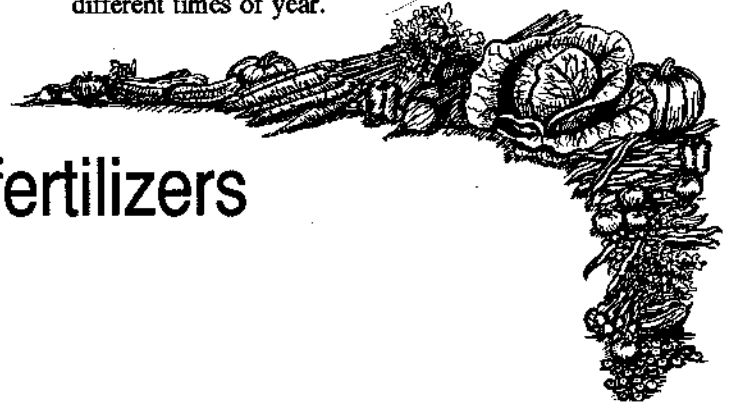
cover after the grain was off.

Slide #9 - the finger weeder (Lely) was first used in Canada by organic farmers. There is a lot of interest in it and it is good for incorporating cover crops.

Slide #10 - manure management is really critical. Roger had seen liquid tankers working when the soils were wet. This is very heavy machinery. It would be better to put it in after the grain is off when the ground is dry, then put in oil radish which will absorb the N and P and transfer it to the next crop without stimulating the weeds.

Roger ended with remarks about on-farm research.

Some advantages: no delay in technology transfer, both ways; the farmer's experience is invaluable; this research is low cost; farmers absorb the overhead and REAP gives them seed, etc. in return. A disadvantage is that sometimes the research will come last, for example in 1988 there was a wet fall after a dry summer and farmers couldn't get things done. When weather was finally good for harvesting and field work, they had to give their crops priority over the research work, so some of the research suffered. The answer: spread your risks and do a variety of trials at different times of year.



Workshop on organofertilizers and soil audits

Summary by Larry Zibilske

WILL BRINTON, Woods End Laboratory, Maine

The area of organofertilizers and soil audits is an intrinsically difficult subject area, full of contradictions. The fundamental contradiction is, as addressed previously, the emphasis on inputs. A better approach would be to address these two systems. The issues become, when materials are brought on farms, what are the qualities of those materials entering organic farms? Where consumers can buy certified organic food, the farmer has no mechanism to certify the quality of the organic materials he buys as a farm input. In response to a case in which a product promoted and used as an organic fertilizer for vegetables was found to be compounded from inorganic sources, a subcommittee has been formed in the Organic Food Producers of North America to begin a program of registering farm inputs with an eye toward certification coupled with certification of the farm produce. This illustrates why it is important to look at the quality of organic inputs.

Stepping back from this specific problem a moment, we might ask why is there a need for inputs from external sources? What kind of farm practices make it necessary to bring outside inputs? We should look at the value of on-farm recycling that would free one from the external inputs that make farms vulnerable. The two questions of importance here are that of the quality of inputs and the quality of the farm's own nutrient cycle.

Sustainability in farming is not only a question of using legumes to capture nitrogen. Quick results can be shown in nitrogen gains with the use of legumes on the farm.

However, we have no plants that fix phosphorus and potassium. Many organic systems are weak on P and K. Some organic farmers can use soluble potassium-magnesium sulfate, but others have difficulty in accepting this input. The problem with P and K is generally related to the presence of animals and the manner in which manure is handled. One case in point is an organic farm in the Midwestern U.S. that has experienced a K deficit for 30 years. They are losing much of their manure K to leaching because of handling problems. Another farm in Pennsylvania that does not import P and K has soils that are marginally deficient in those elements. Legume growth has been affected. Since legumes use much P and K, some conventional growers topdress P and K. Farms in transition experience reductions in legume yield when topdressing of P and K are not continued. There can be too much nitrogen cycling on farms. Many farms are growing too many legumes, particularly if animals are present on the farm. On those systems, farmers should use grass-intensive methods. In addition, non-legumes are the best soil builders we have.

The larger question of farm nutrients has to be looked at from a broader perspective. I recognize the limitations of soil testing and I am uncomfortable in recommending more nutrients on the basis of one soil test. The sample may not represent the total picture on the farm in that there are nutrients being cycled in plant matter and animals that do not show up in the soil until sometime later. A problem that soil testing has created is over-fertilization. European work has indicated that overshooting nutrient goals has long-lasting effects. The answer to these prob-

lems may reside in whole farm nutrient budgeting. Instead of emphasizing individual soil tests, we develop a balance sheet for the inputs and outputs on the farm. The results of these budgets often reveal great imbalances, whether in excessive or deficient levels of nutrients on the farm. Substantial savings in fertilizer costs have been realized that would not have been possible if only soil tests were used. Nutrient budgets are difficult to do. University researchers devote much time to these. Useful but hard-earned information is gained but for the average farmer, it remains an impractical tool. Questions related to erosion and leaching losses suggest one must know the farm well. Subsoil fertility must be understood and included in the budget, since it can contribute significantly to the total farm nutrient budget. Some crops can bring up nutrients from lower soil horizons which then enter the topsoil nutrient cycles. I want to emphasize the importance of understanding, of knowing your farm nutrient budget, to understanding yield problems and controlling expenditures for fertilizers.

Getting back to the subject of inputs, we don't know the quality of those materials. With the new system being developed by OFPANA, such an analysis may be forthcoming. Other materials such as industrial and municipal wastes would need to be examined for their content of contaminants and judgements made regarding whether they are appropriate for use on an organic farm.

**DAVID LING, mixed crop-livestock organic farmer,
North Winsloe, Prince Edward Island**

We started farming organically four years ago. In 1984, I met an organic farmer who experienced reduced yields in transition up to the fifth year. After that, his yields were comparable to those on the conventional side of the farm. The following spring, the National Farmers Union in P.E.I. received funding from the Department of Agriculture to send Raymond McNeil and myself to a conference in Lindsay, Ontario where I met individuals successfully practicing organic farming. I made up my mind at that point to convert. At that time we were using about 20 tons of fertilizer and had recently reduced our acreage of potatoes. We went from twenty tons to two, which is probably too fast for transition. Our yields were 25 to 30 per cent less that year, but our financial situation was unchanged.

In the following year, the NFU on P.E.I. formed an ecological farmers group and brought in several speakers on organic agriculture. The group has grown and includes both farmers using no chemicals and those who have greatly reduced their reliance on chemicals. We in the NFU believe in the concept that the soil is not ours but borrowed from our children, so we must practice good stewardship of the soil. We now farm more than 100 acres of winter

wheat, barley, fall rye, mixed grains (oats, barley and peas), potatoes and now faba beans for protein. We used to grow soybeans but did not think they were adding much to the soil. We use oil radish and other plowdowns for cover crops, followed by harrowing to stimulate growth. We believe that farmers should have a self-contained unit, all major nutrients should be supplied right on the farm. In this way, we can get around some of the problems related to determining what inputs are good enough to use on the farm.

We originally used Roundup on the farm, which I now believe is more destructive than most farmers believe. The gullies caused by the bare soil were common with our old tillage and cropping practices. This indicates that cover cropping is essential.

We use rock phosphate added to manure at about 150 pounds per acre every three years. This may be an excessive amount. The rock phosphate is used in the barn to tie up some of the ammonia and becomes itself dissolved in the manure.

Manure is layered in about 18-inch amounts. We believe that this method of storage reduces heat production. We were told to keep a pile cool by turning it, but turning seemed to make it hotter. I don't like to see composting manure exceed 140 degrees F., since we don't want to sterilize the material. Weeds will germinate in the manure over winter with the layer method.

We seeded oil radish to an old wheat pasture fertilized only with 100 pounds of crab meal. It yielded 42 bushels per acre. After straw removal, the soil was harrowed and sown to the oil radish, which grew fairly well before the soil froze. Potatoes were grown this past year and in an adjacent strip not cover-cropped but fall plowed, we had an infestation of Colorado potato beetle that did not show up in the cover-cropped part of the field. Oil radish can also be sown earlier and turned in for winter wheat.

We are happy with our weeder-harrow. If the farmer can get ahead of the weeds and not let them get large, this will do a good job on 90 per cent of the problem if you have good dry conditions to accompany it. Our potato crop was nice and clean without the use of herbicide. Only the Superior variety had problems with the dry weather in this year. We still got 315 75-pound bags per acre. Last year our seed potato variety yielded well with 12 tons of manure compost, 500 pounds of fish scale and 500 pounds of rock phosphate. Size distribution was good and graded yield was 455 75-pound bags per acre. The weeder-harrow seemed to really tear up soil in the Opal wheat. I thought it was destroying much of the stand. The field recovered well and weed control was good. Yield was acceptable.

We used to use the moldboard plow to turn down the clover after harvesting the first cut for hay. The second growth was allowed to grow up until August. Then we

would disc it and let it lay for a week before plowing under. Winter wheat was sown later. We get a good amount of volunteer clover, which helps with cover cropping. We believe in shallow plowing the clover early, in late September. We try to keep the trash in the top few inches where the living organisms are.

Composted manure on wheat and barley fields has given us good yields. Winter wheat fertilized with fish waste plus compost yielded just under two tons per acre. We have begun to grow faba beans. Some worry about drying but we harvested on October 20th and they contained 22 per cent moisture. Weather conditions did not allow us to wait any longer. We got a ton of beans per acre and the quality was acceptable.

We try to keep the ground covered with vegetation. Century peas were mulched after the bean harvest and we got some good ground cover from what emerged. Whatever can be done to put organic matter into the soil to keep it covered will benefit the operation.

LARRY ZIBILSKE, Soil Microbiologist, University of Maine at Orono, Maine

I would like to make a couple of proposals relating to the activity of soil microorganisms in agricultural settings. One is the concept of looking at soil microorganisms as another crop, perhaps an 'intracrop'. Management practices used to influence the productivity of the above-ground crop also affect the underground crop. The contrast between conventional growers and organic growers becomes apparent when we consider the mindset of nutrient applications for crop production. Conventional fertilizer applications are expected to go directly to the plants. This is different from the organic or biodynamic approach in that organic farmers rely on soil microbes to make nutrients available to plants at rates appropriate to meet crop demands. I want to emphasize the part about rates appropriate for crop demand. This is an important idea that needs to be developed. It is good to rely on the activity of soil microorganisms to supply plant nutrients, but how do we match rates of microbial activity that release nutrients to the rate at which plants require the nutrients. This is the balance that we strive for after a maintenance level of soil nutrients is attained.

Reliance on microorganisms to deliver nutrients by native organic matter decomposition or through the addition of plant residues is tightly linked to the availability of carbon. Microbes transform nutrients in organic matter via oxidation reactions. The ease with which the organic carbon is used up by the microbes determines the rate of nutrient release (or tie-up).

Composting is a method to alter the availability of

nutrients in organic amendments. This reduces the availability of carbon by biological stabilization reactions. Slower nutrient release rates are usually more appropriate to plant needs. The elements that are tightly linked to carbon availability are nitrogen and phosphorus. Potassium contained in organic matter remains in inorganic form, thus its release is not directly linked to carbon availability.

Nitrogen has been studied extensively because it is needed in such large amounts and because of the energy, either chemical or biological, it takes to change nitrogen in the air to a plant-usable form. Phosphorus availability is difficult to predict because it can undergo so many different chemical reactions in the soil. When farmers begin to rely on microbial transformations of organic phosphorus, they must now contend with not only the many different inorganic reactions involving P, but must be able to predict, to some extent, the activity of microbes that release organic P. Nitrogen does not enter into inorganic precipitation reactions. These examples illustrate the point that what is done to soil to manage microbial crop directly affects the above-ground crop by affecting the rate at which nutrients are released. The two are inextricably linked.

The other point I want to discuss has to do with the principles on which to base judgements related to the use of organic matter amendments to soil. The total content of nutrients in the material must be known - the quantity. Next we need to estimate carbon availability in the amendment. This information will give us an idea about the rate at which the nutrients will become available to plants - the intensity. These two measurements, quantity and intensity, have been used for some time to understand the soil's ability to deliver nutrients to crops. Quantity-intensity relationships are consistent with nutrient transformations which occur in both conventional and organic agriculture.

When it becomes desirable to use the microbial crop to furnish nutrients for another crop, then predicting biological activity of the microbes becomes important. These activities are related to climatic conditions. Temperature, soil moisture and tillage used all affect microbial activity in soil. These factors are dynamic in nature, changing from day to day. Microbial activity, therefore, changes with these factors. That is why there are no good soil tests for soil nitrogen. We can determine the total amount of nitrogen in soil, distinguishing between inorganic and organic forms very well. But predicting what fraction of the organic nitrogen will become available during a given year is difficult because that implies the ability to predict what the weather will be like in that growing season.

Another question is often asked with regard to organic matter use. After determining the amounts of nutrients needed and some estimate has been made about the rate at which the added nutrients will be release, we need to ask a

third question. A longer-term view must be taken at this point to determine the goal of our fertility program. By determining inputs and outputs, one can determine the amount of nutrient needed to maintain a given level of soil fertility by replacing that which is removed by the crop. If the present fertility level is not acceptable, then management practices need to be employed that encourage organic matter accretion. If the level is acceptable, then one should address the question of the amount of nutrients to be left in the soil for next year, and how to ensure that they are fixed in place for use by the next crop.

Whole farm nutrient balances, as suggested by Will Brinton, will reveal much with regard to the practices used by growers. This determination will go far in calibrating the practices often used on farms.

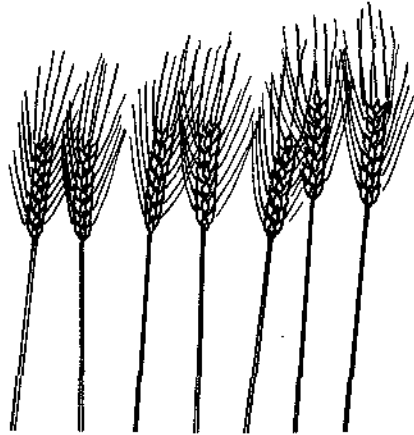
The last point has to do with the way in which organic amendments are commonly used. Since it is so difficult to predict the microbial activity that releases plant nutrients, the tendency is to overuse the amendment, to create a background to make up for deficiencies in our ability to predict accurately nutrient availability in a growing season. Excessive soil richness should, however, be avoided. Too much organic matter may mineralize and release nutrients at high rates. Weeds and other pests may be enhanced. In addition, there is enough heat left in the soil after harvest to continue microbial decomposition resulting in a large pool of nutrients, especially nitrate, which can cause nitrate pollution problems. Problems have arisen in Maine with nitrate accumulation in beets grown in excessively rich soil.

Until we better understand the mechanisms driving the release of nutrients and can predict the outcome of microbial activity, the goal of joining plant nutrient requirements to release rates by microbes will remain a rather obscure concept. We need to work in this direction, however. Farmers and researchers need to cooperate in this. The best methods are those that are calibrated. Universities and private labs need the input of farmers. We all need to keep good records and communicate our experiences to each other. Let's work together to make the system work.

**DALE MCLAUGHLIN, Transitional organic farmer,
Aroostook, New Brunswick**

I was asked to discuss why I think there is a need for a transition from conventional to organic agriculture and

why I was interested in doing so. The potato belt has been exploited to the point of destruction of the soil. Commercial interests developed large processing plants in the province of New Brunswick. Prior to that, plants were spread over the province, in every county. This tended to concentrate potato production and we soon moved in potato monoculture. This also made mechanical methods necessary for harvesting, since local labor was not sufficient for the late harvest. The use of heavy harvesting equipment late in the year compacted the wet soil. The economists maintained that this was an efficient way of doing things. Farmers did not intentionally get into this mess. Gradual changes seemed to creep up on us without our realizing what was happening. It is now important that we get help and understanding from researchers and others.



We are mixed farmers with sheep, cattle, potatoes and mixed grains. We have tried to use crop rotations to keep from growing potatoes too many years in a row. We were concerned that our purchased inputs were so high that profits were small. I had heard about organic methods from proponents of biological agriculture and knew some small growers using organic methods. I thought these were more appropriate to back-yard gardeners than to large-scale agriculture. On a recommendation, we tried sweet clover on a field that had a hard-pan. The clover penetrated the pan and allowed water to percolate through. The clover also mined some of the deep nutrients in the soil and brought them up to the surface again. It grew so high, however, that we had a hard time cutting it with a rotary mower. We had to leave it for two years. This fall we had problems with the wet humus in the field getting into our diggers. This may be a problem on bigger slopes.

We have used buckwheat as a green manure crop. After it grows to the point of going to seed, we disc it and leave it on the ground for two or three weeks before plowing it in. We have heard that we should not plow down a green manure crop while it is still growing. I won't argue that but I would like to relate some of the successes we have had in plowing down red clover and alsike mixes. We have underseeded these in a crop of wheat or barley in one year and plowed down the next spring. We have consistently grown over 200 barrels per acre doing this. We were told that this would not work. Work in Maine in the 1960's with crimson clover was dropped for some reason, perhaps scab or nematode or pinkeye problems.

In Quebec, we met a farmer who mulched with hay cut in the summer. I thought aged hay was necessary but immature hay cut in the current year could be used successfully. We started composting this year. I would add more

straw to it if I could start over. We're farming 350 acres total, of which 150 are in potatoes. Sheep manure does not seem to compost well. We will be harvesting round bales to get enough straw to incorporate into the compost pile. We have seen others use 80 square bales per head, which seems like a lot, but they seem to get good results.

In the summer of 1987, we tried horsetail tea to control blight in a plot of potatoes. We had reasonable results on this small plot. It was situated such that the prevailing

wind from a conventional plot blew in the direction of this plot. It was not a bad blight year in our area, but we did not have a problem in the small plot. Perhaps it was the weather and not the horsetail tea. The tea is made by steeping in enough water to cover and diluted about one part tea to ten of water and then sprayed.

In that same plot we planted bush beans four to six feet apart in the row and offset in the adjacent row. This helped control the Colorado potato beetle.

Discussion period following workshop on organofertilizers and soil audits

Matt Liebman: Questions for David Ling - What are you using for blight control and top-kill on potatoes?

David Ling: We've had ideal conditions for blight problems on P.E.I., so every week to ten days I used copper sulfate (2 pounds per acre) bluestone, with dehydrated lime (1 pound). We had generally good control. I believe it is safe; copper is one of the essential elements. I used straight copper sulfate on Superiors at three pounds per acre and got very good kill. Some spot treatment was still necessary in places. On Atlantics, we used a five pound per acre rate and got good results. The total I used last year was 12 pounds for control and three pounds in Superiors and five in Atlantics.

George Phaeneuf: I want to address the issue of outside inputs to farming operations. We cannot all produce enough fertilizer to support operations. Compost is fine, but sometimes not enough can be produced. Likewise, sufficient manure is sometimes hard to find. I try to fertilize 100 acres of alders with the manure from one cow and it doesn't spread well. Alders are berated by some people but they do fix nitrogen which can benefit the soil. For these reasons I feel that there is a place for externally-generated nutrients on the farm.

Differences between farms and farmers indicate that all may not be able to produce all the nutrients they need, particularly those farmers in transition. One fertilizer company's goal is to see to it that a farmer does not lose yield when in transition. A good source of organic fertilizer may circumvent possible yield loss in transition. Yield loss seen may be due to the time required for the microbes to rebound from the low numbers in conventional to higher numbers and plant feeding activities seen in organic systems.

Will Brinton: In North America there are input materials of questionable origin. There are some new types of 'quasi-organic', urea-like compounds that appear to be organic but are synthetic. It is difficult to decide whether their use should be allowed. Until the new system is in place, we just have to use our best judgement.

Stu Fleischaker: I would like to hear about the results of the testing of crab and fish meal that took place in the Upper Valley. I also wanted to know about the use of local rock powders. I've heard the contention about perhaps instead of picking the rocks out of our fields we should be grinding them up and returning them to the soil. What about the feasibility of that use?

Will Brinton: Rock materials are difficult because of differences in analysis between different rocks. Total analyses is useless in predicting availability of the elements in the rocks. Local sources may be good. Basalt rock materials in Vermont have a good amount of potassium, but it still takes several tons to fertilize. Economic studies suggest that the use may be questionable but not much has been done. Both total and available analyses need to be done to determine the worth of specific materials.

Roger Henry: I want to ask Will Brinton about sources of fish wastes as fertilizer.

Will Brinton: There is available a feasibility study on fish compost that we just published. We have worked with a fish gurry, a ground dogfish waste as well as others such as lobster and crab. Herring and groundfish have been used in this process. We will be doing a herring waste composting project next year in Nova Scotia. All these materials are compostable and organically acceptable. The oil content in the waste of some species could mean PCB problems, but we have seen no problem after composting. Composting is becoming increasingly common and could be a useful source for organic growers.

Sat Lalla: The reason there is crab and fish waste meal available is that in 1984 we had a surplus of crab meal that was directed for fertilizer use. The crab meal contains micronutrients that are not found in fish meal. The presence of chitin and chitosans in the crab meal when decomposed in the soil helps to destroy insects and fungi as shown in Western Ontario. There are several plants producing crab meal, but the supply will dry up soon.

Landings are down and the meal is being shipped to Japan. Fish meal is more abundant, however little testing has been done on these materials. Fish silage is also a possibility. Fish composting may have limits in scale. If transportation becomes a problem, the economics may not be as favourable.

Arnold Nabuurs: How do beans interplanted with potatoes affect the Colorado potato beetle?

Dale McLaughlin: Something seems to just repel the beetle. They did not get into the potatoes. This was a recommendation found in the Organic Gardening magazine published by Rodale Press.

Arnold Nabuurs: I'd like to ask David Ling how he controls the potato beetle.

David Ling: We used rotenone liquid with soap that cost us fifteen dollars per acre and had excellent control. We should look at the effects of late-season soil tillage on the

ecological balances that contribute to control. Rotenone is degradable but rather expensive.

Anonymous: What about seaweed in terms of use in compost or fertilizer?

Will Brinton: Seaweed works well for both. There is much seaweed cleaned from the beaches in New England, which is put in landfills. The material has a good analysis and I have not seen salt problems from using it.

Cathleen Kneen: We need to keep in mind that what is effective for one crop may be disastrous for another, particularly a livestock crop. We experienced copper poisoning in sheep.

Stuart Hill: The interaction of copper and zinc is important. When copper availability is increased, zinc availability goes down. Pest resistance and mycorrhizal activity are linked to zinc availability. When dietary copper increases, medical effects have been seen in humans.

Workshop on potatoes, other vegetables and biological control of pests



Summary by Stuart Hill and Rod MacRae

STUART HILL opened the session by commenting that conventional methods of pest control tend to rely on the application of nonspecific poisons to whole ecosystems, the aim being to 'get the enemy'. Such approaches necessarily have multiple negative effects, including the mortality of beneficial organisms, such as natural control agents and wildlife, the development of resistance to the pesticides, food contamination (including the contamination of mothers' milk) and lethal and sub-lethal effects on people and on their pets and domestic animals.

He noted that back in 1965 Dr. Reginald E. Balch, a forest entomologist in New Brunswick, gave a series of lectures entitled "The Ecological Viewpoint". In these lectures, broadcast by the CBC, Dr. Balch stated that "we are entering the age of ecology ... direct attacks will not give permanent results ... we must study the causes of outbreaks ... and aim at the prevention versus the cure ... we must find how all the factors interact to regulate pests, identify the key factors, and complement them." Dr. Balch

also noted that "forestry is as much an art as a science ... diversity and intensive management of complex systems are key concepts ... we need knowledge and ethics ... and they come together in ecology as an ecological conscience."

Stuart expanded on this by distinguishing between three approaches to reducing reliance on pesticides: efficiency - the chemicals are applied in the optimal ways only when the pest reaches the economic threshold; substitution - benign interventions are used, such as traps and biocontrols (both of these, he noted, protect and perpetuate the agricultural designs that are the cause of the problem); and redesign - changes in the design and management of the farm operation to prevent and control pest outbreaks at the causal level. For example, suitable intercrops might prevent pest outbreaks by their odours, confusing the pests or their flowers attracting the natural controls of the pests.

Stuart ended by showing a table of toxicity levels of some common pesticides and noting how toxic are some of the botanical pesticides, such as nicotine (a class one pesticide) and rotenone (class two). He suggested that any

pesticide, because of its disruptive effect within the ecosystem, should be used in emergencies only as a last resort.

GERRY CHEVRIER is working mostly with conventional growers, but wonders if he might qualify as an ag. rep. in transition. There has been little direct support for organic agriculture from the New Brunswick Department of Agriculture, although he has noticed that many ag. reps. do ask the right kinds of ecological questions, do suggest that all growers use good crop rotations and good sanitation practices and only at the end of their investigation do they propose chemical solutions. He feels that much of what is practiced in conventional agriculture is also applicable to organic growers and much of the information that ag. reps. in the department disseminate can be useful. New Brunswick has a long history of biocontrol. As far back as the 1930's, biological control agents were released to control the European Spruce Saw Fly in New Brunswick, although in the end its population declined as a result of a national outbreak of a viral infection. Nova Scotia's Kentville research center has made major contributions to Integrated Pest Management (IPM) in horticulture.

Pesticides are, however, a serious problem. Consumer demands for more variety, constant supply and high quality (freshness, disease and insect free) are challenging horticultural producers. Farmers are trying hard to develop early-season cropping systems to meet these demands but this often involves greater risks due to climactic variability and possibly greater pest problems. These demands and government and food industry grading standards are encouraging growers to apply pesticides. Ironically, consumers are at the same time also very concerned about pesticide contamination. Most farmers are not keen on spraying because they feel that their 'homes' are being contaminated. These farmer and consumer concerns are driving forces for organic approaches.

Changes are forcing multiple reactions in institutions. Training for students and technicians will have to change and crop extension specialists will have to diversify their approaches. Research attitudes are changing, as demonstrated in new journals such as the American Journal of Alternative Agriculture and the IPM Practitioner.

NORBERT KUNGL opened with a description of his farm, located on the Bay of Fundy and exposed to the prevailing northwest winds. The farm was abandoned four decades ago, with only a few crops of hay and oats grown since then. Nothing had been returned to the land and the soil had been degraded. It was also low in P and K. Since taking it over, they have tried to import manure. Sunflowers have been used as an annual windbreak and although not much help in the spring, are good once they have grown up. They are in the process of establishing a permanent windbreak along the bank of the Bay.

In the first two years they worked one and a half to two acres with a great variety of vegetables. It proved to be too much and limited mechanical cultivation possibilities, thus contributing to weed control problems. Last year they concentrated on four crops - carrots, chinese cabbage or napa, broad beans and asparagus, which had been started three years earlier. Perforated plastic mulch was used early in the season with carrots and they were able to get them to market early. A greenhouse was used effectively to produce transplants. Next year they will produce more vegetables. A fall rye cover crop was planted. In the spring it will be mow-killed and the vegetables will be planted into the mulch.

Cabbage root flies have been a major pest. The maggots attack the roots and the plant begins to wilt and eventually dies. A provincial vegetable specialist provided a physical barrier this past year called Acronet which was placed on the chinese cabbage field. It worked quite well against the cabbage root fly and flea beetles but contributed to some undesirable soft tissue in the napa.

They decided to set up tests to follow the flight of the cabbage root fly and plots to evaluate different control strategies. The treatments were Acronet, black tar paper discs around the plant, rotenone sprayed at ten-day intervals and an untreated control. Each plot was divided into 22 sub-plots. The four treatments were randomized with four replicates.

Two traps were tried: a yellow, sticky trap with tanglefoot and a more sophisticated trap with a triangular structure open to the bottom. This trap is designed to confuse the insects when they fly into it and lead them to the top of the structures where they are collected in a jar. These structures were designed and set up by government specialists but Norbert found that on his farm, they did not work well. The sticky traps were simpler and more useful. Monitoring proved to be a problem, however, as they had difficulty identifying the flies from the extension bulletins that were available to them.

There were two sticky traps, one being better protected from the wind than the other. The number of catches was much higher in the more protected trap. In general, weather and wind conditions had a major effect on the number of flies caught. There did not seem to be any connection between rotenone spraying and the presence of the fly.

They had a good crop of napa and there was no severe damage to any of the test plants. They were surprised with this result because they had lost one third of their broccoli and cabbage in previous years to the maggot. Only a few plants wilted. Since there were no dead plants they evaluated root damage using a scale of 1 (no damage) to 5 (total destruction). The control plot average for all the plants was 1.8. The rotenone treatment average was lower at 1.7. The

tar paper disc treatment was considerably lower with only minor root damage, and the Acronet cover was lowest of all, although a few flies did manage to get under the cover. No statistics were used. As a result of the experiment, Norbert feels he would not recommend rotenone as a control measure. He does intend to use rye to generate a mulch for weed control.

SUSAN TYLER and Clark Phillips have been farming organically in the same location for 12 or 13 years. Much of their farm is on a slope and they practice a hay strip system. They also have 15-20 acres of vegetables and a 1,000 acre woodlot. They normally sell certified organic second-year beef, but will not do so this year after a fire reduced their stock to ten. The hay strips are 7-21 feet wide and the cattle feed on the hay in the strips (contained with portable fencing) and crop residues. The animals are not fed any grain because Susan and Clark do not believe grain feeding to be the most ecological approach. Many knowledgeable people have been unable to tell that grain was not used in raising their beef. A typical rotation involves peas and beans the first year, triple mix the second and corn the third. Late buckwheat is planted one year in three. It is tilled shallowly in the fall and the residue left on the surface for erosion control.

Although they have occasionally had troubles with Colorado potato beetle (Susan wants to try a bean/potato intercrop as suggested by one of the other producers) and cabbage maggot on napa (controlled with late planting), their major pest problem is deer. They do not have many problems with other pests.

