Appendix B

The Master Plan from the Spring 2005 Student Farm Planning Class

17

This Section:

UNIVERSITY OF MINNESOTA STUDENT FARM MASTER PLAN SPRING SEMESTER 2005

Contributors:

Jared Ashling
Joel Bradley
David Campbell
Peter Gillitzer
Michelle Grabowski
Lisa Kissing
Andy Kranz-McGuire
Megan Kranz-McGuire
Ben Jordan
Any Montain
Brian Noy
Kelly Paulson
Mike Petefish
Jesse Sadowsky
Courtney Tchida
Charlie Wamstad
Seth Zeigler

Professors:

Bud Markhart
Paul Porter

LOGISTICS

This Section Contains: Page

Master Plan Format
(times new roman font, 14pt bold for the title)

Contributor: Megan Kranz McGuire
Co-Contributors: list alphabetically by last name (12pt font)
Date Submitted: February 4, 2005
Revision Date: February 12, 2005

Keywords: format, master plan, submit, style

Abstract:

250 words max. Fit the text box to fit your abstract size (drag on the corner).

Body (erase the word “body” when you type your own): Flexible format, use MS office: word, excel, etc. Use 1.5 spacing for word documents.

References:
Use APA style as mentioned in the syllabus.

Organic Certification

Contributor: Charlie Wamstad

Date Submitted: March 31, 2005
Keywords: Organic, certification, MCIA, Standards NOP

Abstract:
After meeting with the MCIA we have the information that is needed to begin to start are Farm plan that is needed for obtaining organic certification. There is a detailed list of the items that need to be incorporated into the farm plan.

The process of organic certification will need to begin as soon as possible to ensure that we begin the records for our transition period prior to certification. To begin the process of transitioning to organic certification we must first come up with a Farm plan that will show our process for our farm operation and how those processes meet the requirements of the National Organic Program (NOP) and that of our Certifying agency Minnesota Crop Improvement Association MCIA. The Farm plan must consist of the type of crops we will be certifying and the fields that those crops will be in and the history of those fields. We will also need to show that we will be able to take detailed records of the crops that will be planted (ex) lot #, brand, variety, and date. There will also need to be a detailed plan for the application of fertilizers (Organic Material Review Institute (OMRI) approved) and other inputs, followed by the records of what was applied to the specific field. The sources of seedlings and perennials must also be documented, also if there is an organic variety that is of equal quality we must use the organic variety.

The Farm Plan must also incorporate soil, crop and fertility management. To effectively do this we need to have a plan for crop rotation, weed and pest management, disease management, and a plan to minimize natural disturbance and water use. We must then also have the records to show that we followed our plans in our record keeping. The farm plan must also have a plan for maintaining organic integrity. This part of the plan must have the procedure of how the buffer strips are managed between conventional an organic, the processes of cleaning equipment that is used for conventional practices. The crops must also be documented from harvest and then maintained in proper storage that is not mixed with conventional crops throughout transportation and processing.

After developing a farm plan we submit our application to the certifier and they review the records we have from the past 3 years of transition and then make a decision whether we meet the NOP standards as an organic operation. During our annual inspection we will need to have all records available to the inspector to review. The inspector report is reviewed by the certifying agency decides whether there is a minor- none compliance issue and we get certification granted or if we have a major-none compliance issue that put our certification in jeopardy. After certification is granted we can now label our product as USDA organic.

References: MCIA meeting with Roger Wippler and Jim Boots

Business Setup

Contributor: Mike Petefish
Date Submitted: April 11, 2005
Keywords: Organization, Student Business Enterprise, IRS, Tax ID #

Abstract:
Determining what is the best to have the farm set up as, either as a student organization or as a student farm enterprise.

When deciding whether to be a student organization or a student enterprise I think the answer is definitely a student enterprise. This is because student organizations are limited to three days combined for fundraising and the selling of products. I see this as being a big bottleneck for us as we will be harvesting things throughout the summer and into the fall and surely not everything can be ready on the same three days. However if we still want to pursue this option there is an online process that can be completed where upon completion a meeting is scheduled with an adviser for the final say. Once we become an organization they will provide the letter to the bank to establish a checking account. Either way we must apply to the IRS for a tax ID number with form SS-4 which can take any where from six months to one year. A student business enterprise may also be applied for online, however we must present a business plan to be reviewed and cleared by the University of Minnesota board of regents which is a rather lengthy process. (As of today there are only two student business enterprises on campus)

Reference:
http://www.sao.umn.edu
MSAO office

FARM HISTORY & CURRENT SITUATION

This Section Contains: Page

Student Farm History, the beginning

Contributor: Jared Ashling

Date Submitted: February 21, 2005

Keywords: history, location, participants, partners, planning, publications, student farm

Abstract: Description of the initial planning processes of the development of the student farm at the University of Minnesota. Includes information pertaining to the initial Summer Seminar series, up to the start of the Student Farm Planning course.

Students at the University of Minnesota Twin Cities campus in the student group What's Up in Sustainable Agriculture (WUSA) have been working to create the school's first student run campus farm. This student supported initiative started last summer with a trial run student vegetable production garden, in which 8 students participated in a bi-monthly summer seminar series discussing various types of organic and sustainable gardening techniques such as composting, soil management, pest management and preservation of produce.

During the past fall semester, students held planning and brainstorming meetings to come up with a solid mission and vision for the one acre of on campus land which would become the permanent student farm plot beginning the summer of 2005. Students are interested in combining research, education and outreach while experimenting with and learning about perennial woody plants and grasses, companion planting, soil management, and many other topics. The Minnesota Institute for Sustainable Agriculture (www.misa.umn.edu) provided the students with the initial 200 dollars needed for the first year. As winter approached, the field was planted with a cover crop of rye. While the rye is now dormant under the January snow, the planning process still continues.

Students reached out to several professors for help in the planning process, resulting in the creation of the Student Sustainable Farm Planning course. The course, which was also formed entirely from student initiative and co-taught by professors Dr. Albert Markhart (Dept. of Horticulture) and Dr. Paul Porter (Dept. of Agronomy), uses the publication, Building a Sustainable Business: A Guide to Developing a Business Plan for Farms and Rural Businesses. This publication was created by a planning team in 1996 for the Minnesota Institute for Sustainable Agriculture. As students develop a business plan for their student farm, they are learning the steps to creating a sustainable farm or sustainable related business. The publication helps students look at values, goals, and strategic planning.

The location of the student's one acre is significant. The one acre plot is on the St Paul campus of the University of Minnesota. It is adjacent to the Gibbs Farm museum, (http://www.rchs.com/) which has a traditional Dakotah garden with native plantings and pioneer gardens with heritage seeds, along with a Dakotah Medicine Teaching Garden.

Across the street from the farm site, is the future site of the Bell Museum of Natural History (http://www.bellmuseum.org/). The student farm will serve as an accessible and informative transition to the 200 acres of additional agricultural research land, mostly dominated by corn and soybean research.

The University of Minnesota Twin cities campus consists of two campuses, referred to as the Minneapolis Campus and the St Paul Campus. The St. Paul campus is the "farm campus." Like its neighboring Minneapolis campus, it is imbedded in the Twin Cities metropolitan area, with a population of 2.7 million (April 2002 census).

Student farm Spring 2005 Update

Contributor: Jared Ashling
Date Submitted: May 5th, 2005
Keywords: history, interns, volunteers, connection , research, student farm

Abstract: Article written for the Sustainable Agriculture Newsletter May/ June Issue 2005.

Over the course of the last semester, students taking the Student Farm Planning Course have shed blood, sweat and tears to come to a consensus on issues affecting the creation of the University of Minnesota student farm. These issues include important topics such as: partnerships, research, organizational structure, connections to faculty and university courses, farm layout, vision, mission, goals, and, (whew!) guiding principles. As a result the student farm is set for the upcoming growing season, complete with an exciting market booth at the new Minneapolis campus farmers market.

More good news: the student farm now has interns! In addition to myself, there are four other students from the course who will be putting their laboring skills to work (and investigation skills I might add, as each student is conducting a research project on or relating to the student farm). Joining the ranks of the student farm interns are six additional students, (undergraduate and graduate) new to the farm, who will be working part time as well on the student farm this summer.

And the best news of all: The student farm needs your help. Get involved! Thursdays are the official volunteer day, so stop by for a chance to spend some time with some knowledgeable, friendly, student farm interns. We might even send you home with a bag of fresh, organically grown produce. To learn more about the student farm and to stay up-to-date with the progress this summer and beyond, visit www.misa.umn.edu/students/studentfarm/.

— Jared Ashling, Undergraduate and WUSA Co-Chair, ashl0017@umn.edu

Cropping History

Contributor: Andrew Montain
Co-Contributors: Gobel, Nate; Krantz-McGuire, Andy; Noy Brian
Date Submitted: March, 3 2005
Keywords: Certification, herbicide, A9-N, A8-N, A9-S, fertilizer

Abstract:
The student farm plot is A9-N. Status as certified organic requires a 3-year absence of biocide application. The plot was last sprayed on 7/28/04. The fieldrows were last sprayed on 11/4/04. Field neighbors are Woodlands Wisdom plot and Jim Curly's research plot. No known soil borne disease problems.

The student farm plot is A9-N. Status as certified organic requires a 3-year absence of biocide application. Round-up was last herbicide applied to the plot (7/28/04) at 16 oz./acre. Weedar was the last herbicide applied to the fieldrows (11/4/04) at 4 pints/acre. Weedar was applied to control dandylions and broadleaf weeds next Spring.

Fertilizer was not applied after liquid manure was injected in 2003.

Salt runoff has never been a noticeable problem. No known soil borne disease problems. The field does not have buried drainage tiles, power lines or water lines.

Plot A8-N to the immediate east of our plot is Jim Curly's plot, who is out of town and needs to be contacted when he returns. We should ask him about his plans to spray, fertilizer with synthetics and use manure. If I understand the NOP rules correctly, we will need a 30' boundary around our plot from any biocide spray. We should negotiate with Jim the possibility of discontinuing biocide spray on that field (for how many years?) so that we can produce saleable organic matter to the grass edge. If this is agreed to we will have to maintain a 'neat' edge to keep up appearances for Mike McCullen

Woodlands Wisdom has the plot A9-S immediately south of us and has not previously nor plan to spay biocides.