Susan and Clark want to live in harmony with the deer but not lose a sizeable amount of vegetables. The first year they lost all their mangels and a few turnips; the second, beets, turnips, cabbage, cauliflower, and broccoli. Since then they have tried every control system imaginable, from tiger manure to all the tricks using human hair. Shooting deer has not been an option because they might have to shoot 40 a night at the beginning.

They have been working with different kinds of fences, including some obtained from New Zealand through technology transfer grants from the government. They have been working primarily with two kinds of fences, one cheap, the other expensive. The cheap one works quite well in the early stages of developing a vegetable operation when acreage are small (around an acre). The fence works by trickery. It confuses them and they fail to realize it can be jumped. It is a threestrand fence. One wire is low and the deer step over it; the second is high and the deer duck under it; and the third is offset and the deer run into it. An electric fence is required that pulses 6000 volts. When the deer get tangled in the offset wire they are shocked. Even if they get through to the vegetables they are sufficiently

traumatized that they do not eat. Because the wire is so thin and the posts so widely set, the deer does not perceive it as a fence. If deer pressure is high, however, it requires a lot of maintenance because it is not very sturdy. This system worked well for 5 years but last year the deer finally figured it out and they lost all their cole crops. They hope to expand the expensive fence system and are going to experiment with another New Zealand fence.

JIM GERRITSEN and his partner are full time workers on their small farm in Aroostook County in Maine, just six miles from the New Brunswick border. They have been certified organic for ten years and are presently certified in both Maine and New Brunswick. They consider themselves to be a mixed farming operation and grow potatoes, squash, pumpkins, grain, hay, beets, carrots, onions, tomatoes (in a greenhouse) and raise sheep. Draft horses are used to supplement the tractor. In 1988, 13 acres were in production, nine in crops and four to crops in 1989. Their target is a two acres/year increase in production.

The rotation involves: squash or pumpkins in wide rows to control witch grass, followed by potatoes, grain, and clovers (a mixture of alsike, medium red and sweet clover-yellow blossom). In a given year about three acres are in potatoes.

The management philosophy with potatoes is to find a balance between yield and a naturally resistant, high quality crop. They try to avoid high fertility because they feel it contributes to potato beetle and blight problems. With their present fertilization scheme, they may border on underfertilization, which can help create a good environment for early blight. They apply eight tons/acre of composted manure with two-three foliar applications of fish emulsion and liquid seaweed. Jim thinks the seaweed suppresses blight and is planning to set up some trials to study it. On some of the poorer land being brought into production, SulpoMag, rock phosphorus and fish meal are used as supplements.

The major weed control strategy is the rotation. The squash/pumpkin crop is a kind of compromise summer fallow. They are able to cultivate between the rows before the plants start spreading. They harrow with a spring tooth the year before so they have almost perfect control of witch grass. As a result, weeds are not a problem in the potatoes, except for the occasional infestation of dandelions. They use a 40-year-old finger weeder to effectively control annuals, which controls weeds in the row. Between row control is accomplished with cultivation and hilling. Very little hand weeding is required.

Insects have not been too great a problem. Aphids are not that common because the farm is somewhat isolated. Flea beetles are a minor irritant and no control strategies have been necessary. Potato beetles have not been a problem except for last year, probably because of a mild

winter. They had larvae from late June to early September. They have a control system, however, that works well. Around June 20 they start looking for diseases and bugs. Diseased plants are collected in bags as they move on foot through the field. They squash bugs as they go if they can do it without breaking stride. If a collection of adults is found they mark it with a diversion ditch flag. This is repeated 7-10 days later with different coloured flags in order to monitor the spread of the adults. When the population rises to what they think is a problem level they go in with a backpack sprayer. The spray is a mixture of liquid seaweed, fish emulsion and rotenone at the label rate (ten lbs/acre). They spray at a two-three foot radius around the concentration. It worked well and was not very time consuming (about one hour in the evening for a three-acre area). The average application for the field for rotenone is two lb/ac/yr, much lower than when rotenone is sprayed over the entire field. They tried M-1 (a new strain of *Bacillus thuringiensis*) but because of timing, it did not work well. The problem with M-1 is that it only works on the larvae, so you must allow the adults to lay eggs and have them hatch. This is not as preventative a strategy.

The humid climate of the region fosters blight. The primary disease control strategy is varietal selection. Every year they try 10-15 varieties. Islander has been rejected because of late blight problems. Black scurf (*Rhizoctonia*) is sometimes a problem. They are cosmetic problems and can result in your grade being lowered. Their system to control blight may be contributing to the scurf problem. They try to harvest as late as possible in September. The tops are rotobated earlier in September and they wait for a killing frost to minimize transfer of late blight. Good hilling practices help as well. The late harvest period may take place in cold humid weather which fosters scurf. Incomplete breakdown of organic matter may also be a factor. They are looking for varietal resistance.

Jim feels strongly that we must not rely on 'organic bullets' like copper sulfate, rotenone or M-1 to solve our pest and disease problems. Why won't resistance to organic products develop over time as has occurred with synthetic ones? He feels we need new systems and to grow as individuals in order to understand how to be in harmony with nature.

Comments and questions:

1. Basic H from Shaklee and other cheaper brands of wetting agents have been used to control potato beetle (1 1/2 lb/ac). This is acceptable in at least some OCIA standards. It may not be necessary to buy a product like this, however, as it is just a low concentration of dish detergent mixed in water. There is also a mechanical machine used in Germany that shakes adults into pans of oil. Another machine vacuums beetles up, grinds them and spits them back onto the field. A large version of this machine is reputed to be in development but requires an 80 h.p. tractor.
2. We need to be wary of contaminants in 'organic' fertilizers such as compost made from imported organic materials treated with persistent chemicals. Although composting can help break down organic toxins, inorganic poisons such as heavy metals are not removed. Most growers are focussing on self reliance so that they know what they are getting. We must at the same time be aware of the reality of undertaking a conversion. How many are totally self-reliant at this point?
3. Some growers are looking for solutions for fungus gnats and white flies in greenhouses. Rotenone does not appear to be the answer to fungus gnats. Vacuuming seems to work on adults. High organic matter levels in the mix may attract gnats, and peat moss may be a carrier. Freezing the potting mix may help and a shutdown period may also be useful. Pasteurizing is another possibility. The May 1987 issue of the magazine IPM Practitioner notes that the mite *Hypoaspis*, which is common in well-made compost, is an effective predator of fungus gnats.
4. In regard to potato storage problems, most originate from the field. Bruises contribute to infestations. Potatoes with late blight should be marketed immediately. In storage, the key is to keep the tubers unstressed. Proper temperature, ventilation and humidity are important to minimize stress on the potato. Temperature control may be a substitute for synthetic growth inhibitors. Horsetail is rumoured to be a good storage fungicide - does anyone have any information on it? Is it due to its high silica content? Common scab problems can develop in the field if just 1% of the seed potatoes are infected. Areas where manure is concentrated from uneven spreading are often worse for scab.
5. Elliot Coleman in Vermont plants potatoes after corn/soybean intercrops to help with disease control. He also applies foliar boron to enhance the plants' ability to fight off potato beetle infestation. Horseradish in the corners of potato fields can also help repel potato beetles but needs to be carefully controlled because it spreads rapidly. Other beetle control possibilities include early spring tillage to disrupt overwintering beetles; eliminating volunteer potatoes; predatory stink bugs, ducks and parasitic wasps as natural controls; mulches; parasitic fungi; and a nematode that is being tried in Quebec.
6. Compost seems to be associated with fewer insect problems as the land is not overfertilized. Weeds may also

be reduced. Pests may be higher on conventional farms or the equivalent level of pests on organic farms may not be as serious a problem as on conventional ones.

7. New Brunswick has developed scouting programs for some insects, as has Prince Edward Island (strawberries, potatoes and other vegetables). It is definitely an asset to know the biology of the pest.

Concluding remarks:

Stuart Hill wound up the session by citing recent U.K. data supporting observations that organic farms seem to suffer from fewer pests. He also referred to a study in

Organic potato production survey

**Margaret Drake, Horticultural Technician
Prince Edward Island Department of Agriculture**

In any organic farming system, the method of crop and/or livestock production varies with the resources of the farm, the farmer and the surrounding region. When considering the crops to be produced within this system, these available resources as well as the nutritional-requirement and pest control problems must be taken into account. Therefore, the production of any crop will vary from farm to farm.

In view of this, the following is a review of methods used by Prince Edward Island farmers during the past growing season to produce potatoes without the use of synthetic fertilizers and pesticides. This information was collected through conversation with the producers and is not meant to be a suggested production method. What I hope it will give you is an exchange of ideas which could be applied to your farm situation.

On P.E.I. in 1988, 12 growers produced 21 acres of potatoes by organic production methods. The size of fields ranged from 1/4 acre to seven acres in size. Of the 12 producers, seven grew less than one acre, eight producers had previous experience in organic potato production and four were first-time producers.

Varieties: varieties grown were Jemseg, Yukon Gold, Bintje, Atlantic, McIntyre blue, Superior, Irish Cobbler, Belle Isle, Fundy and Russet Burbank. Seed stock used by producers was elite or foundation level.

Crop rotation: the length of crop rotation varies from five to seven years and producers precede potatoes with either a forage or vegetable legume crop. One producer precedes with either a fall cereal or summer fallow pro-

gram. Producers who have grown potatoes in the past prefer a fall plowdown.

which cabbage loopers were released on broccoli seedlings at a range of population densities in order to determine the level requiring control. To the surprise of the researcher, at the end of the season there was no difference in yield between any of the treatments. This emphasizes the need to often resist the impulse to rush out and control an insect that may not be having a significant effect.

His final comment dealt with the need to keep in mind that the process of change occurs on several levels. Changes in farming, as with all other changes in society, can be supported by institutional changes. In the final analysis, however, all social change is based on change at the individual level - not me persuading you to change but me changing myself.

Land preparation: pre-plant land preparation varied with producers. Most producers begin with one disking followed at 10 to 14 day intervals with two further cultivations using either a vibra-shank or spring tooth cultivator. Smaller scale producers rototill at least three times at 10-14 day intervals. The purpose is for weed control. One producer avoids the use of discs if he feels he has a quackgrass problem.

Weed control: post planting weed control is accomplished by subsequent cultivations. A number of different methods are used. A Lely weeder harrow is used by one producer, who finds that one pre-emerge cultivation followed by two post-emerge cultivations and hilling gives good weed control. The post-emerge cultivations are done when the potatoes are 3"-5", and 8" high. Tension on the tines which are directly over the potato plants is released on the final cultivation. No damage to the crop has resulted. Another grower, with three years of experience, uses a chain harrow for pre-emerge weed control. Two cultivations are made at 10-14 day intervals. The chain harrows do not appear to damage the potato crop. Post-emerge weed control is via hilling. All other producers are hilling for weed control. One has found that planting on the flat and hilling four times gives good weed control. The major problem associated with weed control is the timing of cultivation and favourable weather conditions.

Crop nutrients: requirements were achieved in various ways by the growers. Some examples are:

- compost applied in the spring at the rate of 20 bu/400 ft²;
- compost applied in the spring at the rate of 12 tons/acre

plus 500 lb/acre of rock phosphate and 500 lb/acre of fish scale or crabmeal;

- compost applied at the rate of 5 tons/acre plus 800 lb/acre of fishscale meal;

- well-rotted manure applied in early spring;

- 100 tons/acre of raw herring waste applied late in the previous summer directly to field and incorporated in.

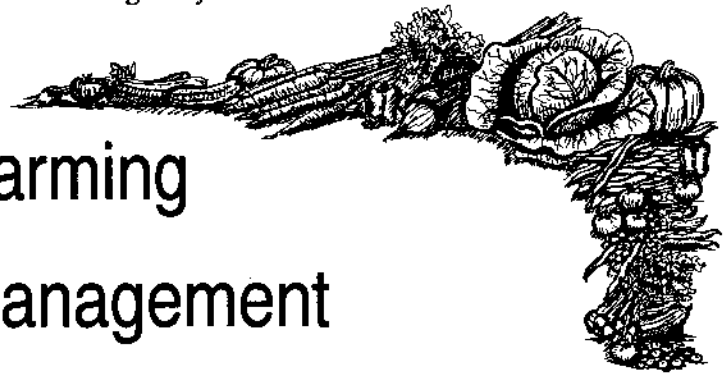
Insect control: the major insect of concern to Island producers was the Colorado potato beetle. Rotenone, applied at label rates, was the only available control method. On average, 2-3 applications were made.

Disease control: for late blight control, some growers applied copper sulfate and hydrated lime. Control was most effective when six applications were made. Growers producing for direct sales and early markets did not apply

disease control. Isolation from other potato fields is beneficial in reducing disease pressure. This can be difficult in P.E.I. The good neighbour principle applied on P.E.I. in late blight control, with one producer saying he will plow down his crop if late blight becomes too much of a problem. He is located in a major potato production area of the Island.

Top killing: top killing is the final area of production. Although most of the producers talked to do not use any method, one grower used a Brush hog rotary mover to dispose of the tops and two producers applied heavy applications of copper sulfate.

Marketing: the major market outlets for this year's crop were farm gate, roadside stands, farmer's market and area grocery stores.



Workshop on better farming with Voisin grazing management

Summary by Ron Loucks

Dr. Bill Murphy has recently published a book, Greener Pastures on Your Side of the Fence - Better Farming With Voisin Grazing Management. His talk provided an update on the applications of the concepts presented in that book.

Dr. Murphy grew up on a dairy farm in Wisconsin and was educated at the University of Wisconsin. He has worked in Chile and Brazil and has been on faculty at Oregon State University. Since 1979, he has been a professor in the Plant and Soil Science Department of the University of Vermont.

The grazier/farmer should be encouraged to read Dr. Murphy's book. However, the Voisin concept briefly is that one strives to maintain pasture plants near their range of maximum growth (e.g. one to six inches in height) by periodic, intensive grazing.

This is accomplished by dividing the pasture into paddocks (usually using a high impedance electric fence system) and rotating the grazing herd through these paddocks. The herd might be kept in a particular paddock until the sward had been grazed down to two inches (or perhaps even less). However, their stay should ideally not exceed two days and should certainly be less than six days, to avoid grazing of regrowth which would weaken the plants.

Then the paddock is rested until the plants have regrown to approximately six inches.

Here are some of Dr. Murphy's Voisin Grazing Management Guidelines:

1. Rest periods between grazings must increase as plant growth decreases as the season progresses. In Vermont, the following rest periods are needed: 10-12 days in late April-early May; 15-18 days by May 30; 24 days by July 1; and 36 days by September 1. These are guidelines; more or less rest may be needed, depending on conditions. The forage should not be taller than 6-8" for cattle or 3-4" for sheep when animals are turned into a paddock, and should be grazed down to 1-1.5" from the soil surface before they are removed. If animals don't eat enough to keep up with the rapidly growing forage in May, remove paddocks from the rotation and cut them later for hay. Usually about 50% of the pasture must be saved for haying because of too much forage produced in May and June. After haying, rest the paddocks for about 25 days before including them in the rotation. If at any time rest periods become shorter than needed, remove all animals from the pasture and feed them elsewhere until rest periods are adequate before turning them back into the pasture system. By strictly observing this need of adequate rest periods, pasture in Vermont may be grazed for 7 months.

2. The total time that animals occupy a paddock in any one rotation (period of occupation) must be less than 6 days anytime, to prevent grazing of regrowth in the same rotation. Paddocks must be small enough so that all forage in each paddock is grazed down to 1-1.5" within these time limits. Periods of occupation may change because plant growth conditions are not the same during the season and amounts of forage available change. In practice, the shorter the periods of occupation are, the better it is for optimum plant and livestock production. Milking or fattening animals should not be in a paddock for longer than 3 days per rotation anytime in the season to keep them on a consistently high level of nutrition. Milking cows produce the most if they are given a fresh paddock after every milking. Lambs grow fast if given a fresh paddock every 12-24 hours. Use one group of animals, or follow milkers with heifers and dry cows, or ewes after lambs, to clean up remaining forage in each paddock.

3. Paddock sizes must be adjusted according to the intensity of management that is wanted. Paddocks usually should be smaller than 2 acres, depending on pasture productivity and numbers of animals. Carrying capacity of the total pasture depends on pasture forage quality and yield. Excellent pastures carry 1-3 animals units (1 AU = 1,000-lb cow or steer, 10 ewes or 20 lambs) per acre.

4. Ten to 80 paddocks are needed, depending on how frequently animals are moved. Tumble weed fences with backup fences can be used with cattle on rolling pasture and decrease the number of fences that need to be built. Use electric fencing to built paddocks; only one strand of smooth wire is needed for sheep. Either provide water, minerals and shade in each paddock, or allow animals to reach them through lanes. Test pasture soils and follow liming and fertilizer recommendations. Starving plants can't grow no matter how they're grazed.

The rewards for applying this concept successfully are pasture productivity some four times greater than from a typical, zero-management, non-rotated, free-choice pasture and a grazing season prolonged to almost seven months in this climate.

1. choose the animals which can best utilize the forage which can be grown;
2. the grounding system is half the fence;
3. mark the electric string with flagging tape for the first paddock in spring, to train the animals;

A poem from Stuart Hill

*Symphony of instruments
in proud procession
reminding us all
of the richness of
the cultures of the earth*

*So many talents assembled
in brave community together
organizers and speakers
farmers and scientists
cooks and musicians
committed and curious
united in their search
for a kinder way to love
one another, and the earth*

Fredericton, N.B.
November 19, 1988

4. move the backfence so that regrowth is not grazed
The following are some new ideas being tested:

1. follow cattle with sheep to reduce the amount of forage rejected because of proximity to cow flops. Ideally, the sequence might be cattle, then sheep, then clipping;
2. graze (scrape) the paddocks to one inch height. This gives a denser, more productive sod but with less diversity of species. Ways of introducing more species into the sward are being examined;
3. try to introduce perennial rye grass and a prairie grass from New Zealand into the sward. White clover may be broadcast into the sward. *Whea* white clover from New Zealand is a promising new variety being tested for pastures (Dr. Joanna Fraser).

Dr. Murphy is optimistic about the system. For example, by rotating to fresh pasture daily using tumble-wheels, Dr. Murphy feels the farmer can, with five minutes work, have productive, profitable pastures with time left over to enjoy life.

Workshop on Third World linkages and participatory research



D.G. Patriquin: Research in Indigenous and Organic Agriculture

Increasing use is being made of 'participatory' or 'farmer first, farmer last' research models in Third World Agricultural research for Resource Poor Farmers(1) and there is much we might learn from those experiences as well as contribute.

A superb example of participatory research in action is the MASIPAG project in the Philippines.

Below is a transcription of a brief submitted to Tim Carroll, Prince Edward Island Minister of Agriculture in the spring of 1988. It describes why and how Participatory Research might be applied to the development of organic agriculture locally. The Minister had no difficulty appreciating the concepts we were promoting. "That's the way we do things in P.E.I.," he said, "neighbour to neighbour".

Implementation of Sustainable Agriculture in P.E.I.(2)

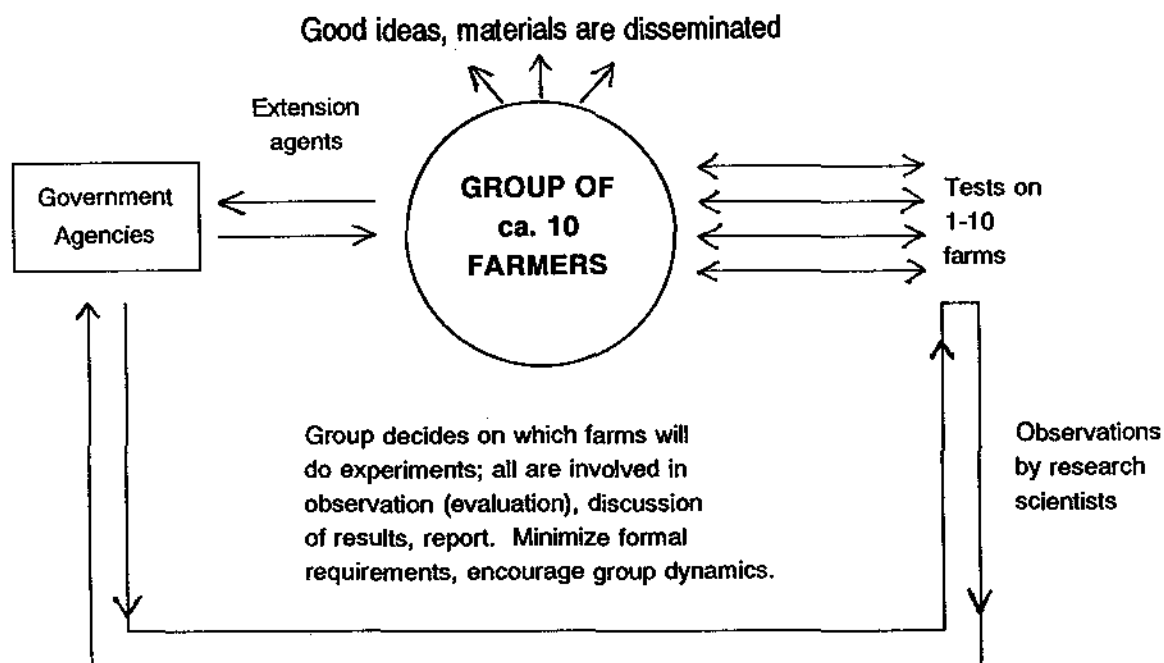
Some comments and recommendations

1. In implementing programs to encourage development of Sustainable Agriculture, P.E.I. is in good company. The states of Massachusetts, California, Nebraska, Maine and Vermont have specific programs in place to foster Sustainable Agriculture.
2. There are certain programs that could be instituted immediately, for example per acre support for growing winter cover crops, and this should be done.
3. Because of lack of interest in Sustainable Agriculture in the past, there is very little formal (scientific) information on how to grow crops without chemicals, which must really be the core of any Sustainable Agriculture program.
4. Some caution is therefore required in implementing programs, because of the danger (1) that it would take too long to see results if pursued by the traditional research-development route (Lab-test plots-test farms-marketing analysis-distributors-farmers), or (2) that if farmers rush into it without proper information, they will soon be disappointed and give up.

5. Managing farms so that they require less chemicals means that they must be more efficient in ecological terms, and the essence of ecology is variability and regional adaptability. Each farm is an experiment and each farmer must be an experimenter. Probably the most important requirement to develop Sustainable Agriculture is to encourage farmers to experiment...to provide the farmers with the resources to experiment and find their own best solutions.

6. Based on my experience elsewhere to develop Sustainable Agriculture, I consider that the best way to foster Sustainable Agriculture at this juncture is to make FARMER GROUPS, of perhaps 10-15 farmers, the primary unit for conducting research and disseminating information (see diagram).

For example, a group might be asked, or ask, to do some trials with a new crop that has special potential for Sustainable Agriculture. Government agencies provide the seed and information about the crop, and perhaps sponsor visits by farmers who have had experience with it elsewhere. The farmers decide (given some examples of possible options) how to conduct the experiments; who would do them; how much land is to be involved (e.g. each farmer might grow one acre or strip); and farmers collectively do the evaluations. In the late fall, they meet to discuss successes and failures and reasons for both and write a formal report. As appropriate, they would disseminate information to neighbours (through co-ops, etc) about the successes and possible pitfalls, as well as seed for others to experiment with. Rather than monitor a FARMER GROUP closely, the incentive for good performance is their own satisfaction and the likelihood of getting more support for subsequent experiments. I suggest that this sort of model entails the least risk, the least expenditure of public funds and encourages quick dissemination of useful information on a regional basis. Extension agents act as catalysts of the process, seeking answers for farmers on specific questions and helping them communicate their results. Scientists should be encouraged to make observations on farmers' experiments but not to be the chief agents in implementing them because their requirements are quite different.



7. Examples of possible FARMER GROUP projects: trials with new cover crops (e.g. oil radish); trials with new legumes (e.g. fababeans, lupins); comparisons of non-chemical weed control with existing methods; comparisons of reduced fertilizer applications with normal applications.

8. The most valuable resource is local farmers who have already made successful transitions to Sustainable Agriculture. Their results and experiences should be documented on video and their continuing efforts to foster Sustainable Agriculture supported (e.g. field days, lectures)

1 See, for example:

R. Chambers and B.P. Ghidyal, 1985. **Agricultural Research for Resource-Poor Farmers: the Farmer-First-and Last Model.** *Agricultural Administration* 20: 1-30.
 P. Richards, 1985. **Indigenous Agricultural Revolution. Ecology and Food Production in West Africa,** Westview Press, Boulder, Colorado.

2 A submission on the Implementation of Sustainable Agriculture in P.E.I. to Hon. Tim Carroll, Minister of Agriculture, by D.G. Patriquin in collaboration with the National Farmers Union Region 1, made February 24, 1988 at the Charlottetown Hotel, Charlottetown, P.E.I.

Gerry Van Koervdan
 former Director of CUSO-Thailand

My role has mainly been as an "extension agent" trying to facilitate cooperation between farmers and scientists. I

came out of my work in Thailand learning three very important lessons:

1) we have to build better-designed systems and whole systems based on traditional ways when we're working in developing countries. When we transfer a system from the West and place it into a farming system in the East, it generally only works if there is very strong financial backing from large agri-business. It rarely, if ever, works on a small scale for the average farmer.

2) in designing those systems, the most important thing is to try to use local resources, local lore and local skills as much as possible. Whenever we try to introduce new skills from the outside, whether that's bookkeeping or how to use pesticides, things become extremely complicated. So even with a pesticide program, we use native botanical pesticides which we grow in the area.

3) a very important means of achieving these things is to have the farmer and scientist get to know each other better. This is perhaps even a more extreme problem in developing countries than in Canada. In developing countries, it's usually only the richer people from the cities who have enough money or contacts to be able to get into university and it's these urban people who determine the agricultural future of a developing country. They know more about how things are done in Canada than how their own farmers farm, because that's what they learn in university.

About 11 years ago, I arrived in Thailand without an appreciation for these kinds of things. Especially when you're in a situation where you're struggling with the language and can't understand the religion and you're trying to find your way around, you fall back on what you know best. You start pushing what you can understand the easiest. The second year I had one particular project with

24 farmers, each with an acre of land. They grew the latest variety of rice (so new that it was unnamed), using substantial amounts of chemical fertilizer and pesticides. This was the first time these farmers had used irrigation in the dry season and I wanted to start off on the right foot. The next year, none of the farmers grew rice in the dry season. They explained that not only was it uneconomical, it was propagating insect pests all year round and it creating more problems in the rainy season.

The first three years I struggled with situations like that and most of them were failures. None of the projects tried to build on what was there. With regard to pesticides, you could talk until you were blue in the face about wearing safety equipment but, in the end, people don't protect themselves. It costs too much or it's too hot. One of the village farmers died that year because the Experimental Station gave him Temik for a demonstration plot of rice. He wasn't told to wear gloves when he spread it through the fields.

One day the Bayer people came through with their slide show and brought out their stuff. After it was all over, the farmers were very quiet, so I asked whether the stuff was very dangerous. "No, no, no, the stuff isn't very dangerous at all", was the reply. Everyone was quiet because three people had died from using that pesticide the same year. The way the farmers deal with pesticides is that they get someone who has no money and nothing to do and he volunteers to do all the spraying. He has his bottle of atrophine, a hypodermic and a little pouch and he goes out and sprays. Whenever he starts getting the shakes from the organophosphates, he just shoots himself up with atrophine. That's the way they solved the pesticide problem in the village that I worked.

For the first four or five years, I had no idea how to deal with this or where to go. Then I became a bureaucrat for a while and didn't have to think about these things. In the sixth year, something happened. I was visiting in a province and saw some farmers who were raising fish in their paddy fields along with rice. This is unusual because where pesticides and fertilizers are used it's very difficult to grow anything else. You are killing off the organisms which would support the life of another. As it turned out, the fish actually replaced many of the inputs, controlling insects so they didn't have to spray and giving fertilizer through the whole growing season.

There were several farmers in the area just starting this, so I held a two-day workshop for about 30 farmers. These people, who didn't know about each other, were very excited about exchanging ideas and information. I helped build a strong extension program that took this information into other villages. CUSO people were brought in to do on-farm research, living on the farms, trying to find out why these systems worked and to see if they could be improved.

Finally, I felt I was working in the right direction. I was learning what the traditional ways were, what could work well and that I must work with the farmers as much as possible. These were not mechanical systems - these were natural systems. The way hogs are raised here, in pens, is not really farming any more. It's like a factory. The climate, the food, everything is controlled to the Nth degree. That's where the scientists and universities really come to the fore because they can study all those factors because they can be controlled. But in an actual situation, in a field, you can control only very few of those factors. In fact, you're lucky if you can control one of them. So these researchers developed a system of research methodology where instead of controlling all factors except one (the normal research method), only one factor was controlled. This was the only way research could be done in the field.

From its beginning of farmers growing fish in their paddies, several other needs arose. For instance, if you grew vegetables around the paddies, how would you control insects? So they started to look at botanical pesticides. Not the ones that are used here, such as rotenone, but the 'soft' botanicals that work by inhibiting insects from feeding, or repelling them by smell, or by affecting their metamorphosis. This led to three Canadian volunteers working on bio-control and predator control programs. Scientists are also now working on testing the botanicals, focussing on on-farm testing. First try to find out what works, then try to understand how it's working later on.

An appropriate technology program involving simple tools for digging also came out of this. They had well-drilling rigs which could be built for \$200 and go down 30-40 metres. Green manure and tree-intercropping programs were also established. In North America when we think of green manure, we think of plowing land in the spring, broadcasting the green manure, let it grow a while and then plowing it under. The farmers where I worked kept saying it was too much trouble - there was no way the buffaloes could handle it. It was in testing a new tropical legume that produced 190 kg of N/hectare that the farmers helped find a workable system.

In the first year, the legume is planted with the first rains, in a little corner. After the rice is transplanted, the legumes are transplanted out at wide spacing as an intercrop. It is a prolific seeder and as the farmers walked through harvesting the rice, the seeds are tramped into the mud. The next year, when the first heavy-rains come, it germinates itself. You let it grow, but just before it's plowed under (the first plowing) you pull out the best looking plants and stick them in a corner. After you plant the rice, you plant the legumes, just as you did the first year. It is so much simpler. There is none of this having to harvest plants, saving seeds, worrying about insects eating them - a simple system that works well within their traditional methods. It was the farmers' own ideas that

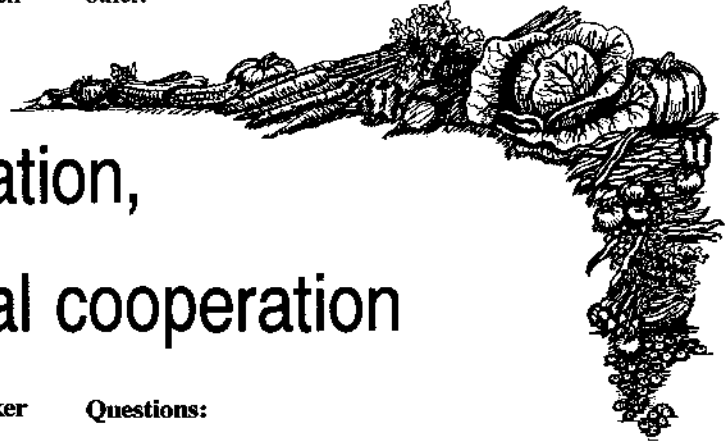
helped evolve a very simple green manure system that regenerates naturally with a little help from the farmer.

The key in developing countries is to start with a native system and develop ways to improve it. That's the only way to go. If you change all at once to a Western system, the farmers just can't compete with the agri-business concerns - all you can be is a contract person. There isn't much money, or future, in contract farming.

These systems must be based on local resources as much as possible. People there know plants - their knowledge of nature is much more than farmers here. Too often

non-traditional farmers know machinery and numbers best and have forgotten a lot of the old lore. Farmers in developing countries have not forgotten that lore, so they can identify 500-1,000 plants in the field and know what's good for what and where specific plants grow.

There is a role for extension officers in this time of change. It is important to bring farmers and scientists together so that these people at opposite ends are thinking and understanding each other better and can help each other.



Workshop on certification, transition and regional cooperation

Summary by Stu Fleischhaker

A history of certification: Dave Reibling

Processing began in 1975 - the consumer wanted a guarantee so certification was begun. Living Farms in Minnesota was an early certifier. Dave fashioned Oak Manor's program after that one, striving to involve the farmers. Certification was run as an in-house operation. The hope was that the process would mature to go beyond the in-house level. Dave believes certification should be farmer-run. OCIA started in 1984 in Vermont and held its first annual meeting in December of that year. In 1985, OCIA-Ontario was started. Seventeen farms were certified in 1986, 50 in 1987 and 80 in 1988.

There is a problem getting new producers to understand standards. An orchardist lost his certification because a salesman gave him misleading information about a product's use in a certification program. We need to take the time to educate farmers coming into a certification program. A good inspector is important.

OCIA-Ontario has an ongoing revenue problem, in particular how to hire someone to deal with all the paperwork. (In Dave's modesty, he neglects to tell us how much he contributed to North American certification from 1975 until 1984. His in-house certification, his attempts to expand the process outside Oak Manor (for instance, the Canadian Organic Certification Association, now inactive). Dave has also been active in getting OFPANA off the ground in an attempt to develop comprehensive organic certification standards for North America. And he has continued to be at the forefront of North American organic movements.

Questions:

(Unidentified): Do you think it's necessary to charge a premium for organic foods?

D. Reibling: We're asking for a premium because it's a quality product. We can sell a quality product for what it's worth.

Jersey Prytyk: How about the social costs of non-organic foods? In North America we spend 14-17% of our income on food. Most of the world spends between 50-100% of their income for food. If anything, conventional food should be higher.

Rod MacRae: Any problems selling products internationally because of government regulations or differing certification programs?

D. Reibling: Not at this point.

Legitimate certification: Jim Gerritsen

Certification is the system of assurance by which bona fide organic food is marketed through commercial trade channels. Good systems create a level playing field for all players. It supports growers who are willing to abide by a set of public standards and weeds out those who are not. It protects consumers from ignorant or intentional fraud. The goal of certification is to bring food of the highest quality and organic integrity to the consumer. A good system has (1) a credible certification organization; (2) a comprehensive set of standards updated and refined over time; (3) recorded production history spanning at least 3

years; (4) an audit trailing system to follow all inputs in producing crop and follows a product through trade channels; and (5) third-party agent who both verifies compliance with standards and helps farmers iron out the production process.

Two critical aspects for a good certification system are that a farmer should own the seal and there should be no financial dealings within a certification organization. This might undermine the certification process.

Topics of commercial threats to organic agriculture:

- (1) the trader owning the seal - this is unfair to the grower. The farmer can only sell to the owner of the seal.
- (2) residue testing as a substitute for certification (ex. Nutri-Clean in California). All pesticides cannot or will not be tested for. There are over 4,000 pesticides used in North America today. Residue testing is not known for its accuracy. It is also not connected with stewardship of the land, fundamental to good farming.
- (3) low spray produce - how much spray is 'low spray'? For example, low spray apples are sprayed 7 times instead of 12 times. This undermines the organic concept.
- (4) organic (non-certified) - this has no place in this industry today. Perhaps it did 10 years ago, but not today.

Co-operative marketing: Keith Russell

I'm also going through a change to the organic foods philosophy. The evidence points to this not being just a fad. It may be the wave of the future. Environmental concerns have been leading to a demand for organic foods. In the Maritimes, organic production is in the early stages of development with small producers supplying a local market. If 25% of consumers want organic foods by 2000, it represents quite a challenge. The opportunity exists for growers to take control of the organic food distribution system, rather than leaving it to get-rich quick entrepreneurs. The marketing function takes a fair amount of time per grower and as growers expand their operations, marketing may take up too much time. The biggest market is going to be the chain grocery stores who wish to deal with only a few suppliers in order to obtain a consistent supply. A marketing structure must be established to meet their needs.

A possible scenario: producers group themselves into local growers co-ops to market their products. In order to prevent the chains from playing one co-op against the other, a central co-op may be necessary. One of the objectives of the Co-op Atlantic Agriculture and Marketing Division is to assist producers groups on request to establish co-op marketing groups. During the next year, we hope to do a

potato test market to determine, among other things, the size of consumer demand and price levels.

Problems in making the transition: Conrad Toner

First a bit of history of our farm. Before 1969, it was a mixed farming operation using on-farm manure for fertility. When Claude and I took over the farm, we needed to specialize - this was recommended by the Department of Agriculture. We started using heavier equipment, we needed larger fields so we removed line fences and stopped rotating on the larger fields and began using more chemicals. The Dept. of Agriculture told us we had to get much bigger. But a lot of farmers were forced to leave the land, as we took over our neighbour's farms. Farm Credit said we had to set up 'viable farms', which meant larger more specialized farms. They wouldn't lend \$25,000, but wanted to loan \$250,000 to create a 'viable farm unit'.

Potato production is specialized in two New Brunswick counties; hog production in the Edmundston area; and poultry production in southern N.B. We have become so specialized that it's hard to get hold of the manure to bring back to our farms. Because the land was left to us in good shape, we were able to get away with poor farming practices for a few years. But we soon began to notice problems, for example in our storage of potatoes. The Dept. of Agriculture advisers had led us in the wrong direction! The banks, Farm Credit, and chemical companies were all leading us in the wrong direction. Over the last couple of years, we have started growing some organic potatoes. We will be looking to those who have been doing this for a number of years for our direction this time.

Questions:

Peter Vido: I don't wish to attack the certification process, but I feel a need to address something to complement the direction certification is taking us. I have always liked the term 'Sustainable' rather than organic, because organic doesn't necessarily mean sustainable. To change agriculture, we need to change the culture as well. To change social awareness, 2% of the people farming is not sustainable, when 98% don't know about how to produce food. We need to get more people directly involved with the environment. The potential exists to involve these people because they're interested in healthy food. In Japan, consumers are encouraged to participate with the farmers in the growing of their food. There is no need there for certification. Perhaps some of the energy we put into certification should be redirected to this kind of social change. There are examples in Fredericton of the Harvest Share Co-op that Jeff Kennett is doing. Another aspect that bothers me is that if I'm certified organic, I can send my food anywhere on a truck in a non-sustainable way and

bring organic fertilizer from California on another truck. We can be producing our food more locally - a much more sustainable way. Stuart Hill has spoken at a number of conferences I've attended about moving towards sustainability but people are more concerned about marketing.

Jim Gerritsen: We all feel that's how we'd like to see things be but how do you put that trust into certification standards? You do the best you can. We need to make sure we aren't just producing organic food to the letter and have lost the spirit. The spirit is really important. As a practical basis, certification helps farmers stay on the land.

Unidentified: When only 2% of the people produce food, thank god there are only 2% of the people polluting the environment. 70% of the people have home gardens. 70% of the people are more concerned about the environment than about employment.

David Ling: Keith, you're not going to buy any potatoes this year?

Keith Russell: We tried to find OCIA certified potatoes but were unable. We're planning to find some for 1989.

David Ling: We had two producers on the Island, though not OCIA. I thought you mentioned you would buy them if they were chemical free?

Keith Russell: They were not OCIA registered and I had to have OCIA registered.

Susan Tyler: Harvest Share Co-op in Fredericton was very successful for one year and that's how we start with something like that. Peter's right, people need to get their hands dirty and feed themselves. On the other hand, we all still live in this world we're trying to change and we are trying to change it. We have to have a way to make a living while we help change things.

Unidentified: This is the first farmers meeting in 20 years I've really enjoyed! We are all moving in the same direction - you can talk about anything. I even bought a book called the 'Soul of the Soil'.

Unidentified: Is the biggest obstacle in the transition process? In the field, or government programs or regulations?

Conrad Toner: The major problem is getting our land certified. And hopefully we can still use our own machinery.

Jim Gerritsen: Regarding using machinery in both organic and conventional agriculture: the standard is to ensure the organic integrity of the crop coming off the ground and in storage. We can't jeopardize our reputation.

Unidentified: I'm uneasy about Keith and Conrad's presentations. I'm worried about the move to bigness. What I appreciate is knowing who my food is bought by.

I know their names. Couldn't you go back to the roots of your co-op when you knew each other's name. If you could bring Co-op Atlantic back to that, it'd be great.

Keith Russell: We can't expect Co-op Atlantic to meet everyone's needs and vision. I remember also when the situation you mentioned existed. It wouldn't have survived in that form in today's world. By the late 1930's, it was obvious that something bigger and more sophisticated would have to evolve and of course you lose some of the more personal aspect. In order for co-ops to maintain themselves, they have to operate in today's world. We'd like to change the world, but we can't change it all, we have to change our small part as we go along. How quickly will this organic market grow? It could grow very quickly. If you can continue to operate in that way, fine. I'm only suggesting that as supply and demand grows, more sophisticated structures need to evolve to market the products. This is only one scenario. If you don't do something, others will. Someone will be out to make some money. If you want the control of your product, you need to act quickly. I think we can still preserve some of the human values.

Karen Davidge: Look around you! How many are still here? When it comes down to marketing, the producer hates that word. As president of the N.B. Farm Markets Association, I represent commodity groups across the province. Those groups are in disarray. They started out with the same philosophies as have been expressed here. I'm beginning to hear rumblings that I've heard elsewhere. "I like to grow my product, I like to deal with the public, but I don't like marketing." Our potato industry is a mess. They forgot about the marketing.

Unidentified: As you grow larger, you become more remote from the people you deal with. As you grow larger, your founding philosophy fades away. We need to address that issue. What will happen to certification when you have more than 100 growers? You need to address the problem of scale.

Jeff Kennett: A medium between the industry and a one-to-one basis. MOFGA and its Fair and newspaper is doing a good job at that.

Unidentified: No message in North American culture tells us you're too big. In organic farming you cannot grow that way. It has to be in the image of Schumacher. We have an opportunity to step back from the industrial model.

A standing ovation was given to David Patriquin and David Cozac for their tremendous energy to create and run this conference.

David Patriquin thanked all the sponsors and especially the organic farmers - a key to the conference's success.

Organic and low-herbicide approaches for weed management



by Matt Liebman, Ph.D.

(Dr. Liebman is Sustainable Agriculture Coordinator in the Department of Plant and Soil Sciences, University of Maine at Orono. Portions of this paper are excerpted from: M. Liebman and R. Jancke (forthcoming). Sustainable weed management practices. C. Francis, L. King, and C. Flora (eds.), Sustainable Agriculture in Temperate Zones. John Wiley and Sons, New York. Thanks to Dr. Jancke for permission to use this material. This paper is contribution #1343 of the Maine Agricultural Experiment Station.)

Over the past several decades, weed management in North American agriculture has become heavily reliant on herbicide applications, particularly as more farmers have shifted towards reduced or minimum tillage systems (Koskinen and McWhorter 1986). Of the more than \$6.2 billion that U.S. farmers spend annually to control weeds on crop and pasture land, an estimated \$3.6 billion is spent for nearly 200 million kilograms of herbicides (Shaw 1982; Pimentel and Levitan 1986). Reliance on herbicides has been affected by increases in farm size and decreases in crop diversity within farms (USDA 1973); these factors make timely cultivation more difficult. A large number of farmers and researchers currently view herbicides as key ingredients for effective weed management and profitable farming, even when non-herbicide tactics such as cultivation and crop competition are brought to bear against weeds in an integrated manner (Baldwin and Santelmann 1980; Hill 1982; McWhorter and Shaw 1982; Shaw 1982; Aldrich 1984).

Despite the current emphasis on herbicides in North American agriculture, several factors have recently led to a reappraisal of their use. First, discovery of herbicides in drinking water supplies has created concerns among farmers and non-farmers over unintended environmental and human health effects (Hallberg 1986; Knudson 1986; Anonymous 1987). Second, consumer interest in organic and residue-free food has increased rapidly (Franco 1988). Third, financial hardships currently facing many farmers have led to considerations that farm profitability might be increased

by reducing use of purchased inputs (such as herbicides) if effective, but less costly, alternative production techniques were available (Papendick 1987; Francis and King 1988). Finally, farmers and researchers have become increasingly aware of full-time farms that operate profitably with little or no use of herbicides (USDA 1980; Lockeretz et al. 1981; Culik et al. 1983; Thompson and Thompson 1984; Sinclair 1985, 1987a, 1987b).

These factors suggest that opportunities now exist within the conventional farm sector to develop and promote weed management strategies that minimize or eliminate the need for chemical interventions, while maintaining farm profitability. Efficient and effective non-herbicide weed management strategies are also needed by organic farmers if their operations are to remain economically and socially viable, and free of excessive drudgery. Maine organic farmers interviewed in Vail's (1978) study identified weed control as their most important production problem. Vail (1978) linked the weed control problems of these farmers to a lack of effective and accessible weed control equipment. Weed control was also the production problem most frequently cited in a poll of New York organic farmers (Baker and Smith 1987). Weed control on these farms involved a considerable amount of hand labor (Baker and Smith 1987).

Research results and experiences of farmers indicate the following practices can serve as important components of organic and low-herbicide weed management strategies in the Maritime provinces and New England states. It is important to realize that the appropriateness of these methods will vary according to soil conditions, climate, crop and weed species and other factors. Moreover, to be effective any of these methods will require experience, fine-tuning, commitment to "getting the system to work," attention to appropriate timing and some knowledge of the dynamic relationships between crops, weeds and their environment.

It must also be recognized that no single method will solve weed problems. Mixed strategies, which employ a variety of weed management methods, will prove more successful.

Crop rotation establishes the framework for non-herbicide weed management. Crop rotation will not eliminate interference from weeds, but it can limit build-up of weed populations and prevent major shifts in weed species composition. Crops tend to be affected by particular weed species that possess similar growth habits and thrive under the same cultural conditions as the crop species (Summer 1982). By growing sequences of crops that differ in planting and maturation dates, competitive characteristics and soil management requirements, growth and reproduction of a given weed species can be disrupted. The effects of rotations on weed population dynamics are demonstrated by data from experiments conducted by Forcella and Lindstrom (1988) in Minnesota comparing continuous corn with corn-soybean rotation systems. With ridge tillage, late season counts of weed seedlings/m² were 38 in continuous corn, 5 in corn grown in the rotation, and 1 in soybean grown in the rotation. With conventional tillage, weed seedling densities in the respective crops and cropping systems were 9, 3 and 1.5 seedlings/m².

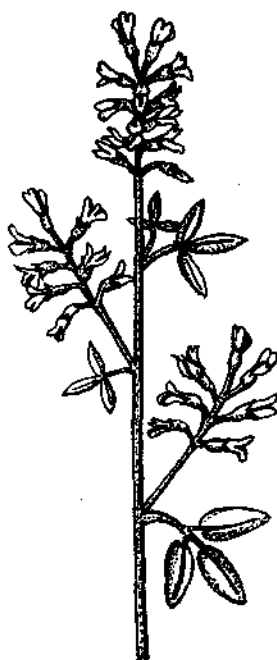
From an ecological perspective, rotation sequences that include clean-cultivated annual row crops (e.g. maize, brassicas), densely planted and highly competitive grain crops (e.g. barley, rye, wheat) and mowed and un-tilled perennial crops (e.g. alfalfa and forage grass-clover mixtures) are desirable because they create an unstable and often unfavorable environment for survival and reproduction of annual and perennial weeds. Further improvements in weed management may be gained by including crops within rotation sequences that have early spring, late spring, mid-summer, and fall planting dates, thus challenging weed populations that have different optimal seasons for germination, growth, and development. Densely planted, rapidly growing, short duration "smother crops" (e.g. buckwheat, sorghum-sudangrass, Japanese millet) can also be considered as weed management options within crop rotation sequences. Crops with mid-summer maturation times (e.g. lettuce, peas, winter wheat, rye, crimson clover as a spring-planted green manure) offer opportunities for effective harrowing of perennial weeds before planting late season crops (e.g. brassicas, over-wintered spinach, winter cover crops). Repeated combinations of short-duration smother crops and harrowing are used on at least one Maine farm to rapidly reduce quackgrass infestation of newly plowed sod.

Intercropping involves growing two or more crops in mixture. The associated crops may be planted simultaneously or on different dates. Intercrops can be more effective in suppressing weeds than monocultures because of increased crop density and/or increased crop competition. Undersowing cereals with clover is effective in suppressing growth of quackgrass (Dyke and Barnard 1976). Clovers

can also be seeded into maize or vegetables after these crops have been growing for several weeks, without any detrimental effect on crop yields (Vrabel et al. 1980; Scott et al. 1987), but with potential value for late season weed control. Intercropping field peas with barley can provide high levels of protein production (Shannon and Lawson 1975; Johnston et al. 1978) while increasing competitive pressure on weeds (Mohler and Liebman 1987).

Allelopathic cover crops suppress weed germination and growth through the release of chemical compounds. These toxins can be very effective against small-seeded annual broadleaf weeds (Barnes and Putnam 1983, 1986; Liebl and Worsham 1983; Putnam and DeFrank 1983; Shilling et al. 1985, 1986; Barnes et al. 1987). Establishment and early growth of small-seeded crops like radish and lettuce can be

inhibited, but large-seeded crops such as bean, maize, peas and cucumber appear to be immune (Putnam et al. 1983). Barley, rye, oats, sorghum, sorghum-sudangrass, and sunflower all have potential as allelopathic smother crops. In addition to their value as weed-suppressive green manures, allelopathic cover crops can serve as mulches in organic or no-till systems. Possibilities include spring peas or fava beans sown into residues of fall-planted/winter-killed oats; dry beans or cucurbits sown into rye that is killed by shredding at flowering stages; mulching of fruit trees with plant residues produced in alleyways.



Based on recent experiences in Maine with allelopathic cover crops, two potential problems with this method should be noted. First, mulches grown to maturity can immobilize nutrients, particularly nitrogen. This might be resolved by including a rapidly decomposing legume in mixture with the allelopathic crop. We are currently screening Austrian winter pea/rye mixtures; hairy vetch is another possibility. Second, allelopathic mulches will not adequately control perennial weeds. This might be resolved with the use of a heavy residue inter-row cultivator.

Crop varieties can differ in their ability to suppress and tolerate weeds (Zimdahl 1980; Minotti and Sweet 1981; Walker and Buchanan 1982). These differences have generally been attributed to differential ability to compete for light, water and nutrients, but allelopathic crop-weed

interactions might also be involved (Putnam and Duke 1978; Minotti and Sweet 1981). Weed-suppressive crop varieties tend to be earlier in emergence, more rapid in early growth, taller and leafier than other varieties. Crops in which superior weed suppressive varieties have been noted include wheat, sorghum, potato, soybean, field pea, dry bean and tomato (Guncelyi et al. 1969; Minotti and Sweet 1981; Challaiah et al. 1986; Liebman 1986). Crop breeding programs have placed relatively little emphasis on the development of superior varieties for growth under weed-infested conditions. However, successes in breeding crops for ability to suppress or tolerate weeds would be a useful research direction with rapidly accessible benefits for farmers.

Increased crop density and narrow row spacing can improve weed control and improve crop yields under weedy conditions. This has been noted for a variety of crops including soybean, barley, wheat, flax, sorghum, snap beans, maize, dry bean, field pea, tomato and beet (Zimdahl 1980; Minotti and Sweet 1981; Walker and Buchanan 1982; Teasdale and Frank 1983; Mohler and Liebman 1987). Two points relevant to use of this approach should be noted. First, increases in canopy cover resulting from denser crops may change microenvironmental factors and consequently disease pressures. Second, narrow crop rows require much greater skill to cultivate mechanically.

Soil fertility management can have a major influence on crop-weed interactions. Crops need sufficient nutrients to provide acceptable yields, but many conventional farmers routinely apply fertilizers in excess of crop demands (Hallberg 1986; Papendick et al. 1987). This is particularly remarkable in light of the fact that many weeds are more responsive to applied fertilizers, at least synthetic fertilizers, than are crops (Alkamper 1976). For example, increasing rates of nitrogen fertilizer were found to decrease spring wheat yields and increase reproductive output of wild oats when these species were grown together (Carlson and Hill 1985). The weed was so responsive to soil fertility conditions that nitrogen increased wheat yields only when weed density was below 1.6% of the total (crop + weed) density (Carlson and Hill 1985). Thus, excessive use of fertilizers may promote weed problems if adequate weed control is not used.

Differential response to soil fertility conditions between crops and weeds can be an important component of weed management through rotations. For example, legumes that use atmospheric nitrogen can avoid competition with weeds for soil nitrogen and can be highly competitive against weeds for light (Liebman 1986). When a legume crop is grown with little or no nitrogen fertilizer, after a non-legume crop that has depleted residual soil nitrogen, weed populations that are responsive to nitrogen fertilizer can be

most effectively controlled with crop competition and other control measures.

In certain geographic areas, soil tarping with plastic mulch can dramatically reduce negative effects of weeds on crops (Egley 1983; Standifer et al. 1984; Stapleton and DeVay 1986). Soil must be moist and heated by the sun for several weeks. Seeds then germinate and die, or lose their viability. This method has been researched most intensively in hot climate areas (e.g. California, Louisiana), but it appears to have application at least as far north as Connecticut (DeGregorio and Ashley 1988). Researchers at the University of New Hampshire are currently experimenting with applying plastic mulch in the fall to induce germination of weeds that would otherwise lie dormant until spring; the emerged seedlings are then killed by winter freezing (O. Wells, personal communication).

Pathogens and insect pests of certain weed species have been developed as commercial products and coordinated biological control programs. The organisms employed have a restricted host range and can be quite effective in reducing weed populations. Notable examples include control of northern jointvetch, a weed of U.S. rice fields, by the fungal pathogen Colletotrichum gloeosporoides f. sp. aeschynomene (marketed as Collego™) (Charudattan 1985); and control of musk thistle by two seed-feeding weevil species that were cultured and released in U.S. rangeland (Aldrich 1984). While these approaches may offer relatively limited help to northern New England and Canadian Maritime farmers in the near future, they may be a key means of controlling difficult weeds such as Canada thistle. Biological control approaches deserve more research attention and budget dollars, given the long-term benefits and decreased environmental contamination that can be achieved.

Careful management of pastures through rotational intensive grazing can have important effects on pasture species composition and productivity and can be a key component of increasing the profitability of livestock production enterprises (Murphy 1987). Short duration, high intensity grazing of immature pasture plants, followed by suitable recovery periods and regrazing can promote an increase in the relative abundance of nutritious legume and grass species and a decrease of noxious weeds. Pasture grasses and legumes are well-adapted to repeated grazing, while many weed species are somewhat palatable to livestock when immature and generally poorly adapted to repeated grazing. Murphy (1987) contends that the weakening of weed species by rotational intensive grazing is exacerbated by increased competition from legumes and grasses, as the latter species begin to flourish. Removal of weeds from intensively managed pastures can be hastened by mowing, or for particularly recalcitrant species, spot application of systemic herbicides.

One particularly attractive aspect of using intensive pasture management as a primary method of producing forage materials is that it greatly decreases or eliminates the need for weed control in maize or other crops grown for silage. One very profitable full-time dairy farm in central Maine produces high milk yields from intensively managed pastures, hay and a small amount of purchased concentrate feeds; no maize is grown on the farm and no silage or haylage is made.

Because goats will preferentially eat a large amount of brush relative to herbaceous species, they can be extremely effective in eliminating brush from pastures and are virtually non-competitive with cattle or sheep for available forage when sufficient brush is available (Scifres 1981; Wood 1987). Wood (1987) observed almost total elimination of brush species and a large increase in grass production with two years of grazing with goats on brushy Vermont pastureland. He suggested that (1) mixed grazing with goats and cattle or goats and sheep should be the most efficient step in restoring brush-infested land for livestock production; (2) to prevent competitive foraging, the number of goats should be gradually reduced as the brush declines; and (3) maintaining a few goats with cattle and sheep could protect renovated pasture from reinvasion by brush and some weedy forbs.

In the Pacific northwest, weeder geese have been used in orchards, vineyards and fields of garlic, tomatoes, cucumbers and mint (McLeod and Swezey 1980). Use of weeder geese has also been reported for strawberry and potato fields (Anonymous 1981). Crops must be of sufficient size so as not to be eaten by the birds and stocking rate should be 5 or 6 birds per hectare. Fencing, protection from predators, adequate water and a small amount of supplemental grain are necessary for survival (Anonymous 1981).

Hogs have been used for control of perennial weeds between cropping seasons in Washington. McLeod and Swezey (1980) noted that when hogs were fenced into fields at a rate of 25 animals per hectare, they removed roots of bindweed to a depth of more than 75 cm.

Well-timed cultivation to uproot, bury, or cut off weeds is one of the most important and effective forms of weed control (Kepner et al. 1978). On a per acre basis, cultivation operations can cost an estimated \$1.74 to \$6.89 (U.S. currency) (Johnson 1985; Roeth and Selley 1987). In contrast, use of pre- and post-emergence herbicides may cost \$10 to \$20 (U.S. currency) for a single chemical, and more than one chemical is often needed if a broad spectrum of weed species is present in the field (Johnson 1985; Micka 1985; Roeth and Selley 1987).

The most serious problem with cultivation can be

inadequate control of weeds in the crop row. Banding of herbicides over the crop row can be used with inter-row cultivation as a means of substantially reducing herbicide use. However, rotary hoes and spike tooth harrows can be effective for control of newly germinated, small-seeded weeds in crop rows, if the soil surface is mellow and dry during the operation and rain holds off for a day or two (Roeth and Selley 1987). These implements can be run lightly over rows of unemerged or newly emerged large-seeded crops planted an inch or two deep.

While the crop is small, shields can be used for crop protection when inter-row weeds are removed with cultivating implements. Shields can be used to allow cultivation of young crops at quite narrow row spacings. Once the crop is well-established, a variety of cultivation implements are available to throw dirt into crop rows and bury small weeds, including "spiders", torsion weeders and hoe-ridgers (Terpstra and Kouwenhoven 1981). These may be more or less effective, depending on timing, weather conditions and crop and weed species present.

Farmers producing small grains and other crops that are difficult to cultivate can often improve weed control by delaying planting after initial seedbed preparation, allowing a cohort of weeds to germinate and emerge and then cultivating immediately before sowing the crop (Wookey 1985). This method is sometimes termed the false seed bed technique.

Listing is a specialized tillage system in which crops are planted into furrows formed at the time of planting. Early cultivations remove weeds from between crop rows, but limit movement of soil back toward young crops within the furrows. After crops are established, later cultivations throw dirt into the furrows, burying small weeds. One Maine farmer uses this method to control weeds in dry beans.

Ridge tillage systems involve construction of soil ridges, truncating the ridge tops immediately before sowing crops such as maize, and excavating soil from furrow areas and depositing it on ridge crests after crops are well established. Ridge tillage not only provides soil conservation benefits, but also removes an appreciable proportion of weed seeds from the crop row at the time of planting (Forcella and Lindstrom (1988). For supplemental weed control, ridge tops can be rotary hoed after planting, or treated with band applications of herbicides.

Geier and Vogtmann (1987) tested the weed control value of a multiple row brush hoe on commercial and research farms in Germany. The PTO driven implement is rear- or mid-mounted on a tractor. Flexible brushes rotate around a shaft mounted parallel to the ground and penetrate the soil to a depth of 5 cm. Width of the brushes between

crop rows can be varied, and crops are protected in shielding tunnels. Reported advantages of the tool include the ability to work very early and close to the crop row, and better kill of weeds under relatively wet conditions. Bristles of the brushes not only uproot weeds, but also wipe soil from the roots, permitting rapid drying by sun and wind.