Before spring we need to confirm that sprays are to be discontinues in the fieldrows and on the grass and sidewalks outside the fence that surround our plot.

Soil Types and Analysis

Contributor: Lisa Kissing
Co-Contributors: Jesse Sadowsky, Mike Petefish
Date Submitted: February 24, 2005
Revision Date: March 22, 2005
Keywords: soil, nutrients, salt, irrigation, utilities, machinery

Abstract:
Description of the soil condition on the future student farm plot. Includes information concerning irrigation, along with the utilities and machinery available through the University of Minnesota facilities management.

On November 19th, 2004, the University of Minnesota Soil Testing Laboratory administered a soil test for the one acre Plot A9, which is located just southwest of the intersection of Larpenteur and Cleveland avenues. The plot and a sample of the plot on the far west side next to the road buffer were sampled. The field plot contains a fine textured soil with a pH of 6.9 and an organic matter content of 4.1 percent. The west plot contains a medium textured soil with a pH of 7.3 and an organic matter content of 4.3 percent.

Macronutrients of nitrogen, phosphorous, and potassium, as well as micronutrients and soluble salts in the soil were measured. Nitrate levels were recorded at 33.9 parts per million (ppm) within the field. As a mobile nutrient, nitrogen is difficult to measure. This value is not definite because weather conditions can greatly affect the recorded levels of nitrogen. Nevertheless, the soil test recommends an application of 0.15 pounds of nitrogen per square foot each year. Above 100 ppm in both testing zones, phosphorous levels reach beyond the very high range. Action may need to be taken to lower these levels, but this could be difficult as phosphorus is not a mobile nutrient and is therefore difficult to remove from soil. Potassium levels are also very high at above 300 ppm in the field and the west field. However, excess potassium is not toxic to plants. Lowering these levels is most likely unnecessary. Magnesium was measured to be 373 ppm. Sulfur, in the form of sulfate, was found to be 16 ppm. The final macronutrient, calcium, held at 1892 ppm.

Micronutrients essential to plant health were also sampled. Zinc was recorded at 5.2 ppm, iron at 34.2 ppm, manganese at 5.9 ppm, copper at 0.7 ppm, and boron at 0.7 ppm. Cobalt, chlorine, molybdenum, nickel and sodium were not measured. Soluble salts were measured at 0.5 mmhos/cm in the field plot and 0.4 mmhos/cm in the far west plot near the road buffer. Both of these salt values are very low and should not create any problems. These low salt values indicate that road salt should not seriously impact the plot. According to Mike McClellen, cultivation has “never been affected” by road salt in the past and “no toxic substances [exist] to know of”. However, this soil report did not test for toxic substances such as lead. We were not provided with a history of any past soil tests.

Different irrigation capabilities are available for the plot. No drainage tiles exist. However, Mike McClellen judges the soil to drain well naturally. An irrigation gun is available, but an alley of 4.5 feet through the middle of the plot would be necessary to properly distribute the gun’s water. The sprinkler guns are 5 feet high and have a 100 foot coverage span. An alternative can be obtained through a garden hose drip line.

In terms of utilities, no electricity is found onsite, but a 300W generator can be checked out from Mike. Equipment, such as a tiller, is also available for checkout. Almost all basic supplies are available for the student farmer’s use. The flat $200 land rental fee assessed per season covers maintenance and irrigation. Edges of the road buffer will

be mowed by the farm crew and maintenance. All spraying by the grounds crew will be banned from the field and buffer zone surrounding the field. There will be a cost for any additional work done by the farm crew on the plot.

References:

University of Minnesota Soil Testing Laboratory, "Soil Test Report: Lawn and Garden", 15 Nov. 2004, Report # 27795.

McClellan, Mike. Interview. 11 Feb. 2005.

University of Minnesota
Soil Testing Laboratory

SOIL TEST REPORT

Lawn and Garden

Client Copy
Department of Soil, Water, and Climate
Minnesota Extension Service
Agricultural Experiment Station

AGRONOMY AND PLANT GENETICS
COURTNEY TCHIDA
W U S A c/o M I S A
411 BORLAUG HALL, ST PAUL CAMPUS

Page	1
Report No.	27795
Laboratory No.	57350
Date Received	11/15/2004
Date Reported	11/19/2004

Sample/Field Number: SODF

SOIL TEST RESULTS

Estimated Soil Texture	Organic Matter %	Soluble Salts mmhos/cm	pH	Buffer Index	Nitrate NO3-N ppm	Olsen Phosphorus ppm P	Bray 1 Phosphorus ppm P	Potassium ppm K	Sulfur SO4 -S ppm	Zinc ppm	Iron ppm	Manganese ppm	Copper ppm	Boron ppm	Calcium ppm	Magnesium ppm	Lead ppm
Fine	4.1	0.5	6.9		33.9		100+	300+	16	5.2	34.2	5.9	0.7	0.7	1892	373	

INTERPRETATION OF SOIL TEST RESULTS

Phosphorus (P): PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
5 Low | 10 Medium | 15 | 20 High | 25 V. High

Potassium (K): KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK
25 Low | 75 Medium | 125 | 175 High | 225 V. High

pH: **********
3.0 4.0 5.0 6.0 7.0 8.0 9.0
Acid | Optimum | Alkaline

Soluble Salts: ****
0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
Satisfactory | Possible Problem | Excessive Salts

RECOMMENDATIONS FOR: Vegetable garden

LIME RECOMMENDATION: 0 LBS/100 SQ.FT.
TOTAL AMOUNT OF EACH NUTRIENT TO APPLY PER YEAR:*

NITROGEN	PHOSPHATE	POTASH
0.15 LBS/100 SQ.FT.	0 LBS/100 SQ.FT.	0 LBS/100 SQ.FT.

THE APPROXIMATE RATIO OR PROPORTION OF THESE NUTRIENTS IS: 33-0-0
Sulfur: 0 LBS/100 SQ.FT.;

Use a fertilizer with the percentage of nutrients closest to the above ratio. Apply according to the instructions on the fertilizer bag or container, or determine the amount required from the instructions given on the back side of this report. Since meeting the exact amount required for each nutrient will not be possible in most cases, it is more important to apply the amount of nitrogen required and compromise some for phosphate and potash.

If a fertilizer contains phosphate and/or potash, it can be mixed in the spring or fall into the top 4-6 inches of topsoil. If a fertilizer containing only nitrogen is used, it should be applied in the spring, tilling or raking it into the surface. Nitrogen is easily leached through soil.

For sweetcorn, tomatoes, cabbage, and vine crops such as squash and cucumbers, an additional application of 1/6 lb. nitrogen per 100 sq. ft. may be desirable at midseason. This can be accomplished by applying 1/2 lb. (about one cup) of 34-0-0 fertilizer. Throughly water fertilizer into the soil.

County: RAM. For additional information, contact the YARD & GARDEN LIN hone: 612-624-4771 Website: www.extension.umn.edu/yardan en

University of Minnesota
Soil Testing Laboratory

SOIL TEST REPORT

Lawn and Garden

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Department of Soil, Water, and Climate
Minnesota Extension Service
Agricultural Experiment Station

AGRONOMY AND PLANT GENETICS
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Page **2**
Report No. **27795**
Laboratory No. **57351**
Date Received **11/15/2004**
Date Reported **11/19/2004**

Sample/Field Number: ROAD

SOIL TEST RESULTS

Estimated Soil Texture	Organic Matter %	Soluble Salts mmhos/cm	pH	Buffer Index	Nitrate NO3-N ppm	Olsen Phosphorus ppm P	Bray 1 Phosphorus ppm P	Potassium ppm K	Sulfur SO4 -S ppm	Zinc ppm	Iron ppm	Manganese ppm	Copper ppm	Boron ppm	Calcium ppm	Magnesium ppm	Lead ppm
Medium	**4.3**	**0.4**	**7.3**				**100+**	**300+**									

INTERPRETATION OF SOIL TEST RESULTS

Phosphorus (P): PPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPPP
5 Low | 10 Medium | 15 | 20 High | 25 V. High

Potassium (K): KKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKKK
25 Low | 75 Medium | 125 | 175 High | 225 V. High

pH: **********
3.0 4.0 5.0 6.0 7.0 8.0 9.0
Acid | Optimum | Alkaline

Soluble Salts: ***
0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0
Satisfactory | Possible Problem | Excessive Salts

RECOMMENDATIONS FOR: Vegetable garden

LIME RECOMMENDATION: 0 LBS/100 SQ.FT.
TOTAL AMOUNT OF EACH NUTRIENT TO APPLY PER YEAR:*

NITROGEN	PHOSPHATE	POTASH
0.15 LBS/100 SQ.FT.	0 LBS/100 SQ.FT.	0 LBS/100 SQ.FT.

THE APPROXIMATE RATIO OR PROPORTION OF THESE NUTRIENTS IS: 33-0-0

Use a fertilizer with the percentage of nutrients closest to the above ratio. Apply according to the instructions on the fertilizer bag or container, or determine the amount required from the instructions given on the back side of this report. Since meeting the exact amount required for each nutrient will not be possible in most cases, it is more important to apply the amount of nitrogen required and compromise some for phosphate and potash.

If a fertilizer contains phosphate and/or potash, it can be mixed in the spring or fall into the top 4-6 inches of topsoil. If a fertilizer containing only nitrogen is used, it should be applied in the spring, tilling or raking it into the surface. Nitrogen is easily leached through soil.

For sweetcorn, tomatoes, cabbage, and vine crops such as squash and cucumbers, an additional application of 1/6 lb. nitrogen per 100 sq. ft. may be desirable at midseason. This can be accomplished by applying 1/2 lb. (about one cup) of 34-0-0 fertilizer. Throughly water fertilizer into the soil.

County: RA[illegible]. For additional information, contact the YARD & GARDEN LI[illegible]hone: 612-624-4771 Website: www.extension.umn.edu/yardan[illegible]en

Field Size & Map

Contributor: Peter Gillitzer
Co-Contributors: David Campbell, Kelly Paulson, Charlie Wamstad
Date Submitted: February xx, 2005
Revision Date:

Keywords: field dimensions, buffer zones, maintenance, management

Abstract:
Physical location, management jurisdiction and land use of student farm plot in addition to dimensions of field and buffer zones.