Flame weeding has been used to control agricultural weeds in North America and Europe to a minor extent for decades (Kepner et al. 1978; Daar 1987). Ott (cited in Daar 1987) recommended preparing seed beds for carrots, irrigating them 10 days before sowing the crop and allowing weeds to germinate. Carrots are then drilled into the seed bed. Shortly before the carrots seedlings emerge, the seedbed is scorched with a flamer; flaming usually occurs 5 or 6 days after carrots are sown. When this method was used on commercial French farms, weed populations were reduced 50% to 80%, as compared to unflamed controls. Weeds between crop rows that survive flaming can be

removed by subsequent cultivation operations; one rapid hand weed may be required to eliminate weeds within crop rows that escape flaming and cultivation. Ott (cited in Daar 1987) also recommended use of flame weeding on well-established onion plants. When used at the crop's 4-leaf stage, one flame weeding gave yields only 4% lower than those obtained by hand weeding. Flaming before the 4-leaf stage damaged the crop and gave lower yields. Combination of inter-row cultivation and within-row flaming can be very effective for weed control in maize, when flaming is done at the "match" stage (maize 1-2 inches tall) (Geier and Vogtmann 1987).

These non-herbicide approaches for weed management are not proposed as cures. Rather, they are potential components of integrated farming systems. Dialogue between farmers and researchers, careful observation and continued experimentation can improve these methods and provide new and better ones.

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Focal questions and responses

(including comments received after the workshops)

#1 What organizations now certify organic produce, how many farms, what is the rough acreage in different crops and number of livestock in each region?

#2 Are there programs in each province/state that cater to specifically to organic farmers? (e.g. subsidization during transition)?

R. Jannasch, N. Kungl: There are no programs in N.S.

#3 Institutional research?

#4 What commercial products are produced in the bioregion that are of particular interest to organic farmers (e.g. fish fertilizer, crab meal, etc)?

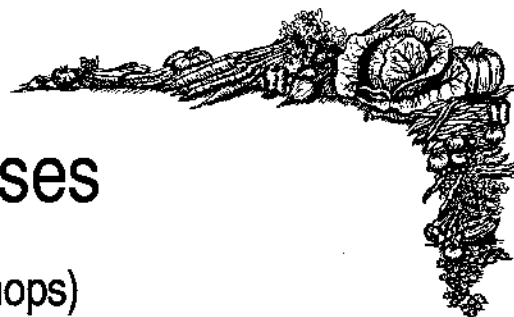
S. Fleischhaker: W.E. Acres in Cap Pelé, N.B. produces

Crab Meal, Shrimp Meal and Fish Scale Meal.

R. Jannasch, N. Kungl: Raw fish waste, especially through the herring-roe fishery in late July, early August; Dr. Roger Blatt, Department of Agriculture and Marketing, Kentville, did fertilization tests with a by-product of the salt fish industry and has the address of the supplier.

#5 What is the actual or potential market within the region for organic produce? How much of it is being satisfied regionally? Export markets?

R. Jannasch, N. Kungl: The demand is bigger than supply. Market needs to be approached through conventional channels (supermarkets!). An organized marketing strategy is required.



#6 What are the particular advantages for organic agriculture in each state/province?

P. Vido: For N.B. it is mainly comparatively low land prices so that a wise farmer can apply sustainable methods without undue pressure of high debts. Manure can often be obtained free for the hauling but this of course is an unfortunate fact, proving that many farmers do not realize its value. Thus the wise are benefiting due to ignorance of others - hopefully only a short-term condition. Sawdust is often free and can be composted along with highly-subsidized lime (which in the long run is also not truly sustainable, but may work for some in the meantime. In coastal regions, there are seaweeds and fish industry wastes (likely containing some undesirable chemicals) but I'm not too familiar with these opportunities.

R. Jannasch, N. Kungl: N.S. has some erosion problems, pesticide contamination, and consumers are requesting pesticide-free food.

#7 What winter cover crops/green manures have been found to work well in our bioregion?

P. Vido: Beside the standard winter cereals (we usually grow some spelt beside rye and wheat and like it very much), a good case can be made for late-planted oats, buckwheat or common annual vetches which will provide a lot of matter before being prevented from going to seed by the frost. In our area the first week in August or so will work well, even a bit earlier at times. Rye will definitely outdo all others in amount of matter and quick regrowth in the spring. In our rather colder than average region, a bit earlier than the standard recommended date (Sept. 5?) will be better in some years with a rather cool autumn. I've planted spelt as early as Aug. 5 and it worked very well.

#8 Which ones are winter hardy, not winter hardy? How does time of planting affect winter hardiness (e.g. in some regions if you plant vetch early enough to flower it won't overwinter, while later planting will result in overwintering)?

#9 What are some ways in which cover crops/green manures can be incorporated into existing cropping systems (e.g. so that the land is not taken out of 'useful' production)?

Discussion at Workshop:

One of the problems with potatoes is that they come off too late to put in a cover crop.

R. Samson: Experiments were done in P.E.I. where they seeded rye about 5 days before harvesting potatoes. Was anyone using this system? A researcher said it is mostly experimental at this time. A farmer from the Woodstock area said he was using it. He noted that the rye never came up where the wheels had gone, but if you disc or chisel it will and then you get a reasonably good stand.

M. Liebman: There is an intermediate solution to these

kinds of problems (difficult to get a cover crop on) and that is to strip crop....if a large field is all bare there is lots of erosion - put some cover strips in and it will be a lot less.

D. Reibling: When you are turning in green manures, you want to let them dry down a bit - turning them in fresh causes decomposition problems of some sort.

Comments returned after workshop:

P. Vido: I like to plow old hayfields as soon as the hay is off and if possible plant buckwheat immediately. It can be mowed by late August or very early September and winter cereals broadcast without further tillage. Very light discing or heavy rolling can follow. Usually I don't manage this so either oats or buckwheat can be planted later (as in #7 above) but the winter cereal will be omitted due to not enough time for proper growth. For such cover crops, not regrowing in the spring will not present the problem of subduing it like a good stand of winter rye sometimes does.

#10 Are recommendations on seeding rates/planting dates for cover crops needed? When is the best time to plant buckwheat if you want to harvest seed?

P. Vido: I think this varies a lot with the region and specific conditions - like fertility, quality of seedbed, the exactness of seeding depth, etc. and should be worked out individually. Some years we got no crop from rye planted Sept. 15 and others Sept. 24 was still early enough even for wheat and spelt. Buckwheat surely has a range of at least a month - June 1 to July 1, especially the old fashioned red straw variety. Japanese should be in by mid-June for us or we have trouble at harvest.

R. Jannasch, N. Kungl: In our region (Minas Shore) rye does not establish well enough if planted early Oct.; Sept. 20 seedings should be aimed for. In general, Ag. Canada and Dept. of Agriculture publications give a lot of useful information regarding varieties, soil management, seeding rates/dates.

#11 Who has experience with frost seeding regionally?

P. Vido: We have frost seeded for 3 past seasons, always to our satisfaction (alfalfa, trefoil, ladine and grasses). I like to frost seed into a stand of previously planted oats which are nice and dead by spring but still hold the soil over winter. But we have seeded into rye, wheat and spelt as well. The rye is definitely the most competitive with a lower quality forage stand resulting. We had strips of these 3 and frost seeded trefoil at the same time in early April by hand cyclone seeder. My wife operates it and it is faster than I would be with a team. It should be done in the early morning between daybreak and when the sun starts to melt the surface.

D. King: I have had good success with frost seeding cleared brush and woodland with grass-legume mixtures for use as pasture. I have both frost seeded early in the cycle before there is much native grass invasion and frost seeded white clover into established mixes of native grass stands.

P. Boswell: I'm not aware of any regional research on this method and really don't see its application for a traditional cover crop. However, as a method of rejuvenating pastures it has a potential, provided an open sward is available and pH and fertility requirements are met. The best way of incorporating a frost seeding system into a farm operation is by using a fertilizer spreader. An alternative is an A.T.V. with a small broadcast spreader, either mounted or towed. These methods would also work quite well for establishing fall cover crops.

#12 Experience with new legumes - Lupin, Fababeans, Tinga pea, Nitro alfalfa, others?

J.K. MacMillan: I was involved with a farmer and crop specialist in 1988 with lupins. There were two plots on different soil conditions. Preliminary results indicate a good yield with a protein content between 35 and 40%. My interest was in lupins for soil improvement. It would seem from the literature review I did and the field results this year that lupins could be a main crop in the future. More studies will be carried out in 1989.

P. Boswell: Sweet clover is not well-adapted to acid soil types and is not too often grown as a forage crop because of feed quality problems. Most work on sweet clover I've read has been done in the west or mid-west regions, where naturally deep soils occur. I would question the ability of sweet clover to extend a tap root much deeper than alfalfa (80 cm) in this region due to the fact that many soils in this region have compacted subsoils. Nitro alfalfa is an annual alfalfa which has been looked at here at the Research Station. Results have not been impressive when compared to red clover.



#13 Sweet clover: experience using it to replenish soil fertility: how long? Is there a volunteer weed problem after that? Does it improve potassium status?

P. Vido: We have used it for 8 years now, without much problem other than that it will sometimes catch up to or even take over short-strawed cereals, making harvesting difficult. Lately we plant it into oats/forage stand destined to be cut for hay about 7 weeks after planting and regrowth grazed or grazed on rotating basis from 4-5 weeks after planting (if not too wet). My hand would get tired if I was to write all of our experiences with it. It is a wonderful plant which will grow well (5-7 feet) even on pH 5.5 or lower (contrary to some information on it). It should be used much more than it is. It is easy to manage it without a volunteer weed problem here (not so in alfalfa seed

producing regions where the reputation comes from).

J.K. MacMillan: Among the deep-rooted crops I looked at for soil improvement characteristics plus other benefits, sweet clover is the one on which I have completed my studies and have published the results.

#14 What crops can be grown in the bioregion to replace supplemental feed for free-ranging hens in winter?

P. Vido: We do not need supplemental feeds from the store. We can grow oats, wheat, buckwheat, rye, barley, spelt, millet. If more protein is needed for laying there is flax, peas and common vetches. We can keep some good dual-purpose cows, which after they have already raised 2 calves that same season can be milked for hens. It will do wonders for their production. And how about looking into raising earthworms on a more commercial scale to compost manure and provide high quality feed for hens?

R. Jannasch, N. Kungl: Soybeans, hull-less oats, fababeans and peas.

#15 Which legumes need/do not need starter nitrogen?

P. Vido: What starter nitrogen do any of them need? Out of a bag? Do any?

D. Patriquin: The 'requirement' for starter N appears to be based largely on experience with soybean in N.A. Most soybean varieties do not begin fixing N until flowering. I think that is related to its evolution in climates where there is a warm wet season and cool dry season. Commonly, nitrate is high at the beginning of the wet (growing) season. However, in our climate, it is normal for

nitrate to be very low early in the season and to be released more and more as the soil warms up. The fababean is better suited to these conditions because it nodulates promptly after germinating and can support heavy vegetative growth by nitrogen fixation alone. Even so, I agree with Peter, most legumes can do without starter N and certainly should be selected in regimes without starter N.

#16 Any good milling wheat for N.B.?

P. Vido: I'd like to get my hands on some. We're not quite happy with the 'Max'. How about getting us to try some 'Lake', an old variety for the west. For quality, we prefer spelt (old relative of wheat) except that it needs to be hulled.

S. Fleischhaker: S.A.V.E., in conjunction with Speerville Mill and David Walker, grain specialist with the N.B. Dept. of Agriculture, will be doing test plots with various milling wheats this spring to determine what varieties will perform under organic conditions. We are very disappointed with 'Max', which is the current wheat of choice conventionally.

I'm not even happy with 'Max' for conventional agriculture. Some possible varieties to try are Max, Neepawa, Katepwa, Spelt and possibly some other western wheats like Columbus. Any other suggestions?

R. Henry: A few comments on my personal experience on growing milling wheat on P.E.I. I have grown five different varieties of milling wheat. Winter varieties - Monopol (very easily winter killed, makes excellent flour, doesn't require the intensive management crops people suggest); Haleychanke 17 (unregistered Russian variety, high bran content, relatively good winter hardiness, quite a difference in traits from plant to plant. Haven't milled any yet). Spring varieties - Selkirk (high yield, good weed competitiveness, flour doesn't rise as well as Neepawa); Neepawa (lower yield, produces excellent flour, can make everything from pasta to muffins to whole wheat bread); Ketapawa (I have not grown this, daughter of Neepawa, higher yielding and more disease resistant than the parent, flour similar in quality to parent, #1 wheat in West now); Max (I have not grown this, used with high N and fungicide inputs but Malcolm MacDonald grows it very successfully under low input system, makes excellent bread, sow at lower seeding rates, use no extra N or fungicide, quite high yielding).

#17 Is anyone using old cereal varieties that are otherwise unavailable now? What are their virtues?

P. Vido: Spelt - decent yields on poor land (lower fertility requirements), very good standability (no lodging), 15% protein (without hull), excellent feel when kneaded (due to gluten content?), long loose hull which animals (like horses) chew better than oats and like very much. Comes in spring and fall type. We have only the latter.

#18 Has anyone had success with winter barley or winter triticale in the bioregion?

P. Vido: Tried triticale once - planted very late, came rather thin so I planted oats into it. Some survived into harvest, maturing rather late. Trying some again, planted fall '88.

R. Henry: Winter triticale did not grow at all for me. Winter kill two years ago was 95% and we had virtually no winter kill on other grains that year.

R. Jannasch, N. Kungl: Previous experience on a chemical-oriented farm showed that winter barley (different varieties) is not winter hardy in N.S. climate.

#19 Is there place for the moldboard plough in organic farming in the bioregion?

Discussion at workshop: There is a lot of use of moldboard in the Maritimes, and it's one of the issues that come up regularly when farmers are converting. It was remarked that the plow has some negative aspects but as an implement for turning soil, it has its place. The problem is we misuse it a lot. Another said the same thing, it is the only way to

deal with heavy hat/clover crops that you are breaking up, turn it with moldboard, then chisel, etc.

Comments returned after workshop:

P. Vido: Yes, I think so, plus to me as a horse farmer it is rather indispensable. Like with sweet clover.

J.K. MacMillan: The only problem with the moldboard plough is the way it is used. On sod ground the moldboard plough will do a very good job and as well on stubble ground. I would not recommend it on fallow ground. One of the mistakes in using the plough is in trying to bury everything. To do this, most people lay the furrow flat which looks nice but it also buries fertility and organic matter. If the furrow is at a 45% angle this buried material could be mixed in the plow depth layer by discs or harrows. Using a moldboard plow on fallow land is like over-using a rototiller, it destroys soil structure and in general does more harm than good.

G. McCabe: I think there is a place for the moldboard plough especially if you are breaking up a sod field.

R. Jannasch, N. Kungl: Yes. (1) after sod, but our experience indicates that one or two trips with a disc, or one trip with a rototiller speeds up sod breakdown; the plow will then produce a sod-free seed bed. This is especially important at the headlands. (2) if you need a clean seedbed after corn.

#20 Is there a place for the chisel plough?

Discussion at workshop:

For small horse power tractors, some modifications of moldboard are possible (e.g. prong plow, looks like a moldboard share without the moldboard).

R. Samson: a lot of farmers in Ontario take the torch to part of the plow.

D. Reibling: cut half the moldboard off, then it doesn't turn the soil upside down, leave residue sticking up from bottom of furrow to the top, results in better water infiltration, aeration etc.

Comments returned after workshop:

P. Vido: Yes, we've used one for 12 years in combination with heavy disc and moldboard.

G. McCabe: The chisel plough has some good points but I think there are some people using them who are doing more harm than good.

R. Jannasch, N. Kungl: Yes, it is the tool for deep cultivation on our loamy sand.

#21 Does ridge-tilling work in this area?

#22 Tillage problems in heavy clay soil pastureland: how to create the perfect seedbed in heavy clay without plowing and soil compacting?

#23 Minimum or no-tillage practices: are they appropriate for organic farming?

P. Vido: Presently the two practices have still many kinks,

relying on chemicals and too heavy equipment to my liking but I'm interested. The permaculturalists have part of the answers but I still don't know where they get their grains. Fukuoka's theories sound nice but need major adapting to our bioregion, including a lot more people on the land. Wes Jackson's working on this one too and I like his approach.

#24 What are the keys to controlling Canada thistle?

P. Vido: Earthcare (excellent book) has a recipe, which I haven't really tried thoroughly.

D. Patriquin: High density of thistle in cultivated fields is a good indication of excess tillage, especially in moist soil - this will just multiply it. Some work done in the fifties showed that if you cultivate at just about the time of flowering, (when sugar reserves are at the lowest point), and then mow or cultivate at about 3 week intervals after that for about 5 cycles, this will knock it out. The trick is to let the plant run its sugar reserves down before cultivating or mowing, then it is at its weakest point. At Tunwath farm, the strategy we developed for controlling thistle in an all annual rotation (FABAS-OATS underseeded with clover-CLOVER -WINTER WHEAT) was to cut clover and plow in early June (when clover is at near maximum biomass and thistle is about to flower), then harrow at 3-week intervals until planting winter wheat in September. Of course, it would be better to have alfalfa hay in the rotation, as mowing combined with competition from alfalfa is probably the most effective control.

J.K. MacMillan: The best method to control most weeds is to prevent them going to seed. Dave Finnermore of our Department has been working with Canada Thistle and St. Johns Wort using different insects to prevent seed production.

#25 What are the keys to couch grass control?

Discussion at workshop:

D. Reibling: Quack grass likes winter cereals. It also likes to be buried and will remain dormant if plowed. He controls it with light tillage, uses chisel with sweeps on, cuts it off and that controls it well.

R. Samson: For couch it seems to be important to lower the nitrogen level in fall. Winter rye is very effective at this, also ryegrass sown in corn will suppress couch. It's the rhizomes that need competition, rye does that and consumes N.

J.K. MacMillan: Couch grass is supposed to be easy to control. Until it is about four inches high, it feeds on the root reserves which if pastured, mowed, pulled or whatever, the root reserves become depleted and the plant dies. Geese, especially white chinese and white emdens do a very good job of controlling grass in strawberries, potatoes and a number of other crops. I believe asparagus may have been one of the other crops.

Comments returned after workshop:

P. Vido: Love it, pasture it, cut it for hay, use it as green manure crop - all are easier than killing it. Alternative approach: combination of buckwheat and rye or buckwheat and timely plowing. Chisel plowing on frosty nights, dragging the roots out and loosening the soil just before the ground freezes hard. Vibrashank cultivator or chisel plow followed by deep moldboard plowing (possibly following seeding of buckwheat).

S. Fleischhaker: The best control I know of for couch is a spring tooth harrow whenever the field shows a tinge of green from spring right into June when buckwheat can be planted. Couch grass uses up plant energy until it is 2 tall, at which time it starts putting energy back into the root. The trick is to weaken the root energy, then smother it with buckwheat.

#26 Alternatives to summer fallowing for control of severe weed infestations?

Discussion at workshop: Moderator (D. Patriquin) remarked this is the problem Dave Reibling brought up, tillage can do it, but what are the alternatives. How effective is it to cultivate once and sow a competitive crop, as opposed to repeated cultivation?

M. Liebman: If you are working with fall planted grains, there is enough time for some tillage in August to drag out crab grass. One approach: light tillage during the summer with repeated use of cover crops - this is very effective in breaking new sod ground that has lots of crab grass - spring plow and then repeated use of sorghum-sudan grass and buckwheat, it very rapidly depletes the weeds. Drag out during the dry period and come right back with a green manure smother crop.

Comments returned after workshop:

P. Vido: There are so many alternatives, depending on specific weeds and the type of operation one is working with. Earthcare has many answers.

#27 Does substitution of mechanical weed control for chemicals necessarily mean more compacting and greater labour?

Discussion at workshop:

D. Reibling: I'm not too concerned about compaction now. Organic matter and the earthworm population increases and that takes care of a lot of it. On the driveway through the fields, there is really severe compaction but the earthworms come right up through it now. A lot of compaction is not just from the big tires, it's because we aren't working the soil properly

P. Vido: Not necessarily, but again there are many alternatives.

#28 Finger weeders? Who has experience with them?

K. Clough: David Ling has experience with them.

Anonymous: Members of the Ecological Farmers of Ontario, (c/o Ted Zettel, Chepstow, Ont. NOG 1K0) are

using finger weeders and flame weeding with success. They also know suppliers who import the equipment from Europe.

#29 Burning for weed control-experience?

P. Vido: See experiments on Indian fallow in Earthcare.

#30 Weed control in asparagus: how to control in row weeds? Can ducks be used?

Discussion at workshop:

M. Liebman: A farmer told me that what's most important is to plant the crop away from the margins of a field. That way, once you have it cleaned up, the weeds won't encroach from the sides and you can keep them out.

P. Ferraro: I have no weeds in my asparagus. I mow it in the fall and allow chickens to graze. Also, set out rotten hay in the field, just cut the strings and allow the chickens to spread it. In another field after the beans were finished, I mowed it and chickens fed on that and the weeds.

D. Patriquin: Has observed Norbert Kungl's sheep grazing lambsquarter but not carrots in the carrot rows (as Norbert had said was the case). There's lots that we can do with animals to control weeds.

#31 Is mulching effective - what about perennial weeds?

#32 What kinds of weed control are effective when using a "no-till" seeder? Does anyone have any experience with this?

#33 What can be used to control weeds when direct seeding alfalfa? How can bayberry be controlled non-chemically in blueberry fields?

P. Vido: August-planted oats and frost seeded alfalfa is the best for freedom from annual weeds without chemicals. If couch grass is present use buckwheat instead of oats and don't worry what comes anyway, after it is cut 8-10 weeks later, alfalfa will be O.K.

#35 Who has experience with refractometer measurements - what time of day do you do them? What part of the plant? How many do you need to do, etc?

M. Drake: I am aware of two organic farmers who use refractometers: Ron Gargas, Volant, Pa., (412) 530-7220, alfalfa; and Tom Harding, Wind Garp, Pa., (215) 863-6700, alfalfa and strawberries. Tom Harding used the following procedure for strawberries: for processing strawberries, the sugar content should be between 6-16% on the brick level; wash off refractometer prism and berries with distilled water; squeeze juice from the berry (sweetest plant part) on prism; leave juice on prism for a few moments before reading.

#36 Soil Audits: What data available from standard analyses for conventional farmers are most useful to

organic farmers? What type of data not included in those analyses might be useful?

P. Vido: Obviously organic matter. With regard to soil testing, I've been haunted by the Rodale's series of articles in New Farm a few years ago-especially because it seemed to conform to long standing gut-feeling about laboratory fertility testing. For me, a soil audit's greatest merit lies in revealing the existence or lack of some special trace minerals, rather than trying to pin down the transiency of, for example, nitrogen.

L. Zibilske: Standard soil test procedures vary greatly between laboratories. The best are calibrated by crop response in the geographical region in which the recommendations are used. These data, however, are not universally available so certain procedures may not be appropriately adapted for a specific region. In addition, the procedures are largely developed for conventional cropping practices and may not be good predictors for organic methods. Some of these tests assess the total quantity of element in the soil, others predict the fraction of the total that is (or will become) plant available. Tests that are applicable to organic situations might be cation exchange capacity, percent base saturation, some micronutrients, pH, and direct organic matter tests (i.e. easily oxidizable). There is certainly room for developments of soil tests appropriate for organic farming methods.

R. Jannasch, N. Kungl: pH is important. Lime requirements should be double checked. If there is enough Mg in the soil, do not apply dolomitic limestone, but prefer calcitic limestone. CEC can be a valuable indicator for soil improvement over a number of years.

#37 Organic matter values: how reliable are they? Is the 3% guideline a good one?

P. Vido: Any set guideline entails a limitation. As much as organic matter is THE fundamental storehouse, true fertility cannot be measured by O.M. data in a soil sample no matter how good the lab. There are forms of energy from which fertility springs that simply are NOT measurable by our present scientific methods.

L. Zibilske: Organic matter determinations are usually done by one of two methods - complete combustion in a very hot oven, weighing the soil sample before and after, or in several variants of wet chemical oxidation methods. Differences between the two determinations reflect what is being measured. Complete destruction of the organic matter in an oven gives the total organic matter in the soil and most of the chemical methods give estimations of a part of that total. For instance, the Walkley-Black wet oxidation method estimates the easily-oxidizable portion of the total organic matter, and would be a smaller number than the total amount of organic matter in the soil. Walkley-Black organic matter can be calculated from a determination of the total but the relevance to organic farm recommendations may not be meaningful, since the proportion of easily-

oxidizable organic matter to total organic matter can vary. J.K. MacMillan: The 3% guideline for organic matter does not seem to be very high. In a study completed last year the average organic matter levels over six years of sampling were 3.62 for livestock farms, 2.56 for vegetable farms, 2.70 for potatoes and grain and 3.68 for livestock potatoes. I would like to see the level raised to at least 4%.

R. Jannasch, N. Kungl: Organic matter values are very transitory. They do not reflect the true level of active humus.

#38 Composting: Who has a system they are very satisfied with? What is it? How consistent is it year to year?

P. Vido: Earthworms - the consistency is directly proportional to MY energy input.

L. Zibilske: There are many methods of composting that all yield good products. Different management methods can affect the quality of the product and the length of time it takes to complete the process. See the comments by Will Brinton.

Anonymous: Ecological Farmers of Ontario (c/o Ted Zettel, Chepstow, Ont. N0G 1K0) report compost rates of 6-10 tonnes/hectare only. They use the compost as an activator of soil biological activity.

#39 Soil nitrates: Can these be a problem in organic farming?

L. Zibilske: Soil nitrates can be problematic in organic farming. What is needed to minimize these problems is the knowledge to match the rates of nitrogen release from organic matter to crop needs during the season. When growing crops that tend to accumulate nitrate (such as spinach, lettuce, beets etc.), don't use rapidly available organic materials such as manure, or excessive amounts of compost. These are difficult ideas to manage but are necessary to minimize the problem.

#40 How important are earthworms to farming land? Can you stop seagulls from eating earthworms?

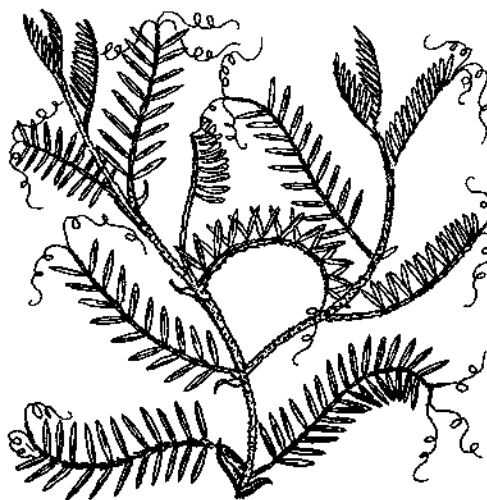
P. Vido: Didn't Aristotle tell us that they are the intestines of the earth? Have we not read even modern scientific evidence documenting the fact that worm castings contain approximately 5 times more nitrate, 7 times more available P, and 11 times more K than the surrounding soil? It has also been said that the earthworms in an acre of old pasture are of more value than the cattle grazing it. Can you stop a dead leaf from falling to the ground? (Of course you can catch it and put it in your pocket; you can blast a sea gull with a bit of lead...but why would you interfere with the natural process of energy transformation? If one cycle is good for us, so is the other. We just do not see too far ahead of our nose. It is one of the heaven-assigned purposes of the earthworm to

feed birds.

S. Hill: Earthworms provide physical (aeration, drainage, mixing, crumb formation etc), chemical (increased nutrient availability in their castes) and biological (stimulating the growth of beneficial microorganisms) benefits. They are also a useful indicator of some aspects of soil health. You could reduce bird predation of worms by cultivating at dusk when they are less active.

L. Zibilske: Earthworms are indicators of good biological conditions in the soil and are effective in assisting the decomposition and processing of organic matter. They are part of the natural processes on which organic farmers depend. Composting is not normally a part of earthworm activity but their activities in soil increases the rate at which soil microorganisms process the organic matter. A fertile soil can have tens of thousands of earthworms per square meter, so the number taken by sea gulls is probably a small percentage of the total present, since most remain underground.

J.K. MacMillan: In cultivated fields the lack of earthworms indicates to me there is something not right in the soil profile. Earthworms help break down raw organic matter and make it more readily available to plants. In addition they help aerate the soil and improve the drainage. I have watched gulls follow machinery eating I suppose among other things, earthworms, grubs, etc, including young mice. For some reason they never bothered the field when machinery wasn't working. A bigger problem I recall with the gulls was when using fish waste or shells on land, it was a battle to incorporate it before the gulls got it.



#41 Are there any limitations to using potassium sulfate? Do all potassium sulfate sources contain a lot of magnesium?
L. Zibilske: Pure potassium sulfate is readily soluble. Fertilizer-grade may be somewhat more slowly soluble but in either, potassium (K) ions released will be

attracted to the cation (a positively charged atom) exchange sites in the soil. Large amounts of any soluble cation can displace other cations on the exchange complexes of the soil, which can lead to imbalances in crop nutrition. A balance of all cations should be maintained. The specific cation ratios that should be maintained in organic systems are not well quantified but might be similar to those in conventional systems. Since calcium (Ca) and magnesium

(Mg) compete for plant uptake with K, a balance of the three must be maintained in the soil. Not all K sources are high in Mg.

#42 What about rock powders: any recommendations for local sources, uses of them?

L. Zibilske: See the response of Will Brinton to the question from Stu Fleischhaker in the discussion period on Organofertilizers and Soil Audits.

#43 Are there any particular crops that are good for improving potassium status? How do you do it?

L. Zibilske: Improving K status in the soil is a reflection of a plant's ability to extract K from natural soil sources, thus concentrating it in the upper soil. Grasses and cereals (plants of relatively low Ca requirement) seem to be better at extracting K from soil sources than legumes. Some suggest that differences in root cation exchange capacity between dicotyledonous and monocotyledonous plants. Dicots seem to have a lower ability to use soil sources of K (as well as other cations). In addition, a relatively smaller proportion of the crop is removed, leaving more K-containing plant residues on the soil.

#44 What about crops to improve the potassium status of soils?

L. Zibilske: Soil phosphorus status can be affected by cropping. Plants absorb P mainly by the action of diffusion. Soluble P diffuses toward the root and is taken in at absorption sites on the root surface. Grasses with more fibrous root systems would have more absorption sites than tap-rooted plants and would trap more total P. Since most P is found in the upper soil, roots do not have to bring it up from lower soil levels. Solubility of P and the rate at which it moves toward the root then become the important aspects of P nutrition. Phosphorus can move more readily in organic systems - indicating easier solubility in the presence of organic matter. Net removal of P through cropping can be a guide to determine the rate of P loss from the farm.

#45 Is it effective to broadcast rock phosphate on pastures?

L. Zibilske: In general, the smaller the particle size of the rock, the faster it will be solubilized. Another factor that controls the availability of nutrients in rock phosphate is the degree to which the rock is incorporated into the soil. Complete incorporation brings about the fastest solubilization of the mineral. The two factors can be used to gauge the rate of solubilization. For instance, a coarse rock incorporated would be solubilized faster than coarse rock left on the surface. Fine-meshed material would be solubilized faster, whether on the surface or incorporated, than coarse material. Therefore the rock phosphate will be effective if left on the surface but will solubilize and become plant available at a relatively slower rate.

#46 Crab meal as fertilizer: sources and costs? What are its benefits? Is it economical to use as a source of major nutrients?

L. Zibilske: See the comments by Will Brinton, Sat Lalla and Roger Henry recorded in the discussion period on Organofertilizers and Soil Audits.

#47 Fish wastes as fertilizer: What type of commercial processing is acceptable? Desirable? Comments concerning experience with fish products, as spray, in compost, in soil applications.

L. Zibilske: See the comments by Will Brinton in discussion period.

M. Drake: The following have done research on fish waste and peat moss composting: (Canada) Dr. S.P. Mathurs, Land Resource Research Center, Ag. Canada, Ottawa, Ont. K1A 0C6; J.Y. Daigle, Centre de Recherche et de Developpement de la Tourbe, Universite de Moncton, Shippagan, N.B.; M. Levesque, Land Resource Research Centre, Agriculture Canada; Jacques Arseneault, Lameque Peat Moss Co. Ltd, Lameque, N.B.; (U.S.) Bill Seekins, Maine Department of Agriculture, Augusta, ME 04333, on fish wastes, and sawdust and horse litter carbon source, in conjunction with MOFGA, Dr. Eric Sideman, M.D. of A. and a conservation organization; Joan L. Brooks, Department of Civil Engineering, University of Maine, Orono, ME, fish wastes and peat in conjunction with Dr. Mathurs' work.

R. Jannasch, N. Kungl: A mixture of peatmoss and vermiculite plus fishmeal and lime produce a very satisfactory propagation mix free of weeds and diseases. Amounts of fishmeal depend on protein content. Bloodmeal and soybean flour can be used as well.

#48 Seaweed products: extracts, meal for animals, soil fertilizers. Comments from users on amounts used, benefits, difficulties?

L. Zibilske: See the comment by Will Brinton in discussion period.

#49 Is there Selenium in Kelp; how much?

S. Fleischhaker: I don't know about kelp, but would assume so since salt water fish seem to have sufficient selenium. Some preliminary test results we have done on grains grown in N.B. as far as selenium are interesting. As you know this bioregion is selenium deficient. Selenium deficiency has grave consequences as well as being toxic when too much is available. The wheat and oats I tested locally were deficient as can be expected. However, buckwheat at first test appeared to be a good source of selenium and rye a fair source. Will be doing further testing this winter to confirm these initial results. Anyone interested can write me.

L. Zibilske: Selenium (Se) is found in kelp; amounts vary but are in the parts per million range. It is also found in

some phosphate rocks in the same concentration range. Rock phosphates must be specifically analyzed to determine whether they contain the micronutrient. Availability of Se in rock sources is not high, and foliar applications of chelates have been found to be more effective than soil applications in conventional farming systems. High levels of natural chelates in organically managed soils, however, may provide for enhanced availability of soil Se as well as other micronutrient metals.

#50 What substitutes are available or alternative practices for fungicides such as Mertec (used for potatoes going into storage)? For disinfections for machinery and bins (for seed potato producers)?

#51 Substitutes for synthetic sprouting inhibitors?

#52 Is seaweed spray effective in reducing blight?

#53 Has any research been done on chiselling versus fall plowing in control of Colorado potato beetle?

D. Ling: My experience this year was a 8-10 yard strip that was plowed later in fall and left bare over winter had a lot more bugs.

#54 What is the cause of scab problems other than high pH?

J.K. MacMillan: Certain types of scab seem to be related to the C-N ratio. Organic material such as sawdust, straw and shavings tend to favour scab. Even green manure crops used in continuous potato rotations promote scab. It appears that additions of straw, etc. causes a depletion of soil nitrogen until the build-up of bacteria need to break down the straw reached equilibrium. Regular additions of organic material will keep bacterial or microbial levels high and the C-N ratio at a reasonable level. I have written a paper comparing cultivated vs. natural soil profiles. You will note the build up of nutrients to 60 cm. Crops like sweet clover should translocate some of these nutrients to the plow layer.

#55 How do you control wireworms and snails in potatoes?

J.K. MacMillan: In my home garden, I have a large population of black scavenger beetles, I am not sure of their right name. Even though I practice intensive cropping which is ideal for slugs, I don't have to use slug bait. If I spaced my rows and plants wider, I don't think they would be a problem.

R. Jannasch, N. Kungl: Wireworms are a temporary problem after sod. Perhaps there were too many weeds in the rotations?

#56 Are there organic controls for the corn earworm?

R. Jannasch, N. Kungl: Trichogramma predatory wasps.

Charles Thompson from the Kentville Research Station has test results.

#57 What organic pest control methods have been proven to work by scientific research (versus hearsay testimonials etc)?

#58 Vegetable varieties for organic production: are the best ones generally the same as those used for conventional farmers?

#59 In my organic vegetable operations, bacterial wilts, root maggots, etc. are really difficult problems in the beginning (2nd year of operation). How much can I expect problems to be reduced with time as the system adjusts?

#60 Which mulches are best for each crop, especially garlic?

#61 What sources of information are available on soil management and pest controls for organic operations?

#62 Are there any regional opportunities to pursue cooperative marketing?

P. Vido: Of course. They are endless of one could unify the minds, goals and set of values of the cooperative members.

#63 What problems do transitional farmers face in relation to government subsidies etc. e.g. do fertilizer subsidies apply to organic fertilizers?

P. Vido: They should not be viewed as problems - a healthy and flexible farm should get by without subsidies. In times to come, the organic guys will be in the majority anyway.

J.B. Goit: Regarding the types of fertilizer that assistance will be paid on, it is the policy that only those fertilizer chemicals or mixed chemical fertilizer of generally recommended ingredients and analyses will be eligible for assistance. This has been broadly interpreted to include materials such as sulphomag, potassium nitrate, Epsom Salts, Solubar, liquid starter fertilizer, etc. The main criteria for us is that the material is a recognized commercial fertilizer with a guaranteed analysis under the Federal Fertilizer Act. This would rule out most manures, composts, meals, etc. unless they were packaged and had guaranteed analysis. Some sea product fertilizers and bone meal are registered and guaranteed and therefore would qualify for assistance. We do allow gypsum as an eligible product as well.

#64 What provisions of the Agri-food agreement (Canada) have been helpful to organic farmers? Can you recommend some provisions that would be helpful?

#65 Is organic seed available?

P. Vido: In limited quantities. A sourcebook would be of great help. In the meantime, we have to grow our own.

#66 Are there any limitations to using plastic mulch?

P. Vido: The plastic part of it.

#67 Where can you get pesticide residue tests done?

#68 Certification of livestock: are the standards too strict? Should there be different categories? How long do animals have to be completely free of any contact with conventionally-managed crops or animals?

P. Vido: A bunch of good questions, likely not answerable with any degree of finality for some time yet.

#69 Are there any cases documented or suspected where a hyperallergic individual reacted to bonafide organically-grown meat? What was the cause?

#70 How can you distinguish aflatoxin toxicity from pesticide-induced toxicity in animals?

P. Vido: Do not use pesticides at all!

#71 An issue: the incorporation of marketing and supply management into the organic food production/-distribution so that overproduction, severe price fluctuation and produce dumping, common in conventional farming, can be eliminated.

P. Vido: One solution would be to have all food as locally distributed as possible.

#72 How is the decision made as to what product is approved for use, and if approved, can it be used in any province or state? If a product is rejected, on what basis is the rejection made?

#73 What is true organic farming? How can one feel safe in merchandising with the words organically grown, no pesticides (from a retailer)?

P. Vido: There are many fine definitions...but ultimately, we'll have to learn to TRUST each other.

S. Fleischhaker: As Jim Gerritsen stated, the only 'organic' is CERTIFIED ORGANIC. I would not recommend anyone paying a premium without certification unless you personally know and trust the grower.

#74 What difficulties are there in growing organic/non-organic food on the same farm, e.g. in using equipment in the conventional fields, then in organic fields?

P. Vido: Ones of dichotomy of mind.

#75 What about copper accumulation in soils and potatoes?

R. MacRae: 1. Accumulation in the tuber. Cu occurs at

very low levels in the tuber (a standard estimate is 1.43 g/tonne of fresh tubers or 1.43 ppm). I did find an abstract of a Japanese study concluding that Cu accumulates in the skin of the tuber but the study did not relate Cu levels in the soil to accumulation in the tuber. My impression is that investigators don't see tuber accumulation as so much the problem. A Bulgarian study concluded that potato yield will decline once total tissue levels reach 41 ppm Cu EDTA-extractable. It may be that yield decline will result before the Cu has a chance to accumulate in the tuber.

2. Accumulation in the soil. A group in France (CAPENE) has put out a fact sheet on Cu in vineyards. they state that normal Cu levels in soils run from 5-50 ppm. In some soils studied in Germany, regular addition of Bordeaux mixture over 27 years produced a 10-fold increase in soil total Cu levels. Extractable and total Cu analyses show that Cu is not mobile so there is a direct connection between what you add to the soil and what will stay in the top 20 cm. The relationship between total and available Cu is a bit more confused, partly because there are so many factors that determine it and partly because of the methodologies used to do the analyses. A Swiss study I found concluded that the key total Cu figure is 50 ppm in the soil. Under that level, they don't think there are any problems for growing potatoes, although the available Cu associated with that total Cu, while low, may still be sufficient to inhibit soil microorganisms. Microbial activity appears to be inhibited in many soils, particularly sandy and acid soils (pH 5.5 and lower). One study found that even 150 ug Cu/g soil (150 ppm) addition had a substantial inhibiting effect on soil microorganisms in sandy soil. It may be that clay content is more important in buffering the effects of Cu than organic matter level.

I came across some references to high Cu levels suppressing directly or indirectly the uptake of Fe and Zn. I didn't have enough time to check into this further. It may be a combination of things that are most useful to neutralize the effects of Cu. The literature suggests a range of factors that effect Cu availability, and it appears to vary tremendously from soil to soil. It may be too difficult to come to any precise conclusions about levels of clay, CEC, pH or organic matter to suitably buffer the Cu. My overall impression is that microbial life is being suppressed with most an level of Cu addition, although the length of the effect depends on a whole range of factors. Negative impacts on yield may occur before Cu accumulation in the tubers becomes a problem. Another issue that may be looming on the horizon is microorganisms developing resistance to Cu.

K. Michalica: Your point of caution on Bordeaux mix and copper sulfide use was well taken. Copper affects molybdenum availability and it is phytotoxic and toxic to microbes in soil. It is building up in the soil and could cause problems in rotational crops.



More comments and questions

- Can someone explain the benefits and drawbacks of tile drainage in relation to organic farms? Seems to me it is very damaging and also a disregard for choosing proper crop/land use for certain areas. P. Ferraro

- I'd like to hear some discussion on Chilean nitrate. OCIA does not approve it yet they advocate using manure tea. Isn't the concern about nitrate buildup? Shouldn't there be more concern of nitrates from tea than from an analyzed measured out amount of the Chilean nitrate? P. Ferraro

- Is seed available for oil seed radish? Where? Any fact sheets on cultural practices, experience with insect problems etc, especially flea beetle or any problems with clubroot? R. Libby

- There was some discussion of oat varieties that function best under low nitrogen conditions in the spring, but none were mentioned. Are there specific varieties, especially open pollinated, that are recommended? R. Libby

D. Patriquin: I tested three modern varieties (Sentinel, Manic and QT-89) and three traditional ones (Garry, Cabot, Fundy) on Tunwath farm; all 3 traditional ones performed well, only QT-89 of the modern ones did. Sentinel and Manic were not competitive with weeds, but there could have been other problems also, eg nutritional.

- How is proper pH maintained in rotation with squash/vegetables and potatoes in following years? W. Baldwin

- How do you compost animal waste (problems with vermin, smell, residual salt, cost effectiveness, etc.)?

- How do you control leaf miners without pesticides? This is a particular problem with leaf crops - spinach, beets, Swiss chard - because we don't want to eat the sprays.

- What are the sources for certified organic potato seed? W. Baldwin

- I would like a list of publications which deal with raising livestock organically, with respect to drugs allowed, withdrawal times, sanitary procedures, supplements, etc. J. MacDonald

- Would like to see some cereal trials done under organic growing conditions and variety recommendations made base on the results. It is very difficult to determine what variety to grow organically if the recommendations are only available for conventionally-grown varieties. Many of us are probably doing this already, but we need to get this

information out to everyone so each is not reinventing the wheel. This also relates to vegetable varieties.

- Do you have more information about Fukuoka's no-till, living mulch farming? S. Reaman

- When is oil radish seeded?

- How do you control worms in apples? S. Reaman

- What are you planting for a cover crop after straw is off?

- Could you give me a definition of Bio-dynamic and Organic farming? S. Reaman

- I would like more information about the regrowth of kale, rape and turnips. S. Reaman

- Any information on organic treatments for sick animals? S. Reaman

- Does anyone have experience using a chain harrow to reduce weeds in cereal crops instead of using the Lely-type rod weeder?

Other comments:

Get involved in 'traditional' channels of scientific conferences, workshops and extension. Your presence and interaction will benefit both groups. Try to push for a study of the size of the market for organically-grown produce - the results may help you to champion your cause and secure more interest and assistance from government sources. Soil, nutrition and tillage are vital and should attract your focus. They are complex and not well understood. Why not organize or participate in a workshop dealing specifically with soils? Are you aware of work with soil organic matter and sweet clover done by John MacMillan? Also, windbreaks in vegetable production by George Reid, both of N.B. Department of Agriculture? K. Michalica

I've made some references to Earthcare (Ecoagric. in Saskatchewan) published by the Earthcare group in 1980. For me it was one of the best all around sources of pertinent information of its time. Perhaps surpassed now, I still think most folks interested in eco-ag should have a copy. Everyone should also read Berret's Harnessing the Earthworm. P. Vido

I agree, it is still the best source for North American, temperate zone eco-agriculture; it is a very nice synthesis of practical experience and scientific information. D. Patriquin

THE RAM'S HORN

MONTHLY NEWSLETTER OF FOOD SYSTEM ANALYSIS

NO. 56 NOVEMBER 1988

GROWING ORGANIC

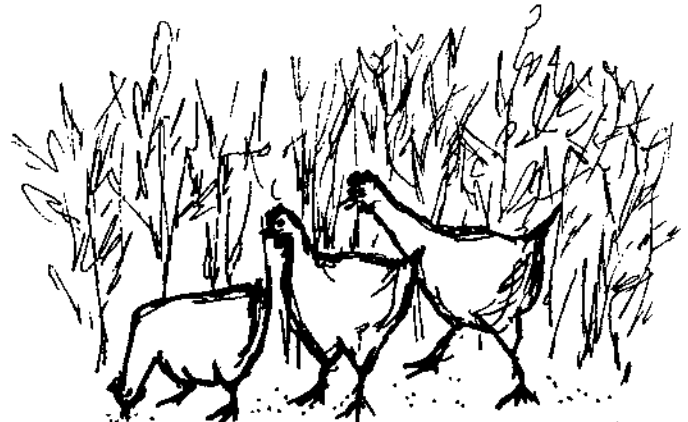
FARMERS AND SCIENTISTS SHARE ORGANIC AGRICULTURE INSIGHTS

It is rare to attend a meeting with "organic" people where there is so little self-righteousness - or with commercial farmers where there is so little defensiveness. But then, this workshop proceeded from the knowledge that each farm is its own micro-ecosystem, so what works for you may or may not work for me. By the same token, the scientists were not laying down rules for the less enlightened to meekly follow. They were revelling in the opportunity to learn from those they respectfully regarded as the real experts; and from the chance to share the information their experimental freedom from the constraints of daily production economics permits. It was really refreshing! A farm woman said to us, "This is the first farmers meeting I've really enjoyed. I can talk to anyone and actually say what I think." A scientist commented, "This is a mature meeting; the people are less ideological and more tolerant of other ideas, more concrete, dealing with particular problems, than meetings of such people used to be."

After living in a multi-racial city, we were aware of how 'white' the crowd was - though it was about one-third women. The meeting got underway without the usual sexist jokes and travelling salesman stories that are pro forma for agri-business meetings (even, sadly, those featuring women). On the contrary, the first item on the agenda was a homely welcome from one of the conference organizers and what in other contexts might be called the keynote speech.

It was a brief, rambling, and lucid talk by two of the "elders" who laid out some of the social issues that form the context of discussion about organic agriculture: the role of women, economic justice, care of the environment, and peace.

The discussion opened with a review of the status of organic agriculture in the bio-region: Maine, New Brunswick, Nova Scotia and PEI. This was followed by a workshop - with 180 people in the auditorium of the forestry building in Fredericton, N.B. - on cropping systems, tillage, and weed control. Despite the crowd, everyone managed to keep to the schedule by limiting their comments to the allotted time. The discipline, as well as the thoughtfulness and commonsense of speakers and the questioners was notable, and characterized the quality of discussion throughout this Bioregional Farmer/Scientist Workshop in Organic Agriculture.

continued →

"ORGANIC" HERBICIDE IN PERMANENT ROW CROP

Bright and early the next day (8:15 a.m.) discussion began on the tricky issue of "soil amendments": Organofertilizers and Soil Audits. A scientist from Maine talked about "nutrient budgeting" as a more truthful, long term approach to soil analysis than the simplistic soil testing that is the usual practice. The reductionist standard soil test simply tells you what elements are present in soluble form at that moment, without revealing anything about the processes at work in the soil, or how the components of the soil might interact with each other or the crop. A soil test takes no account of movement, whether from subsoil to surface, or from chemical input to off-farm loss through leaching, erosion, or crop removal. A soil audit, or nutrient budget, does try to take all these elements into account, and it may well come up with recommendations much less attractive to the fertilizer and chemical companies.

One speaker described the microorganisms in the soil as an underground second crop, as well as a delivery vehicle for plant nutrients. He also surmised that the worms below ground in a healthy pasture might weigh more than the cattle above - as well as being more valuable!

Another session concentrated on composting, on a farm (as opposed to garden) scale. It included comments on how to judge the working temperature of the compost so that on the one hand it is not sterilized, and on the other hand is warm enough to germinate the weed seeds. It certainly got across to us that composting is a much more sophisticated way of utilizing manure than the way we used to do it.

In a session on Third World Linkages David Patriquin's slides gave dramatic testimony to the failure of the Green Revolution and the promise of traditional polyculture. Another speaker highlighted a recurrent theme of the meeting: "substituting biological bullets for chemical bullets is not a great improvement. We need a different system

that is less adversarial..." This theme was carried further by a man who has worked in Thailand for ten years. He pointed out that standard scientific method requires control of everything except one variable, whereas under complex Third World conditions the aim has to be to control one variable. He added that if you do not use native systems and local resources, all you can do is contract out to agri-business.

He illustrated this with a simple story of rice culture in Thailand. In order to maintain fertility, a "green manure" crop is essential in rotation with rice. The Green Revolution approach would have the farmer buy a particular seed every season, plough the paddies, plant the green manure crop, let it grow, and then work it into the ground.

The farmers said this was not only inefficient, but impractical: there is little grass in the early spring, not enough to give the buffalo the necessary energy to undertake ploughing at that time of year. The method finally worked out was built around the traditional system, where transplanting is a standard procedure: In the corner of every paddy there would be a few plants grown of the green manure crop. After the rice was planted, the green manure plants would be transplanted among the rice. Because these plants seed themselves, it does not take very many to seed the whole paddy. When it is ripe, the rice is harvested, by hand, and the green manure crop left to mature. Before it is "ploughed down" a few of the best plants are transplanted to the little plot in the corner. They will then be transplanted into the next crop of rice. With this system, no new seed is required, and very little additional labour, only that of transplanting a few plants along with the rice. This is a sustainable system. In addition, due to careful selection each season, the green manure crop, like the rice, is getting stronger all the time.



There were a great many other stories and wise statements. In discussing certification of organic foods, the approach of testing foods for chemical residues came up: the reply was, it is a capitalist trick that organic farmers and consumers should not fall for. It invites the attitude of getting away with as much as you can, or as much as cannot be detected. How food is produced is the only way to know what it really is.

This raises the key question: what is the difference between sustainable and organic agriculture? While probably everyone at the meeting would agree that in the long run sustainable has to be organic, it does not necessarily follow that organic is sustainable. Putting all the emphasis on certification may simply move organic food production into the existing commercial structures, and indeed, people were talking about the "niche market" that "certified organic" could fill within the industrial food system. For the urban consumer, there may be an immediate and obvious self-interest in buying, and paying well, for food which can be certified organic. The payoff for the urban consumer in purchasing products which are produced in a sustainable system is far less obvious at the moment of purchase.

For example, long distance transportation of organic produce is a contradiction of localization. One farmer commented that he could buy his rock phosphate from California and ship his tomatoes to Boston: this may be "organic" but is hardly sustainable!

In other words, organic and sustainable are not the same thing. If the food system were really sustainable, certification would not be required.

ANOTHER WORD ABOUT POTATOES....

Many Victorian potato growers are starting to grow a product that is more susceptible to blight, requires more nitrogen fertiliser and takes an extra month to grow.

Farmers are encouraged to plant the difficult American variety, the russet Burbank, because the frozen vegetable and instant-dinner manufacturer, McCain, wants to give its customers a longer, frozen chip, according to McCain's agricultural manager, Mr Milton Rodda.

McCain also has to help farmers with fertiliser and pesticides because the russet Burbank is more prone to potato blight. McCain pays growers an extra \$9 for each tonne of the longer spud

with the heavy, netted skin.

The enticement to grow a longer potato, that will make a longer chip, is only part of McCain's involvement with the primary producer. Once a farmer contracts to grow potatoes for the freezing works, the farm soil is tested by McCain to determine the fertiliser required, and advice is given about appropriate fungicides for the tricky russet Burbank.

In this way, a food-processing giant can determine what farmers grow and can be involved at each step of the process, from supplying raw materials to buying the eventual crop. In some processes, no other company need be involved in the path from seed to supermarket shelf.

The Age, Melbourne, Australia, 2 May, 1988

Certification is required at this stage because of the condition of the food system.

This was made very clear when an Upper St. John River valley potato farmer chose to use his time on the "potato" panel to discuss, not the production of organic potatoes, but the genesis of the system within which potatoes are currently produced. He described the transition of potato production in N.B.: Before McCains arrived in the early 1960s, potato production was spread pretty evenly around the province. Now it is concentrated in two counties. McCains centralized production around its processing facilities. It demanded that the farmers grow the Netted Gem/Russet Burbank potato, but this is a very late maturing variety. The lack of available labour in October/November for potato harvest - the kids are all in school - encouraged farmers to buy mechanical harvesters. To pay for the harvesters the farmers had to grow more potatoes, through intensification of production and enlarging their farms. The result is chemical-dependent monoculture, with McCains controlling the show as input supplier, credit manager, and buyer.

→

It seems to us that sustainable agriculture does not seek to accumulate, but to exchange. This is what makes it the antithesis of capitalist agriculture. Capital accumulation is not compatible with a sustainable economy.

This meeting came two days after a smaller national meeting in Toronto that focused on the task of reaching a common agreement on a definition of what could be "certified organic". Brewster participated in this meeting and found it a good prologue to the Fredericton meeting. In the Toronto discussion, with people gathered from almost every province, there was also a review of the status of organic agriculture and certification across the country, and the same issue of sustainable and/or organic came up. As in Fredericton, everyone agreed that one of the biggest current problems is that the demand for organically grown foods is far greater than the supply. This puts pressure on the organic farm organizations to relax their standards and speed up the certification process.

The Toronto meeting also discussed the need to define a "transition" status for those farmers working their way through the 3-year chemical-free period required for organic certification.

We do not entertain any illusions that organic/sustainable agriculture is going to overthrow industrial monoculture tomorrow. But it is inspiring to hear successful commercial farmers talk about their process of transformation and understanding. The strength of this movement lies in its deep roots, quite literally, and its materialism. And, as a wholistic science, it offers a "way of life" that appeals to people seeking a healthy human community.

B.K. + C.K.

Clever vs. Useful

AGRICULTURAL science has been too successful for its own good. Overfed and spoilt for choice, the urban consumer no longer needs to feel any gratitude to the farmer or agricultural scientist... Developing countries are still pitifully short of food; but even more pitifully, solutions to their problems are light years removed from those being pursued at the frontiers of knowledge...

A look at the history of agricultural progress shows what kinds of research have been fruitful. Better feeding has made the greatest contribution to the improved productivity of ruminant animals, especially dairy cattle. The capacity of ruminants to produce meat and milk has always been constrained primarily by how well their digestive system copes with roughage that is slowly fermented. Much of the apparent genetic improvement in beef and dairy cattle, which crossbreeding or selection seem to have achieved, merely reflects the fact that better nutrition has enabled the more productive animals to realise their genetic potential. Silage chemists do not become fellows of the Royal Society, presumably because this work does not appear to be particularly clever. But in an applied science such as nutrition, it is less important to be clever than to be useful.

... for many years, breeders of meat animals selected sires on the basis of their rate of growth or their weight for age. The main consequence of this was that the animals became bigger at maturity. Along the way, the animals also became leaner and more efficient at converting food when compared at a fixed weight or age, because animals become progressively fatter and the capacity to convert food efficiently declines progressively as they grow from birth to maturity. The spectacular improvements in growth rate, carcass composition and the efficiency of food conversion in pigs and poultry have been achieved largely by selecting for bigger animals at adulthood and killing them at an increasingly early stage.

Extrapolating this argument towards absurdity the infinitely efficient animal is one killed at birth...

New Scientist 21 July 1988



Organic farming comes of age

More than 200 attend New Brunswick conference

by Gary Schneider

I am not a farmer. I cannot speak with a farmer's voice. But over the last 10 years I've watched the organic farming movement in the Maritime provinces and New England and it seems to be maturing at a rapid rate.

Coming of age is always beset with problems, and like all problems, those faced by organic farmers have to be dealt with. At a recent conference in Fredericton, New Brunswick, farmers got a chance to deal with some thorny issues as well as to look at their successes over the years.

The Bioregional Farmer/Scientist Workshop in Organic Agriculture, which kept over 220 participants busy from the evening of November 18 to midday of November 20, lived up to its name and more. It was truly bioregional in makeup. As expected, there was a large number of people from New Brunswick in attendance (94), but there was also very good representation from Prince Edward Island (40), Nova Scotia (39) and Maine (28). There were also participants from Quebec, Ontario, Vermont and an organic coffee grower from Peru.

And unlike a recent National Woodlot Owners Conference also held in Fredericton, where woodlot owners were badly outnumbered by the Canadian Forestry Service, provincial forestry departments, private consultants and Irving representatives, this was largely made up of farmers. In fact, a Department of Agriculture speaker chairing a session made reference to the fact that the farmers were the people to talk to, that the farmers knew more about what specific methods were being used, etc.

A good deal of the conference focussed on Organic Crop Improvement Association (OCIA) certified farms and produce. While certification continues to be a touchy subject and open to debate, growers in North America have found themselves under increasing pressure to set standards for their products so that consumers can be sure of

what they are buying. Too many products labelled "organic" either aren't (whether through differing standards among growers or outright misrepresentation) or there is no way to back up the claim.

Consumers, especially those who have allergies to certain chemicals or have deficient immune systems, need to have some assurance that the organic food they purchase (usually at a premium price) is truly organic. OCIA chapters, with strict standards and independent third-party certification, have been springing up in the Maritimes and are already well-established in much of North America. Growers are regularly inspected and while it can be cumbersome, many have found it to be the best solution to the problem.

The program was opened Friday evening by two of my favorite New Brunswickers, Jim and Kay Bedell. The Bedells are staunch advocates of organic agriculture as well as being active in the peace, environmental and women's movements. Being chosen to open the program was a fitting tribute to the Bedells and a treat for those in the audience who had not met them before. I still find it very inspiring to meet activists who fight hard for what they believe in, yet manage to keep a real sparkle in their eyes.