The student farm plot is located on the northwest corner of the University of Minnesota-Saint Paul campus. Physically located on the crossroads of many different land uses and jurisdictions, management of the plot will be a complex process.

The 1.22 acre plot is bordered on the north by Larpentuer Avenue, a main east-west corridor in the Twin Cities metropolitan area, and on the west by Cleveland Avenue, a frequently traveled north-south corridor in Saint Paul. To the east and south lies University property; a mosaic of research plots, grass strips and fields. Immediately to the east of the plot lies a one acre field planted in Roundup-Ready soybeans in addition to a small native prairie plot. To the south lies a grass field and a native tree nursery managed by Woodland Wisdoms

Mike McClellen is responsible for the maintenance and management of the research plots and grounds. His team also tends the property on the north and west sides, adjacent to the sidewalks and roads, which is managed by the City of Saint Paul. Cooperation with Mr. McClellen is required as he is an important ally in managing our buffer zones and plot.

Dimensions:

<u>Field size:</u>

E to W: 132 feet

N to S: 393 feet

Total: 51,876 sq. ft. (1.22 acres)

<u>Buffer zones</u> (width of grass strip):

N: 15-18 feet, melts into sidewalk and Larpentuer Ave.

S: 30+ feet, melts into Woodland Wisdom plot

E: 15 feet, corridor between adjacent soybean field, native prairie plot

W: 10 feet, melts into sidewalk and Cleveland Ave.

Miscellaneous Q & A

Contributor: Seth Zeigler
Co-Contributors: Jared Ashling, Michelle A. Grabowski, Ben Jordan
Date Submitted: February 24, 2005
Revision Date: February 25, 2005
Keywords: Miscellaneous student farm questions for Mike

Abstract:

This entry summarizes Mike's answers to various questions that did not fit into other categories about the student farm.

Is the farm house available for use?
Yes, Mike will provide a key. The student farm can utilize the farm house for tool storage, vegetable processing and classroom space. The space may require some cleaning. Electric and water are available in the farm house. We can install a refrigerator can be installed if we like after consulting Mike.

Is water available?
Irrigation is included in our $200 annual fee. We can hook up hoses and sprinklers of our own or can use a water gun provided by Mike. This water gun requires a 4ft. alley down the middle of the plot and should cover the entire plot. We did not ask about rainwater collection.

Electricity?
Electric is available at the farm house. Mike also has a generator available on a firt come first serve basis.

Are animals acceptable in the plots?
Animals are acceptable in the plots. They must be contained in the student farm plot and be treated well and maintained in good condition.

How can we contact our plot neighbors?
Contact information is available through Mike.

Can we put up fencing?
We can install fencing as long as it is within the plot area, and possibly even outside of it if we first discussed this with other authorities. But the same restraints hold with any activity, it must look good, be maintained, and represent the University well. We also may be prohibited by our quest for organic certification from installing treated wooden posts, and this would have to be looked into first. We also need to plan ahead for potential equipment, like irrigation and tractors, that may not be very conducive to fencing of some areas. And of course, no matter what we do it will be best to

receive a crash course in these all we need to do is send a few delegates for a tour courtesy of Mike.

Is there greenhouse space available? How do we get greenhouse space?
Mike has no control over the greenhouses. Pam Warnke is in charge of greenhouse space and management. Her contact information is 612-625-3153 and alter002@umn.edu

Who do we deal with for maintenance crew work? We plan to become organically certified, are there any potential problems with that? How do we convey our needs to the maintenance crew?
Mike is in charge of maintenance on the plots and seems very much aware of all that happens upon them, but he does not control the area outside the fence, and we still have to do some research to make the proper contacts to prevent contamination from these roadway buffers which belong to the city but are managed by the U. Mike does not foresee any problems with organic certification as long as the plot is orderly and managed. There may be some concerns for how to keep quack grass from encroaching onto the plot, for which roundup was formerly used, and we can not have even managed weeds going to seed, but these should be far from insurmountable challenges. As to our needs for the maintenance crew, there is a very short (approximately one day depending upon season and demand) turn around time between when we request use of machinery and receive it. Any of us with helpful experience can then receive a brief review of how to run it and after a pre-departure equipment inspection can proceed to do the work ourselves. If we wish to use the irrigating gun either one of us or Mike can do this, although this may require us to leave a little more of our edges and a central aisle open.

References:
Interview with Mike

MISSION, VISION & PLANS

This Section Contains: Page

Guiding Principles & Mission Statement

Contributor: Student Farm Planning Class Spring Semester 2005
Date Submitted (Guiding Principles): February 18th 2005
Date Submitted (Mission Statement): May 8th 2005
Keywords: Principles, Management, Research, Education, Outreach, Community

Management Principles:
"The student farm will be cooperatively planned and managed by a core group of students in collaboration with MISA, University faculty and other organizations".

Crops & Farm Management Principles:
"The student farm through its operation will grow, harvest and market a diversity of crops using sustainable organic practices that utilize local resources, reflect natural ecosystems and improve the quality of the farmland".

Science Philosophy & Research Principles:
"The student farm will encourage students to implement, monitor, and evaluate innovative and sustainable organic farming practices".

Education & Outreach Principles:
"The student farm utilizes and teaches sustainable organic farming practices to students, faculty and community members. It will serve as a gathering place for interdisciplinary learning communities and a resource for extension in sustainable organic agriculture."

Mission Statement
To steward a student managed, organic, sustainable farm that provides food, a place for community building, multidisciplinary education, research and outreach.

Education & Outreach Plan

Contributor: Kelly M Paulson
Co-Contributors: Megan Kranz McGuire
Date Submitted: April 4, 2005
Keywords: education, outreach, to-do

Abstract:
Using the Education and Outreach Principles, Goals, and Objectives as a guide, specific actions to attain those goals are identified.

Goal #1: Demonstrate and encourage sustainable, organic, urban agriculture.

Objectives:

1a. Be on the Green Institute's Community Garden Tour this summer (July 2005).

PLAN:

1. We will continue talking with the Green Institute (Jared and Courtney and others, have been in contact with the Green Institute about this issue already); make contacts with educators who may be on the tour from school gardens, for example.
2. We will determine who will be there to represent the farm and what they will say about the farm; develop specific messages to educate visitors during the tour.
3. We will offer samples of our produce.

1b. To create a limited space demonstration garden for this semester. This garden will demonstrate composting, continuous production and perennial incorporation in a 10 X 10 foot space.

PLAN:

1. We will plan the design of the garden, determine the composting system, identify key perennials to be used for production or habitat, and decide which vegetables to produce. In choosing vegetables, high yield, appropriateness for organic practices, and continuous production will be the guiding principles.
    a. This garden will demonstrate certain cropping principles such as plant guilds and landscaping for wildlife.
2. We will have weatherproof signs to increase the educational value of such a garden for visitors who come when an interpreter is unavailable.

1c. By November 1st, 2005, 100 visitors will have signed our guestbook.

PLAN:

1. We will purchase a simple notebook in which we can record our visitors or have them sign the book themselves.

This way, we will be able to measure our outreach success and use the information when talking about the farm with outside organizations.

2. We will host classes from the University and secondary schools. Other visitors may include community gardeners getting ideas from our small plot or student farm groups from other colleges. If signing the book seems too laborious with a large group, counting or estimating the group and recording the name and type of organization will be adequate. This information will help us see who is utilizing the student farm and who is not interested or not hearing about the farm.
3. To measure the educational value we are providing, we will ask visitors to answer one question when they sign in, such as "What did you learn from the student farm/demonstration garden?" or "What would you like to know?"

Goal #2: To Communicate and connect with our partner organizations and the larger community.

Objectives:

2a. Publish a newsletter each semester: Spring, Fall & Summer, which will report the status of the farm: findings, successes, failures, etc.

PLAN:

1. We want even our outreach to be sustainable, so the newsletter will be primarily electronic. We will identify one or more individuals who will be here this summer who could compile the information and create the documents, like an intern to coordinate the newsletter. They would be in charge of either writing short essays to put into the newsletter or finding other participants to write essays and summaries.
    a. The email newsletter will be accompanied by a limited-number print version to attract people who are not already on the email list. To accomplish this goal, we must research how much it would cost to print/copy the newsletter, whether we could buy recycled paper, and whether we want/can afford to publish color photos in the newsletter. The intern will also determine how the paper copies of the newsletter will be distributed: where can we place them? What are strategic places to target? A list of the email addresses and mail addresses of our partners will aid in accomplishing this goal.
    b. We will include an explicitly educational component in this newsletter. This is a chance to teach our collaborators and partners about techniques and innovations that we may not have even been familiar with; for example, chicken tractors. We could also have an "advice column," "Ask the soil microbe" or something, where readers could write in with questions and we could answer them or find the best person to do so (this might be a good avenue for fulfilling educational, outreach, and community-building goals all at once!).
2. We will have a website with the assistance of MISA.
3. We will continue to expand our e-mail list of partner organizations and other interested parties as part of our outreach mission; for example, when speaking with classes, we will pass around a sign-up sheet to get more e-mail addresses of interested students.

2b. To evaluate and prioritize organizations and businesses when forming momentary partnerships, develop a set of criteria to evaluate.

PLAN:

1. We will think about how our principles and values intersect with our business decisions; for example, as Courtney mentioned, we do not want to displace sustainable farmers when we sell our produce. As we are currently researching business opportunities, this objective can be met as we review our choices and their implications.
2. We will evaluate partnerships, and include in our evaluation criteria a summary of what we learned from that partner. We will also have a survey that our partners fill out so we can evaluate both sides of the interaction and learn from other organizations' perceptions of us.

Goal #3: To incorporate and include students outside of the class who are interested in sustainability.

Objectives:

3a. Also the Newsletter (see above)

1. As discussed earlier, we will e-mail a newsletter to both our partner organizations and to interested students. We will also put a link to an online copy of our newsletter on relevant e-mail listservs, such as departments, student groups, the Minnesota Sustainable Communities Network, and offices like the CCLC.

3b. To table during the student group fairs and the freshmen orientation fair.