The conference got right down to business, with speakers spelling out the progress of organic agriculture in their areas. Speaking for New Brunswick, David Cozac said there are ten OCIA-certified farms totalling 400 acres, mostly in grains and mixed vegetables. Tree fruits, small fruits and herbs are also grown, and certified bread and maple syrup are produced.

"There are OCIA products in grocery stores in New Brunswick," Mr. Cozac said, "and the demand currently exceeds the supply."

Speaking for Prince Edward Island, Katherine Clough, Crop Supervisor with the P.E.I. Department of Agricul-

ture, joked that "we're so far behind, we're ahead." While many problems still result from intensive potato growing, she had praise for the strong core of farmers who have been farming in sustainable ways for years and swear by more traditional practices.

"Many are not strictly organic," she said, "but they demonstrate a relatively resource-efficient system of agriculture on which we can build."

Nineteen P.E.I. farmers have 602 acres in organic production — 521 in cereal and forage, 40 in blueberries, 21 in potatoes and the rest in fruit. There are also 50 farmers in transition or heading towards reduced chemical dependence, with 2-3000 acres in production.

Dr. Clough noted that "sustainability" is one of the main objectives of the Department, which sees a big market for organic food. An OCIA chapter has recently formed on P.E.I.

In Nova Scotia, the OCIA chapter has been operating for two years. There are seven certified and one or two uncertified growers in the province, according to Phil Ferraro, a grower from Kingston. There are 28 acres in vegetable and 12 acres in grain, with demand exceeding production. "People have created a market for these products," Mr. Ferraro said.

Eric Sideman, director of technical services for the Maine Organic Farmers and Gardeners Association (MOFGA), said the situation there is quite different. "MOFGA certified 41 growers in 1988 and there are probably just as many other organic growers who are uncertified and not members of MOFGA," said Mr. Sideman. Two Maine growers are members of the New Brunswick OCIA chapter. Of the 618 certified acres, 365 are in pasture, 152 in vegetables, 42 in blueberries, 23 in grain and the rest in fruit. MOFGA growers have access to large population centres and markets now exist with two baby food companies.

Just when most conferences would



RESOURCE

READER SERVICES

VIDEOS ON SEED PRODUCTION

are available from the Canadian Seed Growers Association (CSGA), for rent or to buy (\$20 for a 25 minute version highlighting Atlantic Canada). Describes production systems in Canadian agriculture. For information (or to borrow a copy in Nova Scotia) contact Dwane Mellish, Soils and Crops Branch, Nova Scotia Department of Agriculture and Marketing, Box 550 Truro, B2N 5E3. Telephone (902) 895-1571.

ENJOY WINTER MORE with the help of two free bulletins from the Nova Scotia Museum at 1747 Summer Street, Halifax, N.S. B3H 3A6. "Winter Birds and Feeders," and "Animal Tracks" are available in English or French.

GET YOUR FIELD CROP GUIDES.

1989 guides are now available through Ag Rep offices. The Atlantic guide for '89 includes a new White clover variety that has undergone extensive trials under Dr. Joanna Fraser at the Nova Scotia Agricultural College (in conjunction with Dr. H. T. Kunelius of Agriculture Canada's Charlottetown station). *Sonja*, originally from Sweden, has yielded better than *Sacramento* in various grass mixtures, is winterhardy, and thought to have "excellent" potential for haylage and pasture mixes.

FOR PERSISTENT LEGUMES, you might try Birdsfoot trefoil which comes highly recommended by reader N. Stockman of Kitchener, Ontario. Mr. Stockman has sent us copies of two bulletins on trefoil published by the Ontario Ministry of Agriculture and Food, No. 86-010 ("Birdsfoot Trefoil Production") and No. 85-111 ("BT Seed Production"). Reports one of the bulletins, "trefoil can continue to produce, through re-seeding itself, for ten years or more." Write the ministry's Education and Research Division at the Guelph Agricultural Centre, Box 1030, Guelph, Ontario N1H 6N1.

have called it an evening, a workshop on Cropping Systems, Tillage and Weed Control began and ran until almost 10 o'clock.

This workshop set the tone for the rest of the conference. The panelists were informative and interesting but it was the questions and comments from the audience that reflected the amount of expertise in the room.

One noticeable shortcoming of this and other workshops was that there wasn't always enough time for everyone to ask questions. There was such a good response and so many farmers enjoyed the chance to share their ideas and methods, that time was at a premium. The solution of doubling the length of the conference obviously wasn't possible, but the participants were asked to write their questions and comments on all aspects of organic agriculture onto cards and these will be worked into the report of the proceedings.

Saturday's sessions began at 8 am and included workshops on Organofertilizers and Soil Audits; Potatoes, Other Vegetables and Biological Control of Pests; and an extremely interesting talk and slide show by Bill Murphy on Voisin Grazing. Mr. Murphy, author of *Greener Pastures on Your Side of the Fence*, told of his research into intensive pasture management using fencing systems and regular grazing to control weeds, maintain soil fertility and produce healthy animals.

It seems only natural that people who like to grow good food also enjoy eating good food. Debbie Russell of Fredericton created a wonderful all-organic feast for Saturday evening's banquet — baked beans, millet and squash, coleslaw, potatoes, cider, apple crisp, rolls, tea and even organic coffee from Peru.

Sunday's workshops, one on Third World Linkages and the other on Certification, Transition and Regional Cooperation kept up the high standards. Gerry Van Koerddan and David Patriquin told about their extension work in developing countries as the conference turned to global matters. Mr. Van Koerddan admitted to some early failure in Thailand but said that in 11 years he learned how to work with the farmers and natural systems.

David Cozac, David Patriquin, Katherine Clough, Jim Gerritsen, David Ling, Susan Tyler, Charles Hubbard and Larry Zibilske deserve a lot of credit. First for finding the funds and bringing the conference off and second for choosing varied and interesting topics. They

stressed that the audience was as least as important as the expert panelists.

At other conferences I've attended in this region, someone like Stuart Hill, a very knowledgeable and delightfully-animated entomologist from MacDonald College, would speak and perhaps have time to answer some questions afterwards. This conference was much more interactive and participatory. The many panelists ranged from Department of Agriculture employees to farmers, from educators to CUSO workers.

The large turnout of farmers, both organic and in transition, is also a good sign that interest in organic production has expanded to include far more than small-scale growers and gardeners and that positive results (and the rising cost of chemicals) are swelling the numbers. Some of this is a direct result of farmers getting support from government agencies, universities and each other.

Another sign of the success of the conference is that even before the report of the proceedings was written up (the report will be sent to the participants in March), there is talk of making it an annual event. Maine has offered to host the next conference.

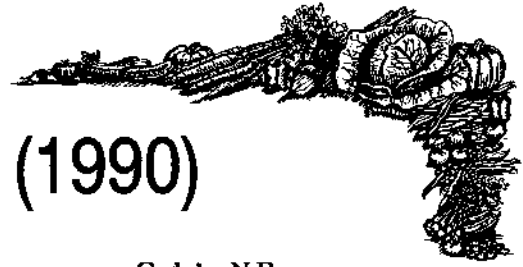
While it is a pun of the worst kind to say the organic agriculture movement is growing, growth and maturity really showed throughout the two days. Organizing a conference that is highly structured but still relaxed enough to encourage the free exchange of ideas is a difficult task. Growers talked about marketing and profit margins and yet the original ideals were still there.

Charles Hubbard, a former *Rural Delivery* contributor and First Vice President of the Forage Council of Canada, spoke of "bringing the joy back into farming," and said that "farming is not a science, it's a way of life." Words like these, the smiles of old and new friends and the sense that organic agriculture is really making progress left me with a positive feeling, and with plans to attend the next bioregional conference.

A report of the proceedings will be available by early March from David Patriquin, Biology Department, Dalhousie University, Halifax, Nova Scotia, B3H 4J1. There will be a small charge to cover costs.

(Gary Schneider who describes himself as "a rabid organic gardener," lives on an old farm near Cardigan, P.E.I.)

Certified organic producers (1990)



PRINCE EDWARD ISLAND

The following Prince Edward Island producers have been granted certified organic farming status by the Organic Crop Improvement Association:

George Campbell
Shining Waters Farm
Box 491
Kensington, P.E.I.
COB 1M0
(902) 436-7329
(potatoes, carrots, turnips, pasture)

Gwen Clohossey
Seabreeze Farm Co-op
Nail Pond, RR#2
Tignish, P.E.I.
COB 2B0
(902) 882-3232
(blueberries)

Alfred & Karen Fyfe
Stanley Bridge, RR#2
Breadalbane, P.E.I.
COA 1E0
(902) 886-2993
(wheat, feed grains, pasture, hay)

John & Louise Hardy
Hardy's Organic Vegetables
RR#1
Alberton, P.E.I.
COB 1B0
(902) 853-3393
(fruits, mixed vegetables)

Daphne Harker
The Robin's Nest Organic Garden
Box 299
Cornwall, P.E.I.
COA 1H0
(902) 675-3501
(mixed vegetables, herbs)

Karl Meyer & Cindy Rice
Kettlegrove Farm
Fanningbrook, RR#5
Mount Stewart, P.E.I.
COA 1T0
(902) 676-2713
(potatoes, grains, pasture, hay)

Paul & Jean Offer
The Doctor's Inn & Organic Market
Garden
Tyne Valley, P.E.I.
COB 2C0
(902) 831-2164
(mixed vegetables, fruit)

Reg Phelan
Byrne Road, RR#2
Morell, P.E.I.
COA 1S0
(902) 961-2428

Wayne Schurman
New Annan, RR#2
Summerside, P.E.I.
C1N 3K0
(902) 436-5302
(potatoes)

Allister & Margaret Veinot
Avondale, RR#1
Vernon Bridge, P.E.I.
(902) 651-2092
(mixed vegetables, grains, hay, pasture)

NEW BRUNSWICK

The following New Brunswick producers have been granted certified organic farming status by the Organic Crop Improvement Association:

Carole Daigle
Highfield Organic Farm

Cody's, N.B.
(506) 363-5358 or 635-8219
(vegetables)

Micheal Hutton & Essie Lom
Hutlo Acres
Glassville, N.B.
(506) 375-6656
(apples, apple cider)

Greg Wingate
Maple Farm
Hillsborough, N.B.
(506) 734-3361
(vegetables, herbs)

Conrad & Claude Toner
C & C Toner
Grand Falls, N.B.
(506) 473-2673
(potatoes, hullless oats)

Wayne Sabine
Circle S Farm
Arthurette, N.B.
(506) 273-3122
(potatoes)

Rita & George Upshall
Cloverhill Farm
Fredericton, N.B.
(506) 357-8565
(vegetables, basil)

Terry Gregg
Maple Meadow Farm
Presque Isle, Maine
(207) 764-6450
(potatoes)

Chris Holmes
Presque Isle, Maine
(207) 473-4040 or 762-4001
(potatoes)

Stephanie & Jerald Coburn
Spring Meadow Farm
Sussex, N.B.

(506) 433-4885
(vegetables, hay)

Linda & Rival Russell
Ridgeway Farm
Burtis Corner, N.B.
(506) 363-3464
(vegetables)

Dwaine White
White Farm
Woodstock, N.B.
(506) 328-6040
(potatoes)

Boyd Bradbury
Bridgewater, Maine
(207) 429-8306 or 429-8216
(maple syrup, candy & cream)

Joan & Ben Young
Ben's Organic Garden
Kinnikinic Foods
Fredericton, N.B.
(506) 363-5005
(vegetables, herbs, apples)

Terry Emery
Brookhaven Farm
Centreville, N.B.
(506) 276-3275
(vegetables, milling wheat, oats, potatoes)

Bill Flemming
Debec, N.B.
(506) 277-6570
(milling wheat, oats, vegetables, potatoes)

Susan & Lyndon Hodges
Happybrook Farm
Hampton, N.B.
(506) 832-4804
(vegetables, herbs, strawberries)

Karen & Brock Davidge
Good Spring Farm
Mouth of Keswick, N.B.
(506) 363-3744
(vegetables, berries, fruit, herbs,
greenhouse plants & transplants)

Speerville Co-op Flour Mill
Stu Fleischhaker

Debec, N.B.
(506) 277-6371
(whole wheat flour, buckwheat, rye
flour, oat flour, wheat kernels, rye
kernels, oatmeal, cracked wheat)

Harvest Share Co-op
Jeff Kennett
Keswick, N.B.
(506) 363-4376
(vegetables, herbs, strawberries)

Stu Fleischhaker
Debec, N.B.
(506) 277-6371
(milling wheat, hay, rye, vegetables)

Susan Tyler & Clark Phillips
Whaughlinbran Farm
Penobscus, N.B.
(506) 433-3935
(vegetables, beef, raspberries, herbs)

Marlies & Abe Friesen
Black Sheep Farm
Fredericton, N.B.
(506) 459-3077
(apple cider, vegetables, fruit, berries,
currants, rhubarb, raspberry canes,
dried apples)

Megan & Jim Gerritsen
Wood Prairie Farm
Bridgewater, Maine
(207) 429-9765
(vegetables, potatoes, apples, straw-
berries, herbs, milling wheat, hulls
oats, processed oat & wheat products,
maple syrup)

NOVA SCOTIA

**The following Nova Scotia pro-
ducers have been granted certified
organic farming status by the
Organic Crop Improvement Associ-
ation:**

Roy and Mary Carnell
RR1, Hantsport, NS
B0N 1E0
(902) 684-3489
(vegetables)

Todd and Sonia Kidston
RR1
Centreville, NS
B0P 1J0
(902) 678-4439
(vegetables)

Lenny Levine
1659 Preston St.,
Halifax, NS
B3H 3V2
(902) 423-3757
(garlic, apples)

Neil van Nostrand
RR1
Port Williams, NS
B0P 1T0
(902) 542-4655
(vegetables, apples)

Norbert Kungl
Box 16
Walton, NS
B0N 2R0
(902) 633-2292
(vegetables)

Paul and Ruth Coville
RR4
Middleton NS
B0S 1P0
(902) 825-4401
(vegetables)

Hugh Rice
RR1
Kingston, NS
B0P 1R0
(902) 765-6730
(vegetables)

Alan and David Stewart
RR3
Wolfville, NS
B0P 1X0
(902) 542-1942
(vegetables)

Robinson Family Farm
RR1
Kingston, NS
B0P 1R0
(902) 847-8744
(vegetables, apples)

Robert MacDonald
RR1
Mount Uniacke, NS
B0N 1Z0
(902) 632-2730
(vegetables)

MAINE

The following Maine producers have been granted certified organic farming status by the Maine Organic Farmer and Gardener Association:

Jill Agnew
Willow Pond Farm
RFD 2, Box 4105
Sabattus, ME
04280
(207) 375-6662
(mixed vegetables, pumpkins, raspberries)

Charles & Lynn Allen
Sweet Haven
RR3, Box 9280
Union, ME
04862
(207) 785-5137
(mixed vegetables, herbs)

Patricia Ames & Janet Duffy
Pine-Apple Farm
RR3, Box 539
N. Berwick, ME
03906
(207) 676-9405
(mixed vegetables, blackberries, herbs)

Reginald Andrews
P.O. Box 81, Rt. 173
S. Liberty, ME
04949
(207) 589-4495
(apples)

Bob Basile & Karla Bock
Hoof'N Paw Farm
RFD 1, Box 85
New Sharon, ME
04955

(207) 778-3903
(seedlings, herbs, mixed vegetables, potatoes)

Bret & Holly Bates
Bates Farm
R 1, 2069, Shaw Hill
Anson, ME
04911
(carrots, beets, parsnips)

Paul & Jan Beane
Mustard Seed Farm
Box 1, Talmadge Road
Waite, ME
04492
(207) 796-2225
(parsnips, squash, corn, pumpkins, peas, beans, berries, mixed vegetables)

Donald Beckwith & Bruce Hincks
Meadowood Farm
RFD 2, Box 347
Cumberland Center, ME
04021
(207) 846-4294
(squash, mixed vegetables)

Joyce Benson & Peter Paton
Village Green Organic Produce
Box 1540
Troy, ME
04987
(green beans, summer squash, winter squash)

Mollie & Paul Birdsall
Horsepower Farm, RFD 1, Box 63
Blue Hill, ME
04614
(207) 374-5038
(mixed vegetables, dry beans, potatoes, carrots, squash)

Noreen & William C. Blaiklock
Woodcock Farm
SR 2 (Rt. 127), Box 86
Arrowsic, ME
04530
(207) 443-3725
(lamb, beef)

Lynda & Richard Boutin
Hobbs Hill Growers

Hobbs Hill, Box 216
Harrison, ME
04040
(207) 583-6172
(mixed vegetables, herbs, raspberries, strawberries)

Walter & Sarah Boyd
Teel Cove Farm
HCR 35, Box 720
Tenants Harbor, ME
04860
(207) 372-6383
(parsnips, mixed vegetables, raspberries, tree fruits)

Mary & Thomas Boyd-Broemel
28 Sewall Street
Augusta, ME
04330
(207) 622-7614
(mixed vegetables)

Richard Brandel
Brandel Farm
RR1, Box 164
Stockholm, ME
04783
(207) 896-3415
(potatoes, apples)

William & Kathleen Brown
New Ground Growers
RR1, Box 537-B
W. Buxton, ME
04093
(207) 642-3942
(mixed vegetables)

Charles W. Carl
K.J. Tucker's
P.O. Box 4, Tibbets Town Road
Columbia Falls, ME
04623
(207) 255-6256
(mixed vegetables, blueberries, apples)

David, Gerry & Sue Colson
New Leaf Farm, 470 Davis Road
Pownal, ME
04069
(207) 353-6498
(mixed vegetables, herbs, raspberries, blueberries, apples)

Denis Culley
Hard Pressed Products
Rt. 2, Box 2215
Mercer, ME
04957
(207) 587-2971
(carrots, raspberries, apples)

Henry C. Cunningham
RR 1, Box 751
Gouldsboro, ME
04607
(207) 963-7633
(blueberries)

Carl Davis & Ellen Tarbox
HCR, Box 382, Goding Rd.
E. Lebanon, ME
04027
(207) 636-1714
(mixed vegetables, herbs, raspberries)

Wayne Davis
Highland Farm
Hansons Ridge Road, Box 627
Springvale, ME
04083
(207) 324-6891
(mixed vegetables, butternut squash)

Dianne Degan & Greg Johnson
Just-N-Thyme Farm
RR 1, Box 4790
Vassalboro, ME
04957
(207) 873-0717
(mixed vegetables, corn)

Rudd & Lizabeth Douglass
Blueberry Ledge Farm
RFD 2, Box 374
Gardiner, ME
04345
(207) 737-8572
(mixed vegetables, potatoes,
blueberries, raspberries, cranberries)

Gerald & Margaret Drake
Rte. 1, Box 1545, Dixmont, ME
04932
(207) 234-2392
(potatoes)

Gail Edwards & John Hilmer
Blessed Maine Herb Co.

Box 4074
Athens, ME
04912
(207) 654-3994
(herbs, potatoes, peas, blackberries,
apples)

William & Carol Ewell
Red Maple Farm
RFD 1, Box 2000
Cambridge, ME
04923
(mixed vegetables, potatoes)

Jack & Rosemary Fecteau
Serendipity Acres
29 W. Pownal Rd.
N. Yarmouth, ME
04069
(207) 829-5859
(freezer lamb, sausage)

Bob Fenderson & Laura Farmer
263 Silver Road
Bangor, ME
04401
(207) 945-6306
(mixed vegetables, potatoes, beets)

Ken Fine & Brenda Harrington
High Ridge Farm
RFD 1, Box 215
Liberty, ME
04949
(207) 589-4773
(mixed vegetables)

Grace Firth
Firth's Fruit Farm
RFD 1, Box 1460
New Sharon, ME
04955
(207) 778-3904
(mixed vegetables)

Charles Fitzgerald
16 E. Main St.
Dover-Foxcroft, ME
04426
(207) 564-3400
(potatoes)

Peter Foltz
Cedarwood Farm
RR 1, Box 4430

Etna, ME
04434
(207) 269-4071
(mixed vegetables, green beans, car-
rots, beets, parsnips, squash)

Gene Fowler
Wagon Wheel Farm
Nelson Ridge Road
Washington, ME
04574
(207) 845-2446
(mixed vegetables, red & yellow
raspberries, blueberries)

Ed Friedman
RFD 1, Box 1186
Bowdoinham, ME
04008
(207) 666-3372
(mixed vegetables, asparagus, leeks,
basil, giant pumpkins, blueberries)

Mark Fulford
Teltane Farm & Nursery
RR 1, Box 3000
Monroe, ME
04915
(207) 525-7761
(mixed vegetables, garlic, apples)

Nancy Galland & Richard Stander
Fiddler's Green Farm
RFD 1, Box 656
Belfast, ME
04915
(207) 338-3568
(mixed vegetables, baking mixes)

John J. Gay
RFD 3, Box 368
Buzzell Rd.
Biddeford, ME
04005
(207) 499-2359
(pumpkins, squash, wheat, oats)

Jim & Megan Gerritsen
Wood Prairie Farm
RFD 1, Box 164
Bridgewater, ME
04735
(207) 429-9765
(potatoes, mixed vegetables, herbs,
strawberries, apples, wheat, oats)

Jamie Greager & Martie Crone
Rt. 1, Box 725
Palermo, ME
04354
(207) 993-2755
(mixed vegetables, garlic, raspberries,
grapes)

Terrance Gregg
Maple Meadow Farm
44 Mechanic St.
Presque Isle, ME
04769
(207) 764-6450
(potatoes, oats)

Rosey Guest
Bluebird Hill
RD 1, Box 1100
Coopers Mills, ME
04341
(207) 549-7205
(mixed vegetables, lettuce, potatoes,
melons)

Mary Constance-Guinard
Josie Brook Farm
RFD 1, Box 571
W. Buxton, ME
04093
(207) 642-2809
(mixed vegetables)

Kevin Hagan
Hagan Homestead
Concord Corner Rd.
(Berry Rd.)
Embden, ME
(207) 773-3572
(mixed vegetables)

Ann Halkett & Tom Cox
Brightwind Farm
RD 1, Box 79A
Cherryfield, ME
04622
(207) 546-2829
(potatoes, beans, raspberries)

Arthur Harvey
RFD 222
Canton, ME
04221
(207) 388-2860
(blueberries)

Francis Harwood
Franny's Farmers
63 Middle St.
Hallowell, ME
04347
(207) 622-7397
(mixed vegetables)

Paul & Edna Hayes
Indian Summer Farm
RR1, Box 900
Morrill, ME
04952
(207) 342-5136
(mixed vegetables, garlic, onions)

Jane Heart & Beldon Morse
Steeplebush Farm
RR 1, Box 285
Machias, ME
04654
(207) 255-4244
(mixed vegetables, blueberries)

Pol Hermes
Crystal Springs
RFD 3, Hollis Road
Biddeford, ME
04005
(207) 499-7040
(mixed vegetables, herbs)

Barbarina Heyerdahl & Kevin Ernst
Beech Hill Farm
HCR 62, Box 307
Mt. Desert, ME
04660
(207) 244-5204
(mixed vegetables, apples)

Bill & Pat Horton
Horton's Farm Products
Rt. 1, Box 1870
Freedom, ME 04941
(207) 584-4664
(mixed vegetables, corn, pumpkins,
potatoes, raspberries, beef, lamb)

Jamie Huntsberger
Lone Elm Farm
RR 1, Box 285
Morrill, ME
04952
(207) 342-5785
(mixed vegetables, potatoes, corn)

Glenn Jackson
Del Gratia Organic Farm
Box 101
Searsmont, ME
04973
(207) 589-4609
(mixed vegetables, squash, cukes,
potatoes, raspberries, peaches)

Bambi Jones & Tracy Moskovitz
Hidden Valley Farm
Hollywood Blvd.
Alna, ME
04535
(207) 586-5837
(mixed vegetables)

Jason & Barbara Kafka
Checkerberry Farm
RFD 1, Box 263
Guilford, ME
04443
(mixed vegetables, onions, garlic,
basil, potatoes)

Dennis King & Jean Hay
King Hill Farm/Hay's Farm Stand
P.O. Box 92
Blue Hill, ME
04614
(207) 374-2822
(mixed vegetables, carrots, corn,
potatoes, strawberries, raspberries,
lamb)

Kara Packard Krull
The Krull Farm
Box 1, Fountain St.
Bar Mills, ME
04004
(207) 929-6358
(mixed vegetables, herbs)

Theda Lyden & William Coxon
Dig It Farm
RFD 1, Box 425
Pownal, ME
04069
(207) 688-2217
(mixed vegetables)

Ellie MacDougall
Blue Sky Farm
Rt. 9A, P.O. Box 1178
Wells, ME

04090
(207) 985-9207
(herbs, greens)

Bob & Elaine MacLeod
The Farm Stand
RR 1, Box 183, Wakefield Rd.
Hollis Center, ME
04042
(207) 247-5439
(mixed vegetables)

Mark & Bonnie Miller
Sand Hill Farm
RD 2, Box 1886
Coopers Mills, ME
04341
(207) 549-7802
(mixed vegetables, dry beans, potatoes, corn, wheat, freezer lambs)

Stephen & Barbara Miller
Miller's Hives'n Gardens
RR 1, Box 125
Stockholm, ME
04783
(mixed vegetables, strawberries, raspberries, blueberries, apples)

David Mireault
Pine Ridge Farm
857 S. Witham Rd.
Auburn, ME
04210
(207) 786-3685
(mixed vegetables)

Francis & Mary Montag
Broken Tree Farm
RFD 2, Box 4550
Winthrop, ME
04364
(207) 685-9647
(mixed vegetables, squash, corn, beans, peas, lamb, beef, pigs, rabbits)

Michael Murphy
Briarwood Farm
P.O. Box 104
Stillwater, ME
04489
(mixed vegetables)

Leif & Margit Nordberg
Clover Hill Organic Farm

RR 1, Box 241A
Alfred, ME
04002
(207) 490-1105
(mixed vegetables)

Arnold & Bonnie Pearlman
Crossroad Farm
Box 3230
Jonesport, ME
04649
(207) 497-2641
(mixed vegetables, potatoes, beets, carrots, squash, cabbage, apples)

A.P. Picard
9 Highview Terrace
Veazie, ME
04401
(207) 942-8157
(beets, raspberries)

Jane Pieriboni & Sidney Marshall
Essex St.
Dover-Foxcroft, ME
04426
(207) 564-2307
(mixed vegetables)

Ram Island Farm
Ram Island Farm Herbs
Cape Elizabeth, ME
04107
(207) 767-4367
(mixed herbs, everlastings)

Margaret & Peter Rearick
Summertree Farm
RR 1, Box 100
Hebron, ME
04238
(207) 966-3630
(mixed vegetables, apples, pears, lamb)

Terry & Carol Rhoads
Buck Meadow Farm
P.O. Box 340
Denmark, ME 04022
(207) 452-2665
(mixed vegetables, broccoli, winter wheat, buckwheat)

Dennis Rioux
Swan Brook Farm

677 South St.
Biddeford, ME
04005
(207) 282-6570
(beef)

Cathy Roberts
RFD 1, Box 40
Liberty, ME
04049
(207) 589-4336
(mixed herbs)

Miller Rush
K.M. Associates
551 Green End Ave.
Middletown, RI
02840
(401) 849-3424
(blueberries)

Martica Sawin
Shady Lane Farm
Cobbs Bridge Rd.
New Gloucester, ME
04260
(207) 926-4197
(mixed vegetables, asparagus, winter squash, beans, raspberries)

Sue & George Sergeant
Patchwork Organic Gardens
RFD 8, Box 5577
Brunswick, ME
04011
(207) 442-8195
(mixed vegetables, herbs)

Robert K. Sewall
Sewall's Orchards
P.O. Box 182
Lincolnton, ME
04850
(207) 763-3956
(blueberries, grapes, apples)

Eric Sideman & Barbara Eldridge
Ridgeside Farm
RFD 1, Box 1455
Greene, ME 04236
(207) 946-7317
(strawberries, lamb)

Andrea Smith
Brae Maple Farm

RFD 3, Box 9095
Union, ME
04862
(207) 785-4978
(mixed vegetables, strawberries)

Deb Soule
Avena Botanicals
P.O. Box 365
W. Rockport, ME 04865
(207) 594-0694
(mixed herbs)

Dave Strater
McKabe Estate
2220 Ohio St.
Bangor, ME
04401
(207) 947-2416
(mixed vegetables, pumpkins, squash,
raspberries, pears, apples)

Cynthia & William Thayer
Darthia Farm
Box 520, W. Bay Rd.
Gouldsboro, ME
04607
(207) 963-7771
(mixed vegetables, potatoes, raspber-
ries)

Teresa Visinare & Beth Hartman
Moderne Farming Ladies
87 Huntington Ave.
Portland, ME
04103
(207) 797-8985
(mixed vegetables)

Paul & Karen Voickhausen
Happy Town Farm
RR 2M, Box 3760
E. Holden, ME
04429
(207) 667-9212
(mixed vegetables, green beans, rasp-
berries, apples, lamb)

Elizabeth Weir
Pleasant Valley Acres
547 Pleasant Valley Rd.
P.O. Box 474
Cumberland Center, ME
04021
(207) 829-5588

(mixed vegetables, herbs, raspberries,
blueberries, grapes, veal, beef)

Henry & Lorna White
Flag Hill Farm
RR 2, Box 4250
E. Holden, ME 04429
(207) 667-3186
(mixed vegetables, apples, lamb)

Ben & Ariel Wilcox/Tom Roberts
Peacemeal Farm
Box 1010, North Road
Dixmont, ME 04932
(207) 257-3943
(mixed vegetables, strawberries, rasp-
berries, apples)

Ann Wilson & Cecil Linscott
White's Orchard

P.O. Box 2450
Frankfort, ME
04438
(207) 223-5525
(potatoes, apples)

Wolfe's Neck Farm
2 Burnett Rd.
Freeport, ME
04032
(207) 865-4469
(beef)

Tom & Ellen Wood
Blue Whale Berry Farm
Rt. 1, Box 1505
Litchfield, ME
04350
(207) 268-4489
(raspberries)

Addresses of interest to organic growers

OCIA INTERNATIONAL

c/o Betty Kananen, 3185 Twp. Rde. 179, Bellefontaine, Ohio 43311
(513) 592-4983

OCIA-PRINCE EDWARD ISLAND

c/o Daphne Harter, Box 299, Cornwall, PEI C0A 1H0 (902) 675-3501

OCIA-NEW BRUNSWICK

c/o Mrs. Karen Davidge, RR#3, Mouth of Keswick, NB E0H 1N0
(506) 363-3744

OCIA-NOVA SCOTIA

c/o Alan Stewart, RR#3, Wolfville, NS B0P 1X0 (902) 542-1942

MOFGA

c/o Eric Sideman, P.O. Box 2176, Augusta, ME 04330 (207) 622-3118

CANADIAN ORGANIC GROWERS (COG)

Box 6498, Str. J., Ottawa, Ont., K2A 3Y6

ORGANIC FOODS PRODUCTION ASSOC. OF N.A.

P.O. Box 31, Belcherown, MA 01007 (413) 323-6821

RESOURCE EFFICIENT AGRIC. PRODUCTION (REAP) - CANADA

Box 125, Glenora House, Ste. Anne de Bellevue, PQ H9X 1G0
(514) 398-7743

Workshop participants



(With apologies to those who have moved, or who participated but were not signed up on the original list)

Abdoud, Antonio, Biology Dept., Dalhousie University, Halifax, N.S. B3H 4J1. (902) 424-2252. PhD student from Brazil studying phosphorus cycling in ecological farming systems.

Armstrong, Christian, RR2, New Denmark, N.B. E0J 1T0. (506) 553-6764. Farmer/I. Small (part time) market gardener. Broccoli, cauliflower, bush beans, cabbage, pumpkins, squash. A Dalhousie DPA.

Asiedu, Samuel K., Department of Plant Science, Nova Scotia Agricultural College, P.O. Box 550, Truro, N.S. B2N 5E3. (902) 895-1571. University. Instructor/Researcher - production and storage management of horticultural crops.

Baldwin, Ben & Wera, Douglasfield, RR2, Chatham, N.B. E1N 3A2. (506) 622-0314. Farmer/CO. Small market gardener.

Barczyk, George, RR, Port Elgin, N.B. DPA.

Beaton, Silvia & Taylor, Nancy, Alexandra Farms, Charlottetown RR1, P.E.I. C1A 7O6. (902) 569-3201. Farmer, student. Silvia - Jersey & horses. Hobby is farming with non-chemically poisoned animals and milk. Nancy - student, interested in gardening and agricultural alternatives as a consumer and possible producer.

Beaulieu, Samuel & Pauline, Site 56, Box 5, Grand Falls, N.B. E0J 1M0. (506) 473-1256. Farmer/I. Hobby farming with a roadside stand. Growing apples, raspberries, corn, beans, beets, carrots, pumpkins, squash, zucchini and cucumbers. About 12 acres in all.

Bedell, Jim & Kay, RR1, Hatfield Point, Kings County, N.S. E0G 2A0. (506) 485-2145. Community activists.

Bell, Colin R, Department of Biology, Acadia University, Wolfville, N.S. B0P 1X0. (902) 542-2201. University faculty. Microbiologist - bacteria in Rhizosphere.

Birdsall, Paul & Mollie, RFD #1, Bluehill, ME 04614. (207) 374-5038. Farmers/OR. Small diversified farm involving livestock and organic vegetables and storage crops (certified organic).

Bosworth, Andrew, 56 Hill St. Orono, ME 04473. (207) 866-3053, or 581-3266 (work). Scientific technician.

Boulay, Francois, N.B. Dept. of Agriculture, Eastern Region, 337, Water St., Chatham, N.B. E1N 1B2. (506) 773-7091. Government.

Brinton, Will, Woods End Laboratory, RD 1, Box 4050, Old Rome Rd., Mt. Vernon, ME 04352. (207) 293-2457.

Buerkle, Beth, RR2, St. Andrews, N.B. E0G 2X0. (506) 529-4382. Farmer/I/OR (not certified). Hobby farmer approaching self-sufficiency using organic methods where possible.

Cameron, Caroline, 5683 Harris St., Halifax, N.S. B3K 1H3. (902) 425-1069. Biology BSc. graduate. Hoping to be involved in Ecological Agricultural Research.

Campbell, Susan, Box 32 Site 6, RR3, Armdale, N.S. B3L 4J3. (902) 876-7906. Student. Biology student interested in organic methods and feasibility as related to large scale marketing.

Carruthers, Eva & James, RR5, Kensington, P.E.I. C0B 1M0. (902) 836-5339. Farmer/CO.

Chevrier, Gerry, P.O. Box 121, Stanly, N.B. E0H 1T0. (506) 367-2339.

Clayden, Gerry, 31 Simcoe St., Fredericton N.B. E3B 2W9. (506) 459-7467. Consumer.

Clohossey, Mariene, RR2, Millville N.B. E0H 1M0. (506) 463-2777 or RR2, Tignish, P.E.I., C0B 2B0. (902) 882-3232. Farmer/OR. Blueberry producer; beef producer.

Clough, Dr. Katherine S., Prince Edward Island Department of Agriculture, P.O. Box 1600, Charlottetown P.E.I. C1A 7N9. (902) 368-5636. Government. Crops supervisor PEIDA.

Coleman, Shirlyn, RR1, Mouth of Keswick, N.B. E0H 1N0. (506) 363-3853. Consumer. Interested consumer.

Coolen, Wendy, 122 Bunbury Rd., Charlottetown, P.E.I. C1A 7G8. (902) 569-3470. Landscape gardener/groundskeeper. Landscape gardener interested in organic methods.

Coom, David, 180 St. John St., Fredericton, N.B. E3B 4A9. (506) 458-8747. Conservation Council of New Brunswick.

Corburn, Mr. & Mrs. Jerald, RR1, Sussex, N.B. E0E 1P0. (506) 433-4885. Farmer/OR. Full-time farmer interested in organic methods. Our profits are in livestock but we are also interested in vegetables.

Covert, Jeffrey, 2155 Newton Ave., Halifax, N.S. B3L 3C1. (902) 429-6851. Student.

Cozac, David, 213 Charlotte St., Fredericton, N.B. E3B 1L5. (506) 454-7554.

Craig, Brian, 63 Brackley Point Rd., Charlottetown, P.E.I. C1A 6T3. Ph (902) 5664536.

Croteau, Gerry, RR2, Box 1500, Brewer, ME 04412. (207) 989-2769. Student. Graduate student, plant and soil science, University of Maine, Orono.

Currie, A., Currie's Greenhouse, 228 Fulton Ave, Fredericton, N.B. E3A 2B8.

Currie, Helen E., RR4, Fredericton, York Co. N.B. E3B 4X5. (506) 472-6350. Farmer/I. Procedures of greenhouse vegetables, bedding plants, field vegetables, cut flowers and berries; using biological controls when and where necessary.

Cuthbertson, Leslie, Atlantic Environment Network, 180 St. John St., Fredericton, N.B. E3B 4A9. (506) 453-0680. Writing article on agriculture for Tides of Change, newsletter of the AEN.

Davenport, Bill, PO Box 14, Wolfville, N.S. B0P 1X0. (902) 542-2876. Soil and water consultant. Consultant: Soil analysis - better crops, reduced costs; Water analysis - pollutants, farm chemicals, oils, toxins, etc.

Davidge, Mrs. Karen, 566 Keswick Ridge Rd., Mouth of Keswick, N.B. E0H 1N0. (506) 363-3744. Farmer/OR. Market gardener: 2 years OCIA certified N.B. Specialities: herbs (plants, fresh cut & dried), mixed vegetables, orchard (apples, cherries, pears, plums), 100 ft greenhouse. President of the N.B. Farm Markets Association.

Doel, Donna S., 76 So. 4th St., Old Town, ME 04468. (207) 581-3266. Student. In soil science working with the U.S.D.A.

Drake, Margaret, P.E.I. Department of Agriculture, Box 1600, Charlottetown, P.E.I. C1A 7N9.

Drummond, Bill, RR2, Centerville, N.S. B0P 1J0. (902) 678-1799. Consumer. OCIA-N.S.

Dyck, Elizabeth, 322 Lincoln St., Bangor, ME 04401. (207) 941-9820. Student. Plant and Soil Science Dept., University of Maine, Orono.

Dyer, Lucy, 758 George St., Fredericton, N.B. C3B 1K5. (506) 455-8045. Consumer and organic home gardener.

Dykeman, Brian, 46 Mayflower, Fredericton, N.B. E3B 4X4.

Easter, Ernest, RR1, Box 143, New Sweden, ME 04762. (207) 896-3183. Consumer/Gardener. Particular interest - organic farming for therapeutic programming purposes.

Emery, Terry, RR5, Centerville, Carleton Co. N.B. E0J 1H0. (506) 276-3275. Farmer/CO.

Erhardt, Wilfred H., 103 Deering Hall, University of Maine, Orono, ME 04469. (207) 581-2937. Government. Extension - vegetables.

Erich, Susan, Dept. of Plant and Soil Sciences, University of Maine, Orono, ME 04469. (207) 581-2997. University faculty. Interested in nutrient availability from manures, sludges, and woodash.

Ferraro, Phil & Butaine, Jane, Box 598, Kingston, N.S. B0P 1R0. (902) 765-4554. Farmers/OR. Small market farmer - certified organic. Berries, vegetables, rhubarb, flowers and also organic landscapers (permaculture designs, perennials, edible landscaping). Plus free-range chickens, day-old chicks and freezer-ready broilers.

Ferris, Dwight, Youngs Cove Rd., Queens, N.B. E0E 1S0. (506) 488-3114. Farmer/I. Small produce and beef farmer interested in organic methods.

Fitzpatrick, Donald, RFD 1, Box 332, Houlton, ME 04730. (207) 5326015. Farmer/CO. Potato farmer - mostly commercial with some organic.

Fleischhaker, Stu, RR5, Debec, N.B. E05 1J0. (506) 277-6371. Farmer and Rep. of business/OR. Grain miller.

Fobes, Martin, 6140 Allan St., Halifax, N.S. B3L 1G6. (902) 429-1212. Student.

Foulds, Chantal, 623 Weller, Peterborough, Ont. K9J 4W8. (705) 748-0085.

Fournier, Flore, P.O. Box 204, Macdonald College, Ste. Anne de Bellevue, P.Q. J0P 1P0. (514) 398-7818.

Fraser, Dr. Joanna, Department of Plant Science, Nova Scotia Agricultural College, P.O. Box 550, Truro, N.S. B2N

5E3. (902) 895-1571. Government. Associate Professor/-
Researcher - forages with emphasis on white clover.

Friesen, Abe & Marlies, Friesen Drive, RR6, Fredericton,
N.B. E3B 4X7. (506) 459-7429. Farmer/OR.

Frost, Brian, Aviva Farms, RR2, St. Andrews, N.B. E0G
2X0. (506) 529-8278. Farmer/OR. Almost organic
homestead planning to grow to a small certified organic
mixed farm - dairy, vegetables, fruit, beef/poultry, eggs.

Fyfe, Alfred, Breadalbane RR1, Stanley Bridge, P.E.I. C0A
1E0. (902) 866-2993. Farmer/CO. Dairy farmer interested
in organic methods.

Germaine, Tom, RR1, Bonshaw, P.E.I. C0A 1C0.

Gerritsen, Jim and Megan, WoodPrairie Farm, Bridge-
water, ME 04735. Organic farmers certified in Maine and
Nova Scotia.

Groenenberg, Dirk, RR2, Lakeville, N.B. E0J 1S0. (506)
276-4754. Worked in developing countries. Future farmer
seriously interested in organic farming and a sustainable
society involving the whole world.

Haliburton, Thomas H., N.S.A.C., Plant Science Dept.,
Box 550, Truro, N.S. B2N 5E3. (902) 895-1571. Govern-
ment & university. Instructor - vegetable production and
storage.

Hendricken, J.P., RR5, Mt. Stewart, P.E.I. C0A 1T0.
(902) 676-2849.

Henry, Roger, Breadalbane, P.E.I. Department of Agricul-
ture, P.O. Box 1600, Charlottetown, P.E.I. C1A 7N3.
Farmer & government.

Hill, Nick, c/o Biology Dept., Acadia University, Wolfville,
N.S. B0P 1X0. (902) 678-8109. Plant ecologist; researcher.

Hill, Stuart, Ecological Agriculture Project, P.O. Box 225,
Macdonald College, Ste. Anne de Bellevue, P.Q. H9X 1C0.
(514) 398-7771.

Horgan, Gerard and Marlene, RR6, Truro, N.S. B2N
5B4. (902) 893-2618. Consumer. Aspiring sheep farmer,
interested in organic farming.

Hubbard, Charles & Judith, RR4, Amherst, N.S. B4H
3Y2. (902) 667-4006.

Huntsberger, Jamie, RR2, Box 285, Morrill, ME 04952.
(207) 342-5785. Farmer/OR. Organic farmer - vegetables,
pork, sheep.

Jordan, Don, Gladstone, RR1, Murray Harbour, P.E.I. C0A
1V0. (902) 962-3031. Farmer/OR. Small market gardener.

Jannasch, Rupert, 583 Prince St., Apartment #2, Truro,
N.S. B2N 1G3. (902) 893-4079. Student.

Kennett, Jeff, RR2, Keswick Ridge, York Co. N.B. E3L
2Y1. (506) 363-4376. Farmer/OR. Gardener Market
Co-op.

Kenny, Dr. & Mrs. Gordon S., Box 55, Truro, N.S. B0N
5B6. (902) 662-3150. Farmer/CO. Small market garden;
sheep farmer (small flock).

Kickham, Keith J., RR5, Charlottetown, P.E.I. C1A 7J3.
(902) 569-2257. Farmer/CO. Interested in organic beef
and market gardens.

Kidston, Todd, RR2, Centerville, King's Co. N.S. B0P 1J0.
(902) 678-4439. Farmer/OR. Farmer: dairy (Jersey cows
and goats), market gardens.

King, Dennis & Hay, Jean, Box 92, Blue Hill, ME 04614.
(207) 374-2822. Farmer/OR. Diversified organic farm,
farm stand, vegetables, sheep.

Kneen, Brewster & Cathleen, 14 Blong Ave., Toronto,
Ont. M4M 1P2. (416) 469-8414. Food systems analysis.

Kungl, Norbert, RR1, Walton, N.S. B0N 2R0.

Lafond, Serge, Ministere de L'agriculture, Bureau
Regional, 337, rue Moreault (2e etage), Rimouski, Que.
G5L 1P4. (418) 722-3615. Government/biologiste.
Regional counsellor for ecological agriculture.

Lalla, Sat, Lalla & Associates Ltd., 6 Hawthorne Terrace,
Fredericton, N.B. E3B 2S5. (506) 454-3259. Rep. of
business. Consultant - food poisoning. Supplier of liquid
fish fertilizer.

Langham, Elizabeth, 27 Pierce St., Orono, ME 04473.
(207) 866-5649. Student. Student & future organic farmer
- animals and gardening.

Lapunte, Daniel, RR3, Bury, P.Q. J0B 1J0. (819) 872-
3346.

Larsen, Mr. & Mrs. Harold, RR4, Breadalbane, P.E.I.
C0A 1E0. (902) 964-2267. Other/I. Helping in chicken
farm and now cultivating grain on unused farm land.

LeBlanc, Paul, Agriculture Canada, Senator Herve J.
Michand Exp. Farm, P.O. Box 667, Bouctouche, N.B. E0A
1G0. (506) 743-2464. Gov't. Researcher - vegetables.

Lee, Mary M., P.O. Box 175, Winterport, ME 04496. (207) 223-4055. Student (graduate). Shellfish aquaculture; small organic farm apprentice 1989.

Libby, Russell W., Research Director, Dept. of Agriculture, Commissioner's Office, State House Station #28, Augusta, ME 04333. (207) 289-3871. Farmer. Researcher interested in potential sellers/growers home scale farmer.

Liebman, Dave, Department of Plant and Soil Sciences, University of Maine, Orono, ME 04469. Sustainable Agriculture Coordinator.

Ling, David, RR1, Winsloe, P.E.I. C0A 2H0. (902) 368-1262. Farmer. Mixed crop-livestock, organic.

Loucks, Ron, 24 Clayton Park Dr., Halifax, N.S. B3H 1L3. (902) 443-1113. (part-time) farmer/OR. Organic beef and apple grower.

Luffman, Margie, Agriculture Canada, P.O. Box 667, Bouctouche, N.B. E0A 1G0. (506) 743-2464. Government. Researcher interested in organic methods.

MacDonald, Albert W., Flat River, P.E.I. C0A 1B0. (902) 659-2094. Farmer/I. Potato and beef farmer interested in organic methods.

MacDonald, Joan, Centerville RR2, Kings Co. N.S. B0P 1J0. (902) 678-6434. Farmer/CO. Sheep and Goat farmer; mostly grass fed animals but would like to utilize organic grain and forages. Sometimes raise baby beef, no pesticides.

MacDonald, Malcolm, Kinlock Rd., RR1, Charlottetown, P.E.I. C1A 7J6. (902) 569-2678.

MacDonald-Keefe, Clare, 1815 Preston St., Halifax, N.S. B3H 3V7. (902) 425-6482. Consumer. Interested consumer & potential farmer.

MacFadyen, Donald & Carolyn, RR4, Hunter River, P.E.I., C0A 1N0. (902) 964-2418. Farmer/CO. Farrow to finish hog producers.

MacKenzie, Bill, Market Development Branch, N.B. Department of Agriculture, P.O. Box 6000, Fredericton, N.B. E3B 5H1. (506) 453-2214. Government. Market planning and Research Officer. Interested in developments on production side and in the ability to meet consumer demand.

MacKenzie, Mr. & Mrs. David E., RR4, Breadalbane, P.E.I. C0A 1E0. P.E.I. (902) 964-3068. Farmer/I. Chicken farmer trying to use only organic-based feed.

MacMillan, John K., P.O. Box 6000, N.B. Dept. of Agriculture, Fredericton, N.B. E3B 5H1. (506) 453-2109. Government. OCIA-N.B. contact for N.B. Dept. of Agriculture.

MacRae, Rod, Ecological Agriculture Project, Macdonald College, P.O. Box 225, Ste. Anne de Bellevue, P.Q. H9X 1C0. (514) 398-7771. Student. Research assistant, Ecological Agriculture projects and PhD student doing research on institutional barriers to more widespread adoption of sustainable agriculture in Canada.

McCabe, Bertha & George, RR3, Summerside, P.E.I. C1N 4J9. (902) 887-2399. Farmer/I. Interested in small market garden. Beef producer. Organic grains.

McLaughlin, Dale & Stella, RR1, Aroostook, N.B. E0J 1B0. (506) 273-3545. Farmer/I.

McLean, Sian Gwynne, Black Avon, RR2, Heatherton, N.S. B0H 1R0. (902) 3862474. Farmer/OR. Manufacture organic tofu. Small market garden (garlic, lettuce, spinach, carrots etc).

McLeod, Ethel & Doug, RR1, Hampstead, N.B. E0G 1Y0. (506) 448-8508 (work); 488-2651 (home). Farmers/OR. Beekeeper and small organic market gardener.

McPamoft, Malcolm, Charlottetown, RR1, Kinlock Rd., P.E.I. C1A 7J6. (902) 569-2672. Farmer/CO.

Mentik, Herman, Box 61, Grand Pre, N.S. B0P 1M0. (902) 542-7366. Farmer/CO. Dairy farmer interested in organic methods.

Merrick, Laura C., Department of Plant and Soil Sciences, University of Maine, Orono, ME 04469. (207) 581-2950. University researcher. Crop genetic resource evaluation; crop evolution; specifically - squash, grain, lupins.

Michalica, Karel, P.O. Box 6000, NBDA, Fredericton, N.B. E3B 5H1. (506) 453-2109. Government.

Miranda, Giselle, c/o Bart Hall-Beyer, RR3, Scotstown, P.Q. J0B 3B0.

Morash, Cheryl, 44 Mount Edward Road, Apt. #5, Charlottetown, P.E.I. C1A 5S3. (902) 892-7248. Consumer & agricultural lab technician. Interested in organic methods of production.

Murphy, Bill, Department of Plant and Soil Sciences, University of Vermont, Burlington, VT. 05405. Professor, author of Greener Pastures on Your Side of the Fence - Better Farming With Voisin Grazing Management.

Nabuurs, Arnold A., RR2, Lower Montague, P.E.I. C0A 1R0. (902) 838-4510. Farmer/I. Commercial greenhouse (bedding plants); U-pick strawberries. Looking to expand into organic vegetables.

Offer, Paul, The Doctor's Inn & Organic Market Gardens, Tyne Valley, P.E.I. C0B 2C0. (902) 831-2164. Farmer/OR.

Oruuku, Livingstone, c/o Steve Reaman, RR1, Ellerslie, P.E.I. C0B 1J0. Teacher/organic agriculturist from Kenya working on Prince Edward Island.

Otis, Therese, Ag. Can. Research Stn., 430 Boul. Gouin, St. Jean sur Richelieu, P.Q. J3B 6Z8.

Patriquin, David G., Biology Department, Dalhousie University, Halifax, N.S. B3H 4J1. (902) 494-2252.

Perry, John P., St. Louis, P.E.I. C0B 1Z0. (902) 882-2455. Farmer/CO. Mixed vegetable farming.

Phaneuf, George, RR1, Box 1050, St. Antoine, N.B. E0A 2X0. (506) 743-6132. Rep. of business. Maritime distributor of farm-tech service fertilizers (made from natural and organic ingredients).

Pilson, John, 76 South Fourth St., Old Town, ME 04468. (207) 9455035. Student. Student at University of Maine in the Sustainable Agriculture Program.

Pinsent, Morley E., High Meadows Farm, South Granville, RR2, Breadalbane, P.E.I. C0A 1E0. (902) 9642991. Farmer/OR. Certified organic (OCIA); herbs, speciality - vegetables & flowers. Use farm output for producing value added speciality products. Researcher & planning consultant for developing small farm; organic and sustainable agriculture programs and systems.

Pobihurchely, Sid, 100 Rochester St. Fredericton, N.B. E3B 4T1. (506) 455-6912.

Prince, Denis, New Brunswick Dept. of Agriculture, 1425 King, Bathurst, N.B. E2A 1S7. (506) 547-2098. Government.

Ramos, Andre de Avila, NSAC, Dept. of Animal Science, P.O. Box 550, Truro, N.S. B2N 5E3. (902) 895-1571. Student. Interested in pasture.

Reaman, Steve, RR1, Ellerslie, P.E.I. C0B 1J0. (902) 831-2788. Farmer/CO. Dairy producer interested in non-chemical food production. Interested in red meat production (e.g. beef & sheep); horticulture; organic soil use practices.

Reibling, Dave, Oak Manor Farm, RR1, Tavistock, Ont. N0B 2R0. (519) 662-2385. Organic farmer.

Rhyno, Don, P.O. Box 2910, Armdale, Halifax, N.S. B3L 4N5. (902) 876-7881. Rep. of business. Wholesaler - interested in background information for better understanding of organic agriculture.

Richard, Paul A.D., 3655 Rosemeade Ave. Halifax, N.S. B3L 4K9. (902) 454-5527. Researcher.

Rowell, Rae, Rm. 20 Rogers Hall, University of Maine, Orono, ME 04469. (207) 581-2736. Student. Studying sustainable agriculture techniques that are applicable to Maine.

Russell, Keith, Co-op Atlantic, P.O. Box 750, Moncton, N.B. E1C 8N5. (506) 858-6037. Rep. of business. Marketer interested in acquiring organic products for sale to food trade.

Sabine, Wayne, RR2, Arthurette, N.B. E0J 1C0. (506) 273-3122. Farmer/OR. Certified; organic potatoes.

Samson, Roger, Box 125, Macdonald College, St.-Anne-de-Bellevue, P.Q. H9X 1C0. (514) 398-7873. President of Resource Efficient Agriculture Production (REAP).

Sanders, Richard, Plant Science Dept., NSAC, Truro, N.S. B2N 5E3. (902) 896-1561. Government. Scientist interested in good production.

Schaefer, Thomas, RR4, Centerville, N.S. E0D 1H0. (902) 2764659. Farmer/OR. Dairy/hog farmer; no chemicals or pesticides used in farm operation.

Schneider, Gary, RR6, Cardigan, P.E.I. C0A 1G0. (902) 838-2678. Organic gardener/naturalist.

Scholz, Monique, c/o Bart Hall-Beyer, RR3, Scotstown, P.Q. J0B 3J0.

Schulman, Daniel, 55 Fitzroy St., Charlottetown, P.E.I. C1A 1R4. (902) 892-3632. Consumer. Environmental technology college instructor, possible future grower, past director of food co-op dedicated to buying organic food.

Sideman, Eric, MOFGA, RFD 1, Box 1455, Greene, ME 04236. (207) 946-7317. Farmer/OR & consultant. Director of technical services for the Maine Organic Farmers & Gardeners Assoc.

Simmons, Brenda M., Agriculture Canada, P.O. Box 2949, Charlottetown, P.E.I. C1A 8C5. (902) 566-7308. Government. Agriculture Canada development officer.

Sipos, John, 202 Brownlow Ave., Suite 304, Tower D, Dartmouth, N.S. B3B 1T5. (902) 468-22840. Farmer/CO; Rep. of business. Technical marketing co-ordinator, Acadian Seaplants Ltd. - manufacturer of seaweed-based agricultural products.

Stark, Tim, 213 Brookhaven Drive, Nitro, W.V. 25143. (304) 776-2632. Student.

Steel, Elizabeth, RR2, St. Andrews, N.B. E0G 2X0. (506) 529-3685. Consumer & former farmer. Interested in organic products as a consumer. Future involvement in organic farming.

Szabo, Steven, P.E.I. Department of Agriculture, Box 1600, Charlottetown, P.E.I. C1A 7N3. (902) 368-5617. Government. Government extension worker.

Tait, Jeanne, 865 Barker St., Fredericton, N.B. E3A 3K4. (506) 472-4223. Rep. Policy Secretariat, Prov. of N.B., Cent. Bldg., Fredericton, N.B. E3B 5H1. (506) 453-2314. Government.

Talbot, Andre, Biology Department, Dalhousie University, Halifax, N.S. B3H 4J1. (902) 424-2149. Student. Researcher.

Tindall, Timothy T., 6 N. Main St. #5, Orono, ME, U.S.A. 04473. (207) 866-7968. Student. Masters candidate - research. Sustainable agriculture.

Toner, Conrad, P.O. Box 1283, Grand Falls, N.B. E0J 1M0. (506) 473-2673. Farmer/CO. Potato farmer interested in organic methods.

Toombs, Ronald, RR2, Hunter River, P.E.I. C0A 1N0. (902) 963-2302. Farmer/I. Hog and grain farmer.

Tracy, Valerie A., 16 Tucker St., Norway, ME 04268. (207) 743-6452. Consumer. Recent graduate student interested in sustainable agriculture.

Tremblay, Roger, Comp. A-4, Site 25, RR12, Fredericton, N.B. E3B 6H7. (506) 459-1788. Consumer. Looking for organically-grown vegetables and fruit products.

Tyler, Susan, Whaelghinbran Farm, Penobscuis, N.B. E0E 1L0. (506) 433-3935. Farmer. Certified organic, vegetables, raspberries, herbs, beef.

Van Nostrand, F.C. (Neil), RR1, Port Williams, N.S. B0P 1T0. (902) 542-4655. Farmer/OR. A beginner biodynamic small farmer. A little of everything and not too much of anything - livestock, market garden, orchard, grapes, grain, marsh products.

Van Steenbergze, Paul, 408 Neville Hall, Dept. of Mathematics, University of Maine, Orono, ME 04469. (207) 581-3957. Student. Organic gardener.

Veinot, Margaret & Allister, RR1, Vernon Bridge, P.E.I. C0A 2E0 or P.E.I. Dept. of Agriculture, P.O. Box 1600, Charlottetown, P.E.I. C1A 7N3. (902) 651-2092. Government. Agriculture resource worker with sustainable agriculture section. P.E.I. Dept. of Agriculture.

Vido, Alex, 842 Windsor St. Fredericton.

Vido, Peter, RR6, Perth, N.B. E0J 1V0. Farmer/OR. Small farmer organically farming for 12 years (not certified). 80 acres of cleared land, 20 acres yearly in grains (oats, wheat, rye, spelt, buckwheat, flax, millet). Other acres in forages & pasture (cattle, draft horses, donkeys, sheep, goats, bees). Some small fruits & vegetables. Part of fieldwork done with horses.

White, Dwaine, RR6, Woodstock, N.B. E0J 2B0. (506) 328-6040. Farmer/CO. Potato farmer. Also small grains for feed and seed (buckwheat, clover seed, timothy seed).

Yoder, Chris, 16 Harrison St., Brookline, MA 02146. (617) 566-7442. Apprentice on an organic farm. Looking for justice, sustainability and cheap land.

Young, Ben L., Box 3205, Strn B, Kingsley, N.B. E3A 5G9. (506) 363-3305. Farmer/OR. Small market gardener.

Zibilske, Larry, Dept. of Plant and Soil Sciences, University of Maine, Orono, ME 04469. (207) 581-2939.