PLAN:

1. The next student group fairs will be next fall, including an opportunity to paint a section of the Washington Ave. bridge. To have the option of painting the bridge, we will register with the Student Activities Office, designate three officers of our group, and pay a small fee (perhaps $25). This will enable us to table at the Fall fair and paint a section of the bridge.
    a. We will designate one person to make the arraignments with the SAO to get registered, but sign-up for these two activities does not open till fall.
    b. During orientation, student groups table for freshman. The person contacting the SAO will also find out the requirements for table during freshman orientation.
2. To follow up registration, we will decide on a name and design to use when promoting the Student Farm. This design could be used on the bridge.

3c. Internet Communication: email-list newsletter and a website with discussion board open to everyone, specifically students.

PLAN:

1. According to Courtney, MISA would help us design a website that includes the capability of having a discussion board. To follow through with this plan, at least one person will read the message board and report summaries back to the group.
2. In addition to having an internet-literate person take on this task, we will make sure that e-mail correspondence has some educational value for the recipients.

Website Components

Contributor: Brian Noy
Date Submitted: April 7, 2005

Keywords: student farms, outreach, web, networking, advertising

Abstract:
The following outline is a list of items that should be included and considered for the student farm website. This is based on the current class site and information included on other student farm sites.

The student farm website should serve as the online resource center for students interested in sustainable agriculture and sustainability in general on campus. It should not only provide information on our farm, but on other opportunities in sustainable agriculture in and around the region.

- The master plan in HTML format so the material is easier to access than it currently is
- Summary of the master plan for easy reading
  - Background, history, objectives, goals
  - Current market operations
- Calendar of events
  - Related seminars
  - Working days
  - Farmers markets
- Updates and newsleters
- Related courses and programs offered at the University
- Internships: both campus and regional
- Research
  - Projects currently in progress
  - Completed reports
  - Potential future projects
- Photos
- Map of location and garden layout
- Registration for listserve and updates
- Online donation form and request for in-kind donations and volunteer assistance
- Contact information
- Directory of local markets, cooperatives, and other sustainable businesses
- Recipes
- Product order form (for value-added products)

Guide for creating a student garden for other schools

Resources:

Cornell University. “Dilmun Hill – Cornell Student Farm.” http://www.hort.cornell.edu/department/facilities/dilmun/index.html

Iowa State University. “ISU Student Organic Farm.” http://www.agron.iastate.edu/studentfarm/index.html

Michigan State University. “MSU Student Organic Farm.” http://www.hort.cornell.edu/department/facilities/dilmun/index.html

The New Farm. “Directory of Student Farms.” http://www.newfarm.org/features/0104/studentfarms/directory.shtml

University of British Columbia. “ubsfarm.” http://www.agsci.ubc.ca/ubcfarm/index.php

University of California Davis. “The Student Farm.” http://studentfarm.ucdavis.edu/Courses/SustAgCourse.htm

POTENTIAL PARTNER ORGANIZATIONS

This Section Contains: Page

Priorities in Forming Partnerships

Contributor: Megan Kranz McGuire
Date Submitted: April 22, 2005
Keywords: partners

Abstract:
Priorities for partnering with other organizations.

In choosing where to concentrate our energy in forming partnerships, I suggest that we concentrate on partners that explicitly address sustainability and social justice in their work. This includes our marketing approach. In marketing our produce, the Student Farm is working toward greater appreciation of sustainable agriculture as a whole rather than prioritizing profit. Therefore, in our operations, we will consider our impact on other organic producers and small farmers, whom we wish to support rather than compete with.

Other priorities should include geographically close groups that compliment our work, such as Woodland Wisdom and the display gardens at the U of M. Working locally will give us access to more land that we can use in collaboration with groups with the same goals as ours.

Finally, the Student Farm has not explicitly sought partnerships with other student organizations. I would recommend making more partnerships with student groups interested in sustainability and social justice so that we can accomplish our goal to educate others and provide space for interdisciplinary learning and community. These groups would also allow us to contact other students who may be interested in working on the student farm.

Summary of Potential Partners

Contributor: Michelle Grabowski
Co-Contributors: Jared Ashling, Peter Gillitzer, Lisa Kissing, Megan Kranz-McGuire, Brian Noy, Kelly Paulson, Jesse Sadowsky, Courtney Tchida, Charlie Wamstad, Seth Zeigler
Date Submitted: March 30th 2005
Keywords: Partners, Summary

Abstract:
Table of which potential partners would meet which organizational guiding principles.

Guiding Principles:
Management Principles:
"The student farm will be cooperatively planned and managed by a core group of students in collaboration with MISA, University faculty and other organizations".

Crops & Farm Management Principles:
"The student farm through its operation will grow, harvest and market a diversity of crops using sustainable organic practices that utilize local resources, reflect natural ecosystems and improve the quality of the farmland".

Science Philosophy & Research Principles:
"The student farm will encourage students to implement, monitor, and evaluate innovative and sustainable organic farming practices".

Education & Outreach Principles:
"The student farm utilizes and teaches sustainable organic farming practices to students, faculty and community members. It will serve as a gathering place for interdisciplinary learning communities and a resource for extension in sustainable organic agriculture."

Summary:

Principle	Organization	We Provide	We Recieve
Education	Teaching Garden	Another garden experience for teachers visiting the teaching garden	Additional exposure as an education-al demonstration site.
	Agricultural Food Sciences Academy	We can provide tours for classes in this school and research space for interested students.	New membership, as many of these students will continue on at the U of MN, potential volunteers and researchers for the farm

Principle	Organization	We Provide	We Receive
Education Continued	Bell Museum	We can provide a tour of the student farm to school groups already visiting the Bell Museum.	Information from the museum staff about how to put together an educational tour, the museum will post information about the farm and encourage visits. We should also get some public recognition from visitors to the museum seeing the farm and farm sign.
	Green Institute	A tour of the student farm for the American Community Garden Association National Meeting	Building materials for garden structures from the reuse center
	Gibbs Farm	Tour of the student farm to groups visiting the Gibbs farm museum and students participating in Gibb's summer school program	Indoor and Outdoor meeting space for educational presentations (rental) & Information about heirloom crops, medicinal herbs and traditional vegetable gardens
	Minnesota Fruit and Vegetable Growers Association	Assistance identifying markets, educational resource	Potentially could give a presentation at one of their conferences
Student-run Farm	Student Farm Network	We could provide tours and or work days for students visiting from other farms, farm management information on the proposed student web forum on Newfarm.org	Farm management information from student farm web forum, field trips to other student farms
Outreach	PIERE	We could provide food for University Dining Services through the "Local Foods Working Group"	Access to university food service as a market, compost ingredients through waste management program
	Display & Trial Gardens	We could provide volunteers to help in trial garden during planting season (trial) We could help design, implement, & manage the Residental Landscape Carrel (2006) (display)	Information on cultivars tested in the trial plots (trial) Visibility on Campus (display)
	Woodland Wisdoms	We could provide produce for use in trials examining nutrition in organic produce and nutrition in produce grown on land that was used in native ceremonies.	Combined land with woodland wisdom, shared activities like ceremonies

Principle	Organization	We Provide	We Receive
Outreach Operations	Green Lands, Blue Waters	Perennials in farm plot as an example of continuous cover production, membership in sustainable U program	Potential funds for student research interns, advice on potential perennials to grow, potential market for farm grown hazelnuts
	CINRAM	Some examples of perennials on campus	Advice on planning, planting, and caring for perennials. Advice on environmental impact of perennial systems. Connections to growers working with perennials that farm students could visit and learn from.
	TRE Nursery	A partnership within the University	Advice, assistance, and loan of equipement for perennial plant production
	Minnesota Department of Agriculture	Partnership within the University	Access to market forecast reports for specific crops
	Minnesota Crop Improvement Association	Potential partner internship site	Consultation on the certification process
	MN Horticulture Society	Membership fees for the Minnesota Green Program	Seed and Plant donations throughout the season
	MFA	Infromation about organic gardening learned on the student farm	Space for research projects too large and extensive for student farm plot
Research	Ecological Gardens / Paula Westmoreland	Opportunities to test and legitimize plant communities, potential partner internship site	Assistance creating plant communities for the student farm, use of the plant community database

References:

Ashling, Jared. 2005. Woodland Wisdom. University of Minnesota Student Farm Master Plan.

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Gillitizer, Peter. 2005. CINRAM (Center for Integrated Natural Resources and Agriculture Management). University of Minnesota Student Farm Master Plan.

Grabowski, Michelle. 2005. Gibb's Farm Partner Information. University of Minnesota Student Farm Master Plan.

Jordan, Ben. 2005. Potential Partnership: Minnesota Department of Agriculture.

Kissing, Lisa. 2005. Potential Partners:Presidential Initiative on the Environment and Renewable Energy. University of

Minnesota Student Farm Master Plan.

Kranz-McGuire, Andy. 2005. Partner of the Student Farm: TRE Nursery Management University of Minnesota, Department of Horticultural Science.

Kranz-McGuire, Megan. 2005. Green Lands, Blue Waters. University of Minnesota Student Farm Master Plan.
Noy, Brian. 2005. The Green Institute, GreenSpace Partners. University of Minnesota Student Farm Master Plan.

Petefish, Mike. 2005. Investigating Potential Partners

Paulson, Kelly. 2005. Potential Partners: Wilder Forest and the Minnesota Food Association. University of Minnesota Student Farm Master Plan.

Sadowsky, Jesse. 2005. CINRAM – Student Farm Partnership. University of Minnesota Student Farm Master Plan.

Tchida, Courtney. 2005. Student Farms on Other Campuses. University of Minnesota Student Farm Master Plan.

Wamstad, Charlie. 2005. Bell Museum Potential Partner Assignment. University of Minnesota Student Farm Master Plan.

Zeigler, Seth. 2005. Potential Partner with the Agriculture and Food Sciences Academy (ASFA). University of Minnesota Student Farm Master Plan.

Zeigler, Seth. 2005. Horticulture Display Gardens. University of Minnesota Student Farm Master Plan.

Zeigler, Seth. 2005. Horticulture Trial Gardens. University of Minnesota Student Farm Master Plan.