Also in attendance:

Yvonne Audet
Joanne Driscoll
J. Gauvin
Tom Hunter
Kevin McCully
Jersey Prytyk
Roger Tremblay

Jean Cloutier
Harry Elsinga
John Hardy
Emery LeBlanc
Janna Nicholas
Mary Ann Savoy
Blair Vanomme



**ORGANIC CROP IMPROVEMENT ASSOCIATION
OCIA - NEW BRUNSWICK CERTIFICATION STANDARDS
1991**

The aim of OCIA-NB is to create a farm organism in harmony with its natural environment and in balance with the requirements of those who work there, and with the market it supplies.

PRESENTATION

These standards have as their basis stewardship of the land, rather than its exploitation, as well as production of top-quality food for the consumer. Reliance on chemical fertilizers and pesticides is taken as a strong sign that the crop being grown is not in harmony with its natural environment (soil, climate, etc.), and therefore meets neither the fundamental criterion of organic production nor the expectation of the final consumer.

1. ADMISSIBILITY

(a) Certification may be of a whole farm, or on a field-by-field basis. If the latter, no fields will be certified unless the aim is to convert the entire farm to organic methods over an appropriate time span; and fields may not be rotated in and out of organic production.

(b) To be certified an applicant must demonstrate a reasonable knowledge of organic agriculture, and cause no reasonable doubt to exist as to that applicant's willingness or capability of adherence to those certification standards.

(c) Because of the possibility of confusion, no crop can be certified as organic if the same crop is also produced elsewhere on the farm using non-organic methods, unless the farmer can clearly demonstrate to the certification committee that there exists both the physical facilities and the organizational ability to ensure that there is no possibility of crops mixing. Quantity verification will be expected to coincide with acreage. This criterion applies equally to situations when uncertified crop is produced by the same farmer on another farm unit, or is purchased by him for resale.

(d) All soils in certified fields must contain at least 3% organic matter. The certification committee may waive this requirement if the applicant demonstrates a strong soil-building program, but in no case shall soils containing less than 2% organic matter be certified.

(e) Before it can be certified a field must have been free from unacceptable pesticide or unacceptable fertilizer application

for 3 years. (Example: If a field had unacceptable fertilizer or pesticide in 1989, it would not be certified until 1993.)

(f) In cases where an adjoining farm or field is growing heavily sprayed crops, there must exist adequate physical barriers, or, sufficient distance between organic crops and sprayed crops to maintain the integrity of the certified fields. Where there is any possibility of drift contamination, in the judgement of the certification committee or the third-party agent, that field cannot be certified.

(g) Complete information describing previous and current farm practices must be provided, including an outline for achieving strict compliance with standards and a complete audit trail.

(h) To be certified, a field must be managed in accordance with required practices and using only authorized products.

(i) The applicant must provide a notarized or sworn affidavit attesting to the truth of information furnished and adherence to these standards.

2. REQUIRED PRACTICES

(a) A long-term soil management program with the goal of optimum soil health.

(b) Crop rotation for non-perennial crops.

(c) Regular monitoring and assessment of soil and crop nutrient balances to ensure quality and productivity. Soil testing for each field, including organic matter content, in the first year of certification.

All members must manage their soils responsibly, with the intent to improve soil fertility and tilth through proper management practices. If any problems arise that are associated with nutritionally imbalanced soils, such as poor plant growth or excessive pest pressure (including insects and/or weeds), then it is the responsibility of the grower to test the field(s) in question for macro- and micronutrient, cation exchange capacity, organic matter, and base saturation. These results should be used in part to determine reasonable management options to correct soil imbalances and improve field and crop performance.

The 3rd party agents shall document field problems associated with nutritionally imbalanced soils, and verify whether soil tests have been taken and/or soil test results received and appropriate action taken. In this case, appropriate action may include developing a more appropriate rotation, applying an OCIA approved material, modifying composting and/or manure management practices, or responding in some other manner to the acknowledged problem.

Failure to respond in any manner to a known soil deficiency(s)

that results in inferior quality crops and/or poor soil quality will be looked upon as a negligence in management and may be used as grounds for de-certification.

(d) For transitional farmers*, soil analysis must be available every year for all fields to be certified.

(e) Use of careful management, resistant varieties, intercropping, and maintenance of soil health as the first lines of defence against weeds, pests, and diseases.

(f) Generation of an "audit trail" which will permit the sources and amounts of all inputs as well as the date and place of harvest, until the product is delivered into the care and control of the initial buyer. Certification agents shall recommend denial of certification for inadequate audit trailing.

(g)1. Maintenance of machinery and equipment in good enough condition to avoid contamination of soil and crops with hydraulic fluid, motor oil, fuel, etc.

2. Sprayers must be THOROUGHLY cleaned and rubber components such as hoses, washers, etc. must be replaced before organic use. Once cleaned and used to apply approved materials, sprayers must be reserved for organic use only and never again used to apply non-approved chemicals.

(h) Pre and post-harvest handling procedures must ensure maximum freshness and nutritional quality (chilling, controlled atmosphere, heating, or other approved physical processes).

* transitional farmer: a farmer converting from chemical to organic production. See section 12.

3. PROHIBITED

- (a) Irradiation of certified foods.
- (b) Wax treatment of fruit or vegetables.

4. PRECAUTIONS

- (a) Regarding the storage of potatoes: If chemical potatoes are subject to a post-harvest chemical treatment, then organic potatoes cannot be stored in the same storage house.
- (b) Excepting that in a case where a farmer in transition uses "Mertect" in the post-harvest treatment of conventionally grown potatoes outside the building, but does not have separate buildings, the certification committee, when convinced of the grower's commitment to

transition, may grant a temporary exemption for one year until such time as the farmer is able to develop separate facilities. Under usual circumstances this exemption will not be granted more than four times and shall under no circumstances be granted more than seven times.

- (c) No unauthorized materials (disinfectants, fungicides, etc.) may be applied inside a storage or packing facility containing an organic crop.

5. AUTHORIZED SOIL AMENDMENTS AND PRACTICES

A. Organic matter

- (a) Composted manure, preferably produced on the farm, or if imported, is free of contaminants.
- (b) Uncomposted manure that has been turned and has been free of internal frost for a total of at least six months prior to application.
- (c) Fresh, aerated, anaerobic, or "sheet composted" manures on perennials or crops not for human consumption, or when a crop for human consumption is not to be harvested for at least five months following application. At application and for the above five months the soil must be sufficiently warm (about 10 C) and moist to ensure active microbial digestion.
- (d) On radishes, leafy greens, the beet family, and other known nitrate accumulators, fresh, aerated, anaerobic, or "sheet composted" manures may not be applied less than four months before planting. At application, the soil must be sufficiently warm and moist to ensure active microbial digestion. Until more is known about high-nitrogen amendments (like unprocessed fish waste) they shall not be applied within four months of planting these crops, without the prior written approval of the certification committee.
- (e) Fish and fish by-products shall be allowed only when the farmer has proven the safety, and compatibility to the standards, of the proposed product to the certification committee.
- (f) Green manures and crop residue, peatmoss, straw, seaweed, and other similar materials. Sewage sludge is prohibited.
- (g) Composted food and forestry by-products which are believed to be free of contaminants. Pulp mill sludge is prohibited.
- (h) All organic matter sources and management techniques must be clearly documented in an audit trail as part of the certification process.

B. Minerals

- (a) Agriculture limestone, natural phosphates, and other slowly soluble rock powders. Fluorine contents of the natural phosphates must be balanced with application rates so that

total flourine applied not exceed an average of 5kg/ha./year in the field, nor 10 kg/ha./year in the greenhouse.

- (b) Wood ash, langbenite (sulpomag), bonemeal, and other similar natural products.
- (c) Until proven non-contaminated, leather meal and cottonseed meal are prohibited.
- (d) Highly soluble nitrate, phosphate and chloride nutrient sources, natural or synthetic, are prohibited from use on soil or foliage.
- (e) Ammonia and urea products are prohibited.
- (f) Natural potassium sulphate may be permitted temporarily where magnesium excess has been officially recognized.
- (g) Sodium borate, sodium molybdate (for legume inoculation only) and dissolved sulphate salts of trace minerals where agronomically justified.

C. Foliar

- (a) Non-fortified, liquid or powdered seaweed extract, or marine by-products. (Note: In some circumstances, such as the use of phosphoric acid to hydrolize fish emulsion, a normal aspect of the industrial process coincidentally furnishes plant nutrients. This is not to be considered "fortification" for the purposes of these standards. The operative criterion is whether a product is added to the process in order to boost the analysis, as is the case with potassium nitrate added to fish emulsion.)
- b) Plant or animal based growth regulators and other plant or animal products where need is demonstrated to the certification committee. Commercial products must be clearly labeled. As more research is needed on these products, their use will be subject to annual review.
- (c) Adjuvants, wetting agents and the like, unless restricted by the certification committee.
- (d) Mineral suspensions such as silica.

D. Seeds, Seedlings, Grafting and Root Stock

- (a) Horticulture crops and non-perennial field crops must be produced from seed that has not been treated with any unauthorized product. Temporary exemption may be granted if untreated seed is not available.
- (b)
 1. Annual transplants must be grown according to OCIA standards.
 2. Perennial transplants may be from any source, but crops sold as "certified organic" must be from plants which have been under organic cultivation for at least twelve months prior to harvest.
- (c) Seed potatoes, onion sets, etc. must be produced using organic methods consistent with these standards.

E. Other

- (a) Assorted plant and/or animal preparations, microbial activators, biodynamic preparations, bacterial inoculants, and microrhizae are permitted.
- (b) Microbes used in the production of certified crops or products must be naturally occurring (not the result of genetic engineering).

6. AUTHORIZED PEST CONTROL METHODS AND MATERIALS

A. Disease

- (a) Use of resistant varieties.
- (b) Lime-sulphur, microfine sulphur, and other sulphur products.
- (c) Plant preparations, vinegar and other natural substances.
- (d) Given the concerns regarding the accumulation of heavy metals in the soil, no exemptions for the use of copper products will be made by the certification committee until more data is available.
- (e) With the exception of diluted bleach, no disinfectants may be used in storage.

B. Insects and similar pests

All pesticides containing aromatic petroleum fractions (vehicles, extractants, preservatives, etc.), or synergists (such as piperonyl butozide) are prohibited. Use of resistant varieties and the provision of conditions favouring natural equilibrium is the acceptable approach.

Acceptable controls are:

- (a) Sexual, visual, and physical traps.
- (b) Introduction of predators, parasitoids, and microbial diseases (virus, fungus, bacteria, etc.).
- (c) Insecticidal soap, dormant oil, and diatomaceous earth.
- (d) Botanical insecticides such as ryania, pyrethrum, etc. Rotenone should be used only as a last resort due to its high ecological profile.

C. Weeds

Chemical or petroleum herbicides are prohibited.

- (a) Weed control is to be obtained through a combination of

cultural practices which limit weed development (rotation, green manure, fallow, the removal and plow-down of weeds prior to their seeding).

- (b) Mechanical, thermal and electrical weeding.
- (c) Use of plastic mulch will be subject to approval of the certification committee.

7. NATIVE AND WILD PLANTS

A. Native or wild plants growing under native conditions may be admissible if it can be clearly documented that areas of collection are free of any contamination by prohibited materials for three years prior to collection. Harvesting must be done in a way that maintains the natural balance of the ecosystem. If there is a history of chemical use in the collection area, residue tests may be required.

B. A specific management plan must be submitted by the member.

8. SYRUP

Maple Syrup

(1) Required Practices

- (a) Sustainable management of the sugar bush which properly maintains its health and ecological diversity. A rotating system should be applied to each woods or section of woods, every 5-7 years to give the trees a rest period of one tapping season.
- (b) Production of high quality maple syrup that meets the reasonable expectation of the consumer.
- (c) Sufficient records, labelling and identification to maintain audit trailing.
- (d) Tapping and Sap Collection
 - i) The maximum measurement of the tap hole is to be 1/2 inch.
 - ii) Size of trees

| | | | | | |
|-----------------------|--------|-------|-------|-------|-----------|
| Diameter at 4 feet | 0-25cm | 25-35 | 35-45 | 45-55 | 55 & over |
| No. of taps permitted | 0 | 1 | 2 | 3 | 4 |
 - iii) Double tapping (freshening of tap holes) is prohibited.
 - iv) Use of vacuum pumps is not allowed without specific exemption from the certification committee, and in no case shall the use of systems with a vacuum exceeding 12 lbs. at the taps be permitted.
- (e) All standards applying to material used in OCIA's general crop standards must be adhered to in maple syrup production.

(2) Acceptable Materials

- (a) Evaporator pans, storage and transfer containers, and equipment made of stainless steel.
 - (b) Glass and food-grade plastic retail containers.
 - (c) 5% Clorox (Javex) solution, cider vinegar, peroxide, fermented sap for cleaning equipment (tube lines, pans, buckets, spiles, etc.) provided equipment is THOROUGHLY rinsed afterwards.
 - (d) Acceptable defoaming agents are: milk and milk products (cream, butter), vegetable oil, spruce, moosewood, lard and glycerine. Defoaming agents must be listed on the label. (This is effective 1992).
- (3) **Prohibited Materials**
- (a) Synthetic antibacterial tap-hole pellets, such as formaldehyde.
 - (b) Used oil as fuel for evaporator.
 - (c) Synthetic defoaming agents.
 - (d) Asbestos is prohibited as a filtering material.
 - (e) Storage or retail-pack containers made of tin and soldered with lead.

9. SHIITAKE AND OYSTER MUSHROOMS

Production standards will consist of OCIA International Standards which OCIA-NB is adopting on an interim basis subject to the OCIA-NB certification committee's interpretation.

10. HONEY STANDARDS

As in Shiitake and Oyster Mushroom production with the exclusion of the use of antibiotics.

11. SPROUTS

The same as Shiitake and Oyster Mushrooms.

12. AUTHORIZED MEAT PRODUCTION STANDARDS

A. Living Conditions

Livestock must be provided with living conditions which respect their needs: Reasonable liberty and access to the exterior, lack of crowding, and kindness.

B. Feed

- (a) Animals raised for organic meat production must be fed OCIA (or equivalent) certified organically grown feed.
- (b) Plastic pellets for roughage, urea, intentional manure refeeding, and similar are prohibited.

- (c) Young animals raised with the mother are the norm.
- (d) Feeding of milk replacer is prohibited.
- (e) White veal production cannot be considered organic.

C. Supplements

Acceptable Materials

- (a) Any source of feed salt.
- (b) Calcium phosphate materials such as bonemeal, marl, etc. or calcium carbonate materials such as limestone, dolomite, etc.
- (c) Magnesium oxide, greensand, seaweed, natural minerals, and other free choice trace elements.
- (d) Selenium of whatever form (ingested or injected at recommended rates).
- (e) Vitamins should be provided from sprouted grains, fish liver oils, brewer's yeast or other natural sources. Synthetic vitamins may be permitted in cases of long winters, mountainous zones, or poor forage due to bad weather.

Prohibited Materials

- (a) Synthetic growth promoters (including antibiotics and trace elements used to stimulate growth) implanted, injected, or ingested.

D. Purchased Animals

- (a) Slaughter stock to be certified must be raised on the farm from OCIA certified females, from birth, or be purchased from OCIA Certified organic producers.
- (b) Breeding stock may be bought from whatever source, provided the animal is not pregnant, but it may only be sold as OCIA certified organic breeding stock if raised in compliance with OCIA standards for one year following purchase.
- (c) Day-old poultry may be bought from whatever source.

E. Herd Health

- (a) The first line of defence must be control of environmental problems through disinfection, pasture rotation, etc.
- (b) Cleaning agents and disinfectants should be chosen from among soaps, biodegradable detergents, iodine 5%, 1% potassium permanganate solutions, lime, lye, alkali carbonates, caustic potash and bleach. Locations to be disinfected should be empty of livestock, and manure should be physically removed as much as possible.
- (c) Biotherapies such as plant concoctions and homeopathic remedies should be used whenever possible.
- (d) Vaccinations (including vaccinations to stimulate production or maternal antibodies), probiotics and similar preventative techniques are permitted, in exceptional circumstances, with the prior approval

of the certification committee.

- (e) When recourse to chemical materials is deemed necessary (chemical wormer, insecticides, fly repellents), slaughter animals may not be sold as certified organic. However, if an antibiotic is administered the animal shall be certified after twelve months.
- (f) If an animal is dependent on active intervention it should be removed from the herd.
- (g) Diatomaceous earth may be used as a wormer.

F. Breeding

- (a) Natural service is the ideal.
- (b) Since breeding methods have minimal effect on the quality of the meat produced, various other methods are tolerated, provided they do not unduly restrict the gene pool.

G. Slaughter

- (a) Animals must be treated humanely during loading and unloading, shipping, holding and slaughter.
- (b) Slaughter must be effected under sanitary conditions which shall usually be government approved slaughterhouses.
- (c) Animals shall be clearly identified in such a manner as to preclude confusion with non-certified meat.
- (d) Carcasses should be hung apart from non-certified meat. Ideally, certified meat should be slaughtered in a separate batch.

H. Audit Trail

- (a) An audit trail must be maintained which will permit tracing the sources and amounts of all feeds, supplements, medication, etc.
- (b) With the exception of poultry, if animals are not individually identified by numbered tags, each animal that is treated with an active material must be clearly identified with a tag which specifies the material and date of treatment.
- (c) In addition to all inputs, the audit trail must trace each animal from birth to slaughter, until the meat is delivered into the care and control of the initial buyer.

13. AUTHORIZED METHODS AND MATERIALS: DAIRY AND EGGS

Standards are the same as for meat production, with the exception of the following situations:

- (a) Dairy calves may be weaned as young as 12-24 hours old, provided they receive colostrum before weaning and receive whole milk until the age of three months, or are sold out of the herd shortly after weaning.
- (b) Hormones to increase milk production are prohibited.
- (c) When pullets are purchased, they must be treated in accordance

with these standards for at least four months before their eggs are certified.

(d) All sanitation requirements for milk handling equipment shall be observed, and milk shall be tested for bacteria, somatic cells, etc. Milking parlors should be sufficiently clean to protect the integrity of the certified product. Milk equipment and udder washes are two potential sources of contamination. If possible, sanitary standards should be met using OCIA approved materials, however, if due to local regulations unapproved materials must be used, all equipment must be rinsed at least two times more than usually required for the material used.

(e) All withdrawal periods are 12 days, or twice the label specification, whichever is longer. Treated cows are to be milked at the end of the string.

(f) Eggs should be free of manure, but routine washing is discouraged.

14. AUTHORIZED METHODS AND MATERIALS: PROCESSORS AND PACKERS

Where the industrial process is different, and has specific areas in which "organic" methods and materials differ from conventional production, it is the responsibility of the industry to develop standards specific to each process (flour milling, tofu, breakfast cereals, etc.) and have those standards approved by the OCIA Certification review Committee. Such standards must be designed to provide maximum quality and nutritional value within the overall goals of these standards.

A. Raw Materials

- (a) All ingredients must be certified by OCIA or an approved equivalent certification program.
- (b) Permitted additives include sea salt, fermentation organisms, natural colors, natural flavours, herbs, spices, aluminum-free leavening, pure water, and other similar products approved by OCIA.
- (c) Carob gum, guar gum, pectins, gelatins, potato starch, corn starch, carageenans, etc., may be approved on a case-by-case basis.

B. Processing and Packing

- (a) No product can be certified if a similar non-certified product is produced on the same premises, by the same company, or under the same brand name unless the processor or packer can clearly demonstrate that there exists both the physical facilities and the organizational ability to ensure that there is no possibility of product mixing. For the purposes of these standards, subsidiaries are deemed to be the same company.
- (b) In cases where there is risk of contamination, the certification agent shall require residue testing, with the costs to be borne by

the applicant.

- (c) The plant must meet all hygiene regulations using sanitation methods approved by OCIA. In general, these will be the same as those approved in Section 6 under Herd Health.
- (d) All packaging must be free of fungicides, preservatives, fumigants, insecticides, or other intentionally added contaminants.
- (e) Aluminum, tin, and solder are discouraged in all cases, and prohibited when the pH of the product is not between 6.7 and 7.3.
- (f) Processors and packers should research and share information on the relative benefits and drawbacks of the various plastics and papers used for food packaging.
- (g) Carriers must not have been fumigated or used to transport any substances which could compromise organic quality.

C. Pest Control

Pest control inside a plant must be accomplished using materials which are permissible in farm operations as outlined in the current OCIA materials list.

D. Audit Trail

- (a) Audit trail and inventory control procedures must be detailed enough to trace raw materials from the supplier, through the entire plant process, and on through the distribution system to the retailer, using lot numbers, serial numbers, or the like.
- (b) Company records (including purchase orders, bills, invoices, and inventory records) shall be made available on demand to a bonded OCIA certification agent or through the Audit Bureau.
- (c) The application must provide a notarized or sworn affidavit attesting to the truth of information furnished and adherence to these standards.

15. TRANSITIONAL FARMERS

Operative Principle: A transitional farmer who chooses to use equipment in parallel production (that is, some organic, some chemical) must use sufficient care in the pre-use cleaning and application of that equipment so that any risk of chemical contamination of the organic crop is negligible and the organic integrity of that crop will reasonably match that of a similar crop grown by a farmer that is 100% organic.

A. Planting:

- 1. Under ideal conditions the organic crop should be planted first with equipment that was thoroughly cleaned beforehand
- 2. Otherwise, all equipment used to handle the seed for the organic crop (including conveyers, barrels, bulk bodies, seed cutters, etc.) should be cleaned before organic planting begins and be

- free of residual fungicides, etc. from the chemical operation.
3. **Planters:** After emptying fertilizer and seed boxes, planters should be steam cleaned (or with a high pressure hose or equivalent) to remove residual fertilizer and fungicide from the chemical operation. Systemic applicator boxes should be dismantled and thoroughly cleaned and the drive chain unhooked before planting organic crop.

B. Harvest:

All equipment that handles the organic crop (including barrels, bulk bodies, conveyers, chutes, etc.) should be cleaned to be of any chemical residue (Mertect, etc.) from chemical operation.

C. Storage:

Ideally, chemical and organic produce should be stored in separate buildings. Due to the excessive cost of this during transition, these guidelines must be strictly followed to ensure the integrity of the organic crop.

1. No sprays of any kind (fungicides, sprout inhibitors) must be used inside or via ventilation systems of the storage house during the current crop year in order to avoid possible residues on the organic crop.
2. Only approved disinfectants must be used during the current crop year.
3. Totally separate bins or boxes must be available such that inadvertent mixing is not possible from bin to bin.

D. Packing:

A farmer may pack and grade his organic produce in a different building from where they are stored to allow use of an existing packing line provided the following conditions are met:

1. Only an authorized (bleach) disinfectant could have been used in the building or on the packing line in the current crop year.
2. No unauthorized chemicals (Mertect, sprout inhibitors, etc.) were applied inside the building or through the ventilation system in the current crop year.
3. All steps in the packing and grading operation are carried out to insure the uncompromised integrity of the organic crop.

16. CERTIFICATION AGENTS

The third-party certification agent is to be a demonstrably impartial and independent evaluator of member compliance with these standards or those of the chapter to which the member belongs.

- (a) The agent shall not be a party to any transaction involving the certified products.
- (b) The agent may not be an employee of or have any financial interest in any company which is a party to any transaction involving the certified products.
- (c) Advice provided by the agent shall be limited to helping the member meet standards and improve organic production techniques. Consultation for an additional fee at any time within the

certification year is unacceptable and constitutes grounds not only for dismissing the agent, but for revoking the member's right to use the seal.

- (d) The agent shall not have worked for the applicant member in any capacity in the year prior to the certification year, and shall not work for the applicant member in the year following the certification year.

In cases of suspected contamination, or following a request from the certification committee, the agent or designated members of the certification committee shall have the right to make unannounced visits, take samples, and require residue tests, all at applicant expense.

The relationship between certification agent and member is one of confidence in all matters not pertaining directly to certification. In certain cases it may be necessary for the agent to be bonded. It is also advisable for the agent to carry liability and/or errors-and-omissions insurance.

17. CERTIFICATION PROCEDURES: CHAPTERS

Chapters shall have a certification committee which consists of at least 50% farmers, but must also have two members with no financial interest in the production of sale of food, and shall:

- (a) Define and implement standards; verify adherence to standards through peer evaluation and a third party certification agent; ratify or reject the certification agent's recommendation to certify or refuse to certify member farms.
- (b) Administer the certification program including hiring the agent, scheduling visits, coordinating paperwork, and ensuring that all requested documents are forwarded to Confederation offices.

The certification agent, shall, before the harvest begins:

- (a) Visit each field and verify that practices conform to these standards and to written information in the application.
- (b) Examine post-harvest handling facilities, evaluate the applicant's management skills and organizational ability, inventory materials, and ensure that equipment available for weed control, etc., is capable of doing the job required at the scale proposed.
- (c) Discuss potential problems and possible solutions with an emphasis on product quality, audit trailing, and organic crop improvement.
- (d) Fill out and sign an affidavit (See Admissibility Sec. 7) to be sworn by the applicant before a justice of the peace, notary, etc.
- (e) Meet with the certification committee and recommend to certify, or to refuse to certify an applicant member.

The chapter shall sign a trademark licensing agreement with the pertinent national OCIA corporation, and shall grant rights to use the OCIA

Certified Organic trademark to certified members in accordance with normal trademark control procedures. The chapter shall ensure that trademark use complies with normal or accepted OCIA practices.

18. CERTIFICATION PROCEDURES: MEMBERS AT LARGE

Certification procedures for members at large are identical to those for chapters with the exception that the Confederation's Certification Review Committee replaces the certification committee of the chapter.

19. APPEALS

An appeal may be initiated against either a refusal of certification or the granting of certification.

- (a) Any member or applicant may initiate an appeal, even against a decision made in another chapter.
- (b) Burden of proof is on the party initiating the appeal.
- (c) Expenses will usually be borne by the losing party to the appeal.

Appeals of a certification committee decision shall be heard by an ad hoc tribunal consisting of one member of each of the three neighbouring chapters, provided none is a party to the appeal.

- (a) In appeals against certification, the grower should be notified of the complaint and its nature, be furnished with an outline for response (audit trail, farm plan, financial books, etc.), and respond within 72 hours indicating whether the appeal will be contested.
- (b) The appeal tribunal shall hear arguments within ten days, and may seek amicus curiae submissions from others. The tribunal decision shall be final and binding for the certification year.

20. OCIA CODE OF ETHICS

- 1) All members shall support OCIA certification standards in the production, post-harvest handling, storage, transportation, processing, or promotion of food bearing the OCIA trademark.
- 2) No certification documentation shall be used in the sale, marketing, or promotion of any product or service unless the terms of the current OCIA licensing agreement are met.
- 3) No member shall knowingly deal in products that are falsely labelled organic, or represented as such, nor engage in any advertising that is false or misleading.
- 4) All members shall cooperate in the development of the market for OCIA trademarked products, and compete with each other in an honest and friendly fashion, at all times respecting the brand-neutral nature of the trademark.
- 5) All members shall cooperate in the development of an organic food

system which enhances life and health, is ecologically and economically sustainable, and gives a fair return and dignity to its merchants, to its labourers, and to the stewards of its living soil.

ORGANIC CROP IMPROVEMENT ASSOCIATION
NEW BRUNSWICK CHAPTER
C/O MRS. KAREN DAVIDGE
R. R. # 3
MOUTH OF KESWICK, N.B., EOH 1NO



Variety test results in the region

Effects of organic fertilizers on the production of Shepody seed potatoes in New Brunswick, by Gary Hawkins. Full text available from the New Brunswick Department of Agriculture.

The following trials were conducted: 1) 10 tons/acres of composted cow manure; 2) 1 ton/acre finely ground crab meal; 3) 1 ton/acre finely ground shrimp meal; 4) 1 ton/acre finely ground herring scales; 5) 120 lb/acre chemical N-P-K; and 6) control plots without addition of fertilizer. There was no significant difference in yield between the various organic treatments which produced less than both the chemically fertilized treatments and the untreated control. This yield difference was probably due to the application of copper sulfate as a control for Late Blight which severely damaged the organic plots after an application in early August following which the plants did not fully recover. Common Scab and Rhizoctonia were severe in the plots using crab meal.

The use of these materials in commercial potato production appeared to be feasible when compared with composted manure based on a single year of evaluation, however the natural soil fertility was high and could obviously produce at least a reasonable yield for one year without any fertilizer addition. It is recommended therefore that the evaluation be carried out for several years at the same location maintaining individual plot identities to determine the possible long term effects.

New Brunswick Department of Agriculture 1989 Potato Variety Evaluation; Organic Production Practices, by Gary Hawkins. Full text available from the Department and also reproduced in P.E.I. Department of Agriculture's Information Newsletter to Low Input and Organic Farmers.

The trial was conducted in the Grand Falls region. Fertility was applied at the rate of 10 T/acre of composted manure. Twenty three varieties in total were compared.

The seed was hand-cut, with each seed piece being of approximate equal weight. Yield differences within the trial ranged from under 50 cwt/acre to over 200 cwt/acre. The top five yielders within the organic system were Raritan, Kennebec, Mirton Pearl, Rhine Red and Red Pontiac. Under conventional practices, the top five were Red Pontiac, Red Gold, Atlantic, Mirton Pearl and Nipigon.

The New Brunswick Department of Agriculture has also conducted an Organic Cereal Variety Evaluation of wheat, oats and barley. The Prince Edward Island Department of Agriculture conducted low input cereal trials of barley, spring wheat, triticale and oats, and organic cereal trials of barley.

Bioregional Dinner
November 19, 1988

Whole Grain Rolls & Butter
Cole Slaw
Jacob's Cattle Beans, Baked
Carrots, Turnip
Baked Potatoes
Millet & Squash
Apple Crisp & Milk
Mint Tea, Coffee
Apple Cider, Spring Water
...an organic meal!