Agriculture and Food Sciences Academy (AFSA)

Contributor: Seth Zeigler
Date Submitted: March 2, 2005
Keywords: Partner, AFSA

Abstract:
AFSA is a charter school in nearby Little Canada for grades 8-12 that specializes in both agriculture, which is defined very broadly to include everything from forestry to floriculture, and in hands on intensive individual student projects. The school is relatively new and currently leasing its facilities, which provide little opportunity for the agricultural projects that it needs, but state of the art new facilities should be ready for the start of the 2005-2006 school year. This school has a very similar goal to our own of expanding knowledge of and about agriculture, particularly to urban youth, and of providing an alternative experimental mode of education, and this coupled with its proximity make it a perfect partner for stirring up interest in our own student farm and providing AFSA students with a better glimpse and even opportunities to participate and study in urban agriculture.

AFSA has three full time agriculture education teachers, Stephanie Wohlhuter, Jeremy Daberkow, and Carl Aakre, but each teacher is also required to incorporate some agriculture into each class. This school has an additional benefit of a highly diverse student body that represents the entire gamut of home and cultural backgrounds. When I talked with these three instructors we specifically discussed both possibilities of simply using the student farm as an example to bring entire classes to, since they naturally need examples to study but these are hard to come by in this area, and the possibility of working together with students on their independent research. If we have a surplus of land, especially this first Spring when AFSA has none, we could possibly encourage students from AFSA who aspire to do research complementary to our goals to do so on the student farm itself. AFSA members already frequently commute back and forth to the U for other research projects and a respectable proportion of them also intend to attend the U upon graduation or are already accepted. This is an excellent student base that we can bring into our organization even before they leave high school.

I propose that we keep AFSA, and I volunteer for this, very well posted on our progress and development and nurture relationships with the school as a whole and with any students who are particularly interested in organic and urban agriculture. This could potentially be a great spring of new enthusiastic students, both college and high school, to help the student farm grow, and these students, through their school, research projects, families, and communities can then radiate this knowledge to still more individuals that we otherwise very well may not reach.

References
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Agricultural & Food Sciences Academy 70 West County Road B2
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Bell Museum

Contributor: Charlie Wamstad
Co-Contributors: Charlie Wamstad
Date Submitted: March 7, 2005
Revision Date: March 22, 2005
Keywords: Bell Museum, natural history, partners

Abstract:
The Bell museum is a potential partner in the future that can help by connecting the garden to people with interests in organic gardening and the natural processes that it entails.

The Bell Museum of Natural History's mission is to strengthen the connection between people and the natural world. The James Ford Bell Museum of Natural History was established by state legislative mandate in 1872 to collect, preserve, skillfully prepare, display, and interpret our state's diverse animal and plant life for scholarly research and teaching and for public appreciation, enrichment, and enjoyment. Its governance belongs, by state legislative designation, to the University of Minnesota. The Bell Museums functions of Collecting, researching, and teaching serve to inform exhibits, exhibitions, for public outreach. The Bell Museum helps many students and teachers connect to the natural world each year through its educational programs for children in grades K-12 and their teachers. Programs include:

- Museum tours
- Learning kits that are filled with museum objects and hands-on activities
- Science workshops
- Satellite broadcasts of scientific expeditions
- Traveling exhibits for classrooms and libraries
- Training programs and a resource center for teachers

Scott Lanyon the director of the Bell museum said they couldn't directly give us funds for our farm but they could put up signs or something about what we are doing and how our garden ties into our natural world. We also should get a decent amount of people walking by the farm because of the traffic to the Bell Museum. In the Future we might also be able to have an educational tour on our farm much like that of the tours in the museum. The teaching staff could possibly help with the structure and organization of our tours and educational programs. We could also coordinate with schools that come to the Bell Museum to also schedule time to tour the student farm.

Scott Lanyon, Museum Director
Phone (612)-624-2013
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General museum information: (612) 624-7083 info@bellmuseum.org

Center for Integrated Natural Resources and Agricultural Management - CINRAM

Contributor: Peter Gillitzer & Jesse Sadowsky
Date Submitted: March 3, 2005
Date Revised: June 21, 2005
Keywords: CINRAM, natural resource management, alternative crop, perennial system, environmental services, conservation
Abstract:
CINRAM is a partner-based organization within the University of Minnesota. CINRAM is involved in changing the course of agriculture from a major source of water pollution to a more sustainable system build around perennials. Through their breadth of knowledge regarding perennial systems, they could serve as a great reference for establishing and marketing perennials on the student farm.

The Center for Integrated Natural Resources & Agricultural Management (CINRAM) is a partner based organization that works to bring the U of M together with producers and other agencies to promote sustainable crop production options for rural Minnesota. CINRAM looks for ways for producers to generate income and provide environmental benefits, particularly for environmentally sensitive areas such as riparian zones and other areas in close proximity to water courses.

CINRAM forms groups with other agencies and producers that meet to discuss alternative crop options outside of traditional corn-soy rotation. CINRAM's current partners include the Blue Earth River Basin Initiative (BERBI) and the Land Stewardship Project. CINRAM also works to drive changes in agriculture by encouraging local enterprising and helping minimize investment by producers in their crossover from traditional to sustainable cropping through access to their wealth of information.

CINRAM is actively involved with research both on University land and in farmers test plots. CINRAM primarily focuses on perennial crops such as willow, poplar, and hazelnut. They offer advice as to what has works for other farmers that have converted at least part of their operation to a perennial system.

CINRAM, under the direction of Dean Current, Dr. Kenneth Brooks and Dr. Donnald Wyse, is a partner based organization located on the St. Paul campus of University of Minnesota. They work to help the development and adoption of integrated land use systems by coordinating research and extension projects related to agro forestry, link University faculty, researchers and landowners to work for integrated land use, promote educational training and encourage a holistic approach to agriculture and natural resource management.

CINRAM is located in the College of Natural Resource (Green Hall 115) and the College of Food, Agriculture and Environmental Sciences (Borlaug Hall 411). Dean Current is much involved with perennial, woody and continuous

cover and its application in agricultural systems. He is working closely with the Green Land, Blue Water project and has similar recommendations as Steve Morse: permanent woody perennial cover on the farm plot.

The student farm could incorporate some of the design schemes for perennial systems that CINRAM is currently researching. Dean Current, project manager for CINRAM, said he would be happy to provide information from other farms that have established perennial systems. CINRAM could offer the student farm advice on planning, planting, and caring for perennials that we may decide to plant. They have connections to a number of farms that interested students could tour to gain more a feel for what a perennial system is like.

Contact information:

Dean Current

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References:
Interview with Dean Current, CINRAM
www.cnr.umn.edu/FR/cinram

Ecological Gardens & Paula Westmoreland

Contributor: David Campbell

Date Submitted: 4/5/05

Keywords: plant community, guild, Plant Communities Database

Abstract: Paula Westmoreland has created a database designed to help organize and find plants that work together within a particular setting, eg. landscape, agricultural, wildlife habitat etc. These groups are called plant communities. Plant communities designed for specific human uses are named guilds. This database may be helpful for the farm by giving us a starting point for planting our perennials. We may be of use to Paula by providing feedback for the further refinement of the database.

Paula Westmoreland owns a company by the name of Ecological Gardens. Ecological Gardens is a landscaping company focused on planting with natives. Paula has begun work on a database that describes and organizes plant communities. A plant community is a group of plants that function together harmoniously and perennially, often times providing benefits for each other. Guilds are a type of plant community that incorporates natives and non-natives into a functioning system that provides various human benefits. Those benefits may be soil building, fruit and vegetable production, flowers, insectory, etc.

The database is designed to allow multiple queries to be entered to receive a list of plants that match your specifications. Soil type, zone, what use the plant has, guild members etc. are all possible queries. The database is in its beginning stages and we could become involved in its development by validating and refining the guilds.

The Plant Communities Database can provide us with a good starting point for our selection and planting designs of our perennials. Becoming involved with Paula with the database would also fulfill our research objective by researching the efficacy of different planting regimes and plant guilds. Paula has provided lists of guild members and their functions for an apple tree guild, an apple orchard guild, a hazelnut grove guild, a cabbage family polyculture, I have included these for review.

Candidate Guild for a Back Yard

plant_community_id	common_name	scientific_name	Ecological Functions
Apple Tree Guild	Alpine Strawberry	Fragaria vesca	Mulch Maker
	American Grape	Vitis labrusca	Wildlife Habitat
	Camas	Camassia quamash	Insectory
	Chives	Allium schoenoprasum	Insectory
			Nutrient Accumulator
			Pest Repellent
			Soil Builder
			Erosion Control
	Comfrey	Symphytum officinale	Animal Forage
			Fortress
			Insectory
			Mulch Maker
			Nutrient Accumulator
			Pest Repellent

			Water Purification
	Common Chokecherry	Prunus virginiana	Animal Forage
			Nurse
			Wildlife Food
	Daffodil	Narcissus	Pest Repellent
	Dill	Anethum graveolens	Insectory
			Pest Repellent
	Garlic	Allium sativum	Nutrient Accumulator
			Pest Repellent
	Pale Purple Coneflower	Echinacea angustifolia	Animal Forage
			Insectory
			Nutrient Accumulator
			Pest Repellent
			Restoration/Reclamation
	Pea (Garden or Field)	Pisum sativum	Insectory
			Nitrogen Fixer
			Nurse
			Soil Builder
			Soil Cultivator
			Erosion Control
			Weed Suppressor
	Rugosa Rose	Rosa rugosa	Nurse
			Windbreak
			Wildlife Food
	Tansy	Tanacetum vulgare	Insectory
			Pest Repellent
			Soil Builder
			Erosion Control

This is what Mark Shepard has planted on his farm in Viola, Wisconsin. This is oak savanna with sandy dry soils.

plant_community_id	common_name	scientific_name	Ecological Functions
Apple Orchard Guild	American Grape	Vitis labrusca	Wildlife Habitat
	Comfrey	Symphytum officinale	Animal Forage
			Fortress
			Insectory
			Mulch Maker
			Nutrient Accumulator
			Pest Repellent
			Water Purification
	Daffodil	Narcissus	Pest Repellent
	Rugosa Rose	Rosa rugosa	Nurse
			Windbreak
			Wildlife Food
	Siberian Peashrub	Caragana arborescens	Nitrogen Fixer

			Nurse
			Windbreak
			Erosion Control

This is what Mark Shepard has planted on his farm in Viola, Wisconsin. This is oak savanna with sandy dry soils.

plant_community_id	common_name	scientific_name	Ecological Functions
Hazelnut Grove Guild	American Grape	Vitis labrusca	Wildlife Habitat
	American Hazelnut	Corylus americana	Soil Builder
			Erosion Control
			Wildlife Food
	Rugosa Rose	Rosa rugosa	Nurse
			Windbreak
			Wildlife Food

These are a few other companion plantings

plant_community_id	common_name	scientific_name	Ecological Functions
Cabbage Family Polyculture	Black Eyed Susan	Rudbeckia hirta	Insectory
			Nurse
			Erosion Control
			Toxin Absorption
	Broccoli	Brassica oleracea italica	Pest Repellent
	Buckwheat	Eriogonum Michx.	Insectory
			Nurse
			Nutrient Accumulator
			Soil Builder
			Soil Cultivator
			Weed Suppressor
	Cauliflower	Brassica oleracea botrytis	Pest Repellent
	Dill	Anethum graveolens	Insectory
			Pest Repellent
	Zinnia	Zinnia elegans	Insectory
Tomato Family Polyculture	Basil	Ocimum basilicum	Pest Repellent
	Coriander (Cilantro)	Coriandrum sativum	Insectory
			Nurse
			Pest Repellent
	Nasturtium	Tropaeolum majus.	Pest Repellent
	Parsley	Petroselinum crispum	Insectory
			Pest Repellent
	Pepper	Capsicum	Pest Repellent
	Tansy	Tanacetum vulgare	Insectory
			Pest Repellent

			Soil Builder
			Erosion Control
	Tomato	Solanum lycopersicum	Pest Repellent
	Dill	Anethum graveolens	Insectory
			Pest Repellent
	Marigold	Calendula officinalis	Insectory
			Nurse
			Weed Suppressor
	Nasturtium	Tropaeolum majus.	Pest Repellent
	Summer Squash	Cucurbita pepo	Pest Repellent
	Winter Squash	Cucurbita maxima	Pest Repellent

Gibb's Farm

Contributor: Michelle Grabowski
Date Submitted: March 2, 2005
Keywords: heirloom vegetables, native plants, medicinal, Pioneer, Dakota, heritage orchard

Abstract:
Gibb's Farm Museum of pioneer and Dakota life provides an interactive portrayal of pioneer and Dakota life in the late 1800's and early 1900's.

Gibb's Farm Museum, located at 2097 West Larpenteur Avenue, Saint Paul, Minnesota 55113 (phone 651-646-8629), is operated by the Ramsey County Historical Society. The museum is designed to show many aspects of Pioneer and Dakota life. The grounds of the museum include an original 1854 farm house, a replica sod house, Dakota style tipi and bark lodge, two barns, and a one room school house. Gardens on the farm include a traditional Dakota garden with corn, squash and beans, a Pioneer style garden with heritage varieties, and a Dakota medicine garden with medicinal native plants. The farm also has a heritage apple orchard with many heirloom varieties. Natural areas include a native prairie and oak savannah.

Gibb's Farm Museum is open mid April to mid November annually. Many public events take place at the farm during this time including maple syruping, berry day, prairie walk, wild rice festival, and pumpkin carving. Group tours are also available upon request. Picnic tables and barn space can be rented for events. A children's school program is run during the summer months, where children study in the one room school house on the museum grounds followed by outdoor activities after class.

References:
Ramsey County Historical Society. (2005). Gibbs Farm Museum of Pioneer and Dakota life. Retrieved February 28, 2005, from http://www.rchs.com/gbbsfm2.htm

The Green Institute & GreenSpace

Contributor: Brian Noy
Date Submitted: March 11, 2005
Keywords: Green Institute, GreenSpace Partners, Community Parters, American Community Garden Association National Conference

Abstract:
A general overview of the Green Institute and its three main programs. The American Community Garden Association National Conference is approaching and offers us some opportunities to get some exposure.

The Green Institute is an organization located in the Phillips neighborhood on the south side of Minneapolis. Its mission is to foster sustainable community development that pursues the economic, environmental, and social gains of the Phillips neighborhood and the greater Twin Cities Area. The institute is housed in the Phillips Eco-Enterprise Center; a state-of-the-art environmentally-friendly office building that is home to more than a dozen organizations and businesses working towards sustainability and social justice.

The Green Institute encompasses three main programs; DeConstruction Services, GreenSpace Partners, and Phillips Community Energy Cooperative. DeConstruction Services is an employment program that salvages material from buildings that would otherwise be demolished and disposed of. Salvaged goods are then sold at the ReUse center and to contractors. The Phillips Community Energy Cooperative addresses the issues of energy production and conservation in the neighborhood and is in the process of planning for a biomass generator to be housed in an old garbage incinerator adjacent to the office.

GreenSpace Partners works the advocacy for and planning of green spaces in the twin cities such as green roofs, community gardens, and bike trails. They provide resources for gardeners and are currently in the process of planning for the American Community Garden Association National Conference to be held August 11-14 at the University of Minnesota. There is an opportunity for us to present a seminar and have exposure throughout the event. There will be a tour that will make a stop at our farm where somebody will need to be there to discuss the project. Planning meetings are held every other Monday at 11:30 at the office and we are encouraged to be part of the process.

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Green Lands, Blue Waters

Contributor: Megan Kranz McGuire
Date Submitted: March 3, 2005
Keywords: partnership

Abstract:
Information on the Green Lands Blue Waters initiative between the University of Minnesota and many other Institutions throughout the midwest.

The mission of Green Lands, Blue Waters is "to support development of and transition to a new generation of agricultural systems in the Mississippi River Basin that integrate more perennial plants and other continuous living cover into the agricultural landscape."

Their specific goals include making continuous living cover systems economically competitive, "a significant adoption of continuous living cover systems in the Upper Basin," and ecological improvement in water sheds. Green Lands, Blue Waters seeks to reduce nitrogen loading by 30% and increase migratory waterfowl and songbirds by 30% as well as shrink the hypoxic zone.

Currently, the initiative is drawing together a variety of partners and defining their strategies and tasks. They are engaging farmers and stakeholders through outreach and education, involving land-grant institutions in research, connecting with various levels of government agencies, and coordinating efforts from many sectors.

Green Lands Blue Waters has many, many partners, including the Institute for Agriculture and Trade Policy, many of the land-grant universities in the Mid-West, government entities, and non-governmental organizations. More organizations continue to partner with this group, so their list is continually growing.

In talking with Steve Morse, he suggested that we could partner with the work of Green Lands, Blue Waters by adding perennials and other continuous cover to our farm plot. He told me the Jared Ashling (one of our members) has compiled a list of perennials that we should consider utilizing. He also suggested that we make our farm part of the Sustainable "U" initiative. Finally, in marketing our produce, he suggested that we could find a niche market, such as a local chocolate company that uses organic, sustainably grown chocolate for a high-end market. Mr. Morse thought that we could possibly market hazelnuts to him as a local, sustainable component of his eco-friendly business.

Green Lands, Blue Waters does not have its own office space, but can be contacted through:

Steve Morse
Senior Fellow
College of Agriculture, Food and Environmental Sciences,
University of Minnesota
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1991 Upper Buford Circle
St Paul, MN 55108
Ph. 612.625.7278
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Horticulture Display & Trial Gardens

Morse033@umn.edu
www.greenlandsbluewaters.org.
Contributor: Seth Zeigler
Date Submitted: March 23, 2005
Revision Date: March 29, 2005
Keywords: Trial Garden, Display Garden

Abstract:
The Trial Garden only grows a few special All American Selection vegetables and is currently limited for space and expansion is unlikely. On the other hand, the Trial Garden does require a fair deal of labor, especially at planting time in mid-May, and this may be a great opportunity for a few of our members. We also do share many goals with the Trial Garden, and as the Student Farm develops we should maintain contact and help to direct interest back and forth between our two organizations. The Display Garden will develop a Residential Landscape Carrel to demonstrate sustainable landscaping, but under a different definition of sustainable than our own and of little overlap with our activities or even interest to the Student Farm.

I was directed to Karyn Vidmar, who is largely responsible for the Trial Garden and can most often be found in the greenhouses, as she was when I met with her. She is interested in our endeavor and it is obvious that we share a lot of common ground, but although there have been considerations of including more vegetables in the trial garden they remain very limited. Data is currently collected, although, on the tomatoes grown in the Trial Garden. These tomatoes are All American Selections, which are developed for quality, yield, and to be propagated by seed, and the Trial Garden is certified as a growing site.

Karyn would also be grateful to anyone who would help during planting, which begins in mid-May, and maybe we could lend a little official help as a group during this time. The Trial Garden draws substantial attention, as shall the Student Farm, and we can all benefit by helping each other get the word, and thus the people, out. As the Student Farm grows so can mutually beneficial relationships, and this is a close one that we may choose to nurture even more so than some others.

The Display Garden will begin to build a Residential Landscape Carrel in 2006. This will mimic a typical backyard and even include a mock cottage and deck and will both exhibit sustainable landscape design and provide a place for students to practice this art. Unfortunately, this will all be done under a different definition of sustainable than our own and most likely include chemical applications. Additionally, any food crops grown will be included primarily for their landscape qualities, not their nutritional merits or potentials.

Thus I recommend that we do not concern ourselves, at least at this point, with the Residential Landscape Carrel. This search was not in vain, although, as Julie did recommend that we contact Vicky Vogels of The Green Institute. Vicki is involved in more than 100 local community gardens and is also active in The Living Green Expo.

References:

Email discussion with Julie Weisenhorn – Teaching Specialist in Horticultural Science Phone: 612-624-7407 Fax: 612-624-4941 Email: weise019@umn.edu Address: 405 Alderman Hall, 1970 Folwell Avenue, St. Paul, MN 55108

Personal Discussion with Karyn E Vidmar – Teaching Specialist in Horticultural Science - vidm0009.umn.edu

Minnesota Department of Agriculture

Contributor: Ben Jordan
Co-Contributors:
Date Submitted: April 25, 2005
Revision Date: April 25, 2005
Keywords: MDA, Meg, Moynihan, Minnesota, Department, Agriculture

Abstract:
In investigating the potential for partnership with the Minnesota Department of Agriculture, a group of students from our class met with Meg Moynihan, who is the head of the Energy and Sustainability Issues department. She gave us several tips and resources to work with, and I have found them to be an extremely valuable partner.

Meg Moynihan wanted us to all know that if successful, it will be great PR for the University of Minnesota. Meg's department is Energy & Sustainability Issues. One of her suggestions, based on what she has seen other organic farms struggle with, is research on innovative methods of pest control is very needed. She thinks that if we have innovative projects like this, we will get more and more exposure to state interests.

She is more than happy to provide market analysis data, as needed, for any products. If we want to know what the market trends and prices for august 3rd for brandywine tomatoes should look like, we can choose the best places to distribute our vegetables to maximize our benefit (profits, partnerships, etc.). I am going to suggest that we use the resource by taking the spreadsheet of seed planting dates, and forecast when our crops will be harvested, and what we can expect the market price to be.

She also pointed out that we should, in her opinion, decide whether our goal was to actually be "economically sustainable" as a unit inside of the U of M, or if our goal is to provide education about this, and the other components of our farm to the greater community? A point I think is quite valid. We should keep in mind that while we may not be profitable as a entire unit, we can use the tracking of our expenses to eliminate certain costs that we bear due to research, limited land availability, etc. and cateogrize them. This would allow us all to see an accurate picture of the farm, and understand the real costs. I think much of what Mike may have to do will be setting up a chart of accounts. While a checking account may be important soon, we really need to start tracking the expenses AND donations, and there estimated value. I can suggest a simple setup of Quickbooks, which is a common application that an actual organic farm would use. It has a simple interface to create the income and expense accounts needed to start tracking this stuff. We can also put the checkbook into this, and track it all in one place. As Mike pointed out the other day, the simple part is getting the checking account, but what about where the money is going? Quickbooks is a low cost ($99?) purchase, and may even be available through the U of M. It would even easily allow a user account to be created for the managers of the farm (both seedlings and sprouts!), so that each could view the data, or a monthly report coudl be issued. Something to discuss.

We should look into Organic Farming Research Foundation (http://www.ofrf.org). They have good information and grants up the wazoo. She suggested that we apply for fall 2006 grants ASAP.

Minnesota Food Association and Wilder Forest

Contributor: Kelly M Paulson
Co-Contributors: N/A
Date Submitted: February 28, 2005
Keywords: Minnesota Food Association, MFA, New Immigrant Agriculture Project, Wilder Forest

Abstract:
The Minnesota Food Association (MFA) is a non-profit based in the Twin Cities area that works to connect people and organizations working on sustainable food systems. MFA has recently acquired land at the Wilder Forest property, including acreage to train new immigrants in sustainable agriculture practices, a community-supported agriculture (CSA) operation, and space for community gardens. There are existing partnerships between the MFA and the Minnesota Institute for Sustainable Agriculture (MISA) which the student farm could potentially leverage to the advantage of both organizations.

The Minnesota Food Association (MFA) is a non-profit that has been in existence for about 20 years. Their mission is to "form a coalition of informed, connected, activated urban and rural citizens to work together to build a more sustainable food system. Sustainability has many dimensions. In the arena of food systems work, sustainable describes a system in which all people, regardless of income or other variables, have access to safe, quality food which is grown, processed and distributed in a manner that supports family farms, viable urban and rural communities, and stewardship of the land and environment" (MFA). As expressed by Josh Bryceson, farm manager, the primary goal of MFA is to connect people (personal communications, February 23, 2005).

Currently, MFA has undertaken several new projects, including the New Immigrant Agriculture Project and the May Farm CSA, both on the Wilder Forest property in Washington County, just south of Marine on St. Croix, MN. The Wilder Forest farm property includes 65 acres for the New Immigrant Agriculture Project, which combines classroom and field instruction. Community gardening acreage is also available on the Wilder Forest site for a fee. The CSA encompasses 20 acres total, only 10 of which will be planted this year. MFA is also endeavoring to increase their role in research and monitoring (WUSA, 2005), and the CSA has 10 acres fallow in the 2005 season that could possibly be used for research, particularly in soil quality or rotational grazing (J. Bryceson, personal communication, February 23, 2005).

The MFA has several established partnerships and they are constantly trying to grow their list of partners. The Minnesota Institute for Sustainable Agriculture (MISA) is on the board of MFA and the New Immigrant Agriculture Project (WUSA, 2005); it would be easy for the student farm to leverage this existing partnership to mutual advantage. It is possible that a partnership with May Farm CSA could allow for research that is too extensive or not appropriate for the student farm site (for example, livestock). In return, the student farm could possibly help the MFA by sharing some of the information that we collect regarding marketing and niche identification for local foods. MFA also partners with the Land Stewardship Project (LSP) to host an annual food summit in conjunction with the Living Green Expo (WUSA, 2005).

Contact information for MFA staff present at WUSA presentation (WUSA, 2005):

Name	Role at MFA	e-mail	Phone
Josh Bryceson	Farm Manager	jbryceson@mnfoodassociation.org	651-433-3676
Alvaro Rivera	New Immigrant Agriculture Project Director	arivera@mnfoodassociation.org	651-433-3676
Yimeen Vu	New Immigrant Agriculture Project Southeast Asian/ Hmong Coordinator	yvu@mnfoodassociation.org	651-433-3676

Minnesota Fruit and Vegetable Growers Association

Contributor: Mike Petefish
Date Submitted: April 11, 2005
Keywords: Organization, outreach, market access

Abstract:
Getting in touch with the Minnesota Fruit and Vegetable Growers Association in hopes of creating a partnership that will help us to accomplish our goals.

The MFVGA is an organization that helps improve the awareness and availability of Minnesota grown fruits and vegetables. The also help farmers by creating and or locating a market for them to bring their products. They have annual education conferences, tradeshows, summer tours, as well as a newsletter to subscribers and members. Their physical location was not revealed on the website and two emails were never responded to when I mailed them to the contact person. Initially I had thought collaboration would be easy since they have an ongoing research project sponsored by the U of M, but contact was never made. I thought they might help us with locating a market or possibly sponsoring an internship and we might be able to give a presentation for them at one of their education conferences. It seems like a logical partner and perhaps trying to contact them in the future would be a beneficial thing for the student farm to do.

Reference:
http://www.mfvga.org/

Presidential Initiative on the Environment and Renewable Energy

Contributor: Lisa Kissing

Date Submitted: March 3, 2005

Keywords: The Presidential Initiative on the Environment and Renewable Energy, PIERE, The President's Interdisciplinary Academic Initiatives, The Commission Report on Environmental Science and Policy, Initiative on Renewable Energy and the Environment, IREE, Sustainability and U, coordination, communication, capacity, curriculum,

Abstract:

The Presidential Initiative on the Environment and Renewable Energy (PIERE) is one of eight interdisciplinary academic initiatives outlined by University of Minnesota President Robert H. Bruininks. The Initiative works to foster sustainability and unite environment and energy related efforts within the University. Three main branches of PIERE are The Commission on Environmental Science and Policy, the Initiative on Renewable Energy and the Environment, and Sustainability and U.

In his 2003 State of the University address, President Robert H. Bruininks spoke on the importance of maintaining the University of Minnesota's status as a top public research institution. Bruininks defined eight interdisciplinary Presidential Initiatives for the University. One of these targeted areas was the environment and renewable energy. The Presidential Initiative on the Environment and Renewable Energy, known as PIERE, was born. Each initiative was developed by working groups and guided by the University's strategic planning process. On a more personal level, the president's drive for environmental progress can bee seen in an interview with UMN News, "I've been a long-term advocate of energy conservation and preserving the natural environment. I've spent a good part of my life on the edge of the Boundary Waters, and I have a deep and abiding interest in the environment and in preserving it. Failure to address energy policy would be a detriment and create a destabilized world for all of us."

Prior to stating the eight presidential initiatives, The University of Minnesota's Commission Report on Environmental Science and Policy set the stage for PIERE's creation. In 2002, what is often referred to as the Sullivan Report, because of its leader Al Sullivan, defined the universities environmental status. A resulting 27 recommendations were consolidated into three main areas needing improvement: communication, coordination, and capacity. The report stood as a starting point to improving environmental teaching, research, and outreach in the University. And indeed, the original three main recommendations formed the mission of the Presidential Initiative on the Environment and Renewable Energy a year later. The first branch of PIERE works solely to accomplish the recommendations of Commission on Environmental Science and Policy. This branch is the main focus of PIERE. Because of the diverse nature of University programs, sources of environmental projects and knowledge are scattered and often isolated from one another. The communication and coordination areas work to unite the sustainability efforts within the University. In the words of the Office of the President, "the University is building on its breadth by cultivating work across the disciplines." The capacity area of the mission works to gain more capacity for environmental sources within the University. According to Susan Stafford, a third "c" goal of curriculum has been attached to PIERE. The initiative will also work toward improving the University's environmental curriculum. All together "these are efforts largely aimed at 'tying together' the multitude of environmental and energy related work happening at the University."

A second branch of PIERE is the Initiative for Renewable Energy and the Environment (IREE). IREE aims "to promote statewide economic development, sustainable, healthy, and diverse ecosystems, and national energy security through development of bio-based and other renewable resources and processes." This research branch of PIERE is a collaboration of University faculty, Xcell Energy, and other partners. These partnerships bring substantial funding, far more than any other PIERE branch. IREE focuses on hydrogen; bioenergy and bioproducts; policy economics, and ecosystem; and conservation and efficient energy systems.

Sustainability and U is the last branch executing the mission of PIERE. Sustainability and U brings the commitment to sustainability to campus. University Services holds the leadership to spread these sustainable practices. The activities of Sustainability and U range from waste management to Beautiful U Day. One interesting project of Sustainability and U is The Local Foods Working Group which is working to connect University Dining Services with local farmers to support the use of local products.

Any inquiries into PIERE may be directed toward:

Coordinator: Laureen L. Ross McCalib (rossm025@umn.edu or 612-624-9476)

Initiative leaders: Susan G. Stafford, Dean, College of Natural Resources (stafford@umn.edu or 612-624-1234), Robert Elde, Dean, College of Biological Sciences (elde@umn.edu or 612-624-2244) and Charles Muscoplat, Dean, College of Agricultural, Food and Environmental Sciences (cmuscop@umn.edu or 612-624-5387)

References:

(2004, 1 May). Initiative on Environment and Renewable Energy. Office of the President. Retrieved March 2, 2005, from http://www1.umn.edu/pres/01_init_env.html

Stafford, Susan G. (2005, 25 February). Presidential Initiative on the Environment and Renewable Energy (PIERE). Green Lands Blue Waters Forum.

Erickson, Cass. (2005, February 10). Bruininks gives hybrid SUV a thumbs-up. UMN News

Sullivan, Alfred D. (2002, June). Commission on Environmental Science and Policy. Retrieved March 2, 2005, from http://www1.umn.edu/enviro/NewFiles/recommend.html

Student Farms on other Campuses

Contributor: Courtney Tchida
Date Submitted: March 3, 2005
Keywords: student farms, ISU, MSU, UW Madison, Northland College, St. Olaf University

Abstract:
Report on networking with students from other student farms that took place during and following the Upper Midwest Organic Farming Conference February 24-26th 2005. Dialog with potential network of student farms in the Midwest and next steps for that group.

At the Upper Midwest Organic Farming Conference (2/26/05) two sessions were held around student farms. The first was Students Shaping Education: Student-Run Organic Gardens and Farms in which students from three Universities: University of Wisconsin at Madison, Iowa State University and Michigan State University sat on a panel and talked about their experiences working on their campuses student farms. The second session, "Students Shaping Education Networking" was held later the same day and was attended by students from the three above mentioned schools plus, Northland College, University of Wisconsin Stevens Point (who were thinking about trying to start a student farm) and students from our student farm at the University of Minnesota.

The information covered in the first session is available elsewhere, namely Jared Ashling's article on student farms at other campuses, and in addition I have copies of the power point presentations made that can be referenced later.

The second session was a discussion among students from the student farm represented that focused on how we can build a network of student farms in the Midwest. Many options were discussed the two main outcomes of the meeting were the proposals to 1. create a student farm forum website which may end up being hosted on newfarm.org's website that would include a message board and calendar, and 2. a meeting next year on the Thursday before the UMOFC for student farm students. Another important item that was discussed but undecided upon was inviting students from other farms to visit other student farms. No definite plans were made, however our group connected with the ISU students and we may connect with them when we visit Des Moines for the Community Garden Leadership Workshop. Students from our school also invited students from other farms to visit our farm in conjunction with the ACGA conference in August.

On a related note, two days later I met a student, Daye from the St. Olaf University in Northfield, MN. The student farm at St. Olaf has the goal of increasing campus sustainability by growing vegetables and herbs and selling them directly to Bon Appetit (the food service company that supplies their cafeteria. She is in the process of starting a student farm on their campus and is interested in networking with our student farm as well.

Contact Information:
Bridget Holcomb, Co-Chair of F.H. King: Students of Sustainable Agriculture at University of Wisconsin, Madison
blholcomb@students.wisc.edu www.fhking.rso.wisc.edu

Peter Lammers, President of the Iowa State University Student Organic Farm plammers@iastate.edu

Sarah Carlson, Iowa State University sarahcar@iastate.edu

Michelle Farrarese, Student Organic Farm Co-Manager at Michigan State University
ferreres@msu.edu

Kristen Smith, Northland College (additional contact info unavailable)

Dayna Burtness, St. Olaf College Northfield, MN burtnesd@stolaf.edu www.stolaf.edu/orgs/stogrow

References:

None

Teaching Garden

Contributor: Kelly M Paulson
Date Submitted: May 3, 2005
Keywords: teaching garden, demonstration, Green Hall, K-12, education

Abstract:
There is a new demonstration garden near the Green Hall greenhouses. It will be used mainly for educating K-12 teachers. The student farm might be able to join in some of these teaching events.

There is a new garden on the Saint Paul campus in spring 2005 – the teaching garden next to Green Hall. Dr. Karen Oberhauser, who has a long history of working with K-12 teachers through her Monarchs in the Classroom project, has spearheaded this garden project. Karen and colleagues conducted a focus group with teachers to find out what they would be interested in vis-à-vis the teaching garden, and they wanted to learn from a small demonstration garden that they could replicate on the campuses of their own schools. The teacher did not want a prairie garden because they feared school groundskeeping departments would find prairies too difficult to care for and unkempt-looking. So they've settled on an all-native, mostly-flowers garden, designed to attract butterflies and other interesting or beneficial insects. Karen anticipates this garden will be used by three classes of K-12 teachers, including an Insect Ecology course, and potentially will also dovetail with an outreach project through a Bush grant (Rob Blair, contact information below, is the lead on this portion of the project). Karen was interested in hearing about our student farm and our potential partnerships with Woodlands Wisdom to coordinate tours and educational events. The garden does not yet have a name or a website, so the best way to keep informed about its goings-on is through Karen or by stopping by the garden itself!

Contact information:

Name	e-mail	Phone
Karen Oberhauser	oberh001@umn.edu	(612) 624-8706
Rob Blair	BlairRB@umn.edu	(651) 624-2198

References:

Conversation with Dr. Oberhauser on 2005-05-02.

TRĒ Nursery and Nursery Management
University of Minnesota – Department of Horticultural Science

Contributor: Andy Kranz McGuire
Date Submitted: April 5, 2005
Keywords: TRE Nursery, Horticulture, Woody perennials, Equipment, Tree Care, Shrub Care, Cover Crop

Abstract:
TRĒ Nursery, and Chad Giblin especially, is a valuable resource for advice, assistance and equipment loan for most things relevant to woody perennials.

TRĒ Nursery is first and foremost an extension service for research and education about the cultivation of woody perennials and nursery management. Jeff Gilman and Chad P. Giblin have both expressed personal interest in organic practices and are available for advice, assistance, or as a source of equipment, regardless of whether or not we are official parnters. After reviewing the principles of the student farm and discussing them, Jeff Gilman has stated that he would agree to let TRĒ Nursery be an official partner of the student farm.

Chad is available for advice and assistance with the propagation of woody perennials, preparation of the seed bed, and the planting and maintenance of woody perennials. Though he does not have special knowledge in the organic production of fruits or nuts, he can help with such technical processes as grafting.

There is a variety of equipment that may be available to the student farm. This includes tractors, tillers, disks, cultivators, planting drills, etc. Chad also has a stash of various cover crop seeds that the student farm may have access to upon request.

Chad may also assist with installation/operation of semi-permanent irrigation system.

Chad Giblin, Scientist and Nursery Manager
gibli002@umn.edu
(612) 624-2729

Woodlands Wisdom

Contributor: Jared Ashling
Co-contributor: Andy Montain
Date Submitted: March 4, 2005
Keywords: Woodland Wisdom, neighbors, partnerships, native gardening

Abstract: Contact information for Woodlands Wisdoms group, a brief description of what they do, and how they see themselves partnering with the student farm.

Partner Institutions: Fond du Lac Tribal and Community College, Lac Courte Oreilles Ojibwe Community College, Leech Lake Tribal College, College of Menominee Nation, Turtle Mountain, Community College, White Earth Tribal and Community College

Woodlands Wisdoms is, according to their website "a collaboration between Tribal Colleges and the University of Minnesota, which seeks to address chronic health issues in Native American communities by integrating traditional Native knowledge with scientific methods of discovery in a culturally relevant programs of teaching, research and community awareness."

The goals are, according to the website "to integrate traditional Native knowledge with western methodologies to create, promote and support sustained healing processes of American Indian communities."

1. The objectives are, according to the website "to increase the number of Native American providers, educators and researchers;
2. to increase culturally responsive research;
3. to promote community awareness around issues of health and well-being; and
4. to increase the capacity of tribal colleges".

Their Vision according to the website: Eventually Woodlands Wisdom would like to see strong partnerships developing between Tribal Colleges and 1862 land-grant universities throughout the country, sharing resources in order to meet the needs of the communities they serve. Woodlands Wisdom will work for recognition and support of the work being done by the Tribal Colleges through equity in funding resources for research, facilities and operating expenses. We would like to see more Native American students graduating and continuing on for advanced degrees in Nutrition and Food Sciences. And that the Indian Nations once more become Strong and Healthy.

Barbara and Francois were very excited about the possibility of partnering with the Student Farm. They have a garden plot that is directly south of ours. The plot is mostly managed by François, the landscape designer, and is the place of 7 ceremonies through out the year, conducted by the eight tribal elders (one from each of the major tribes in Minnesota.)

They have many connections with nutritional departments on campus, and had many recommendations as to who to contact regarding nutritional comparisons (conventional vs organic) on campus. In addition, François expressed interest in comparing the quality of the produce grown on land upon with ceremony was held, and land that was not touch

by ceremony. Both François and Barbara felt that the student farm and the Woodland Wisdoms plot could be combined, with a barrier going around both plots. Their land has been organically managed for 20 years with out certification.

References:

Woodland Wisdoms

Contact: Barbara L. Graham, Ph.D.

Director, Woodlands Wisdom Nutrition Project

426 Church Street; 650 Children's Rehab

Minneapolis, MN 55455

612-625-1204 (ofc)/ 612-730-6083 (cell)

www.WoodlandsWisdom.org

MARKET ANALYSIS

This Section Contains: Page

Summary of Preliminary Market Analysis

Contributor: Kelly M Paulson
Co-Contributors: (see references for indirect contributors)
Date Submitted: March 30, 2005
Revision Date: N/A

Keywords: marketing, markets, recommendations

Abstract:

A compilation of the market strategies investigated by my colleagues is presented. I offer my opinions on the benefits and drawbacks of each strategy, a summary of which marketing strategies would be best for the student farm, and considerations that remain.

As a new enterprise on the University of Minnesota campus, situated in a metro area blessed with numerous marketing opportunities for sustainably grown food, the student farm has its pick of several different marketing models and opportunities. We could market our produce directly, through a CSA or Farmer's Market, sell to a specific institution like the UMN Housing Co-op or Hopkins School District, or we could act as a distributor to a Cooperative grocery or wholesaler.

I have reviewed several of these marketing options (see Table 1 or attached Excel file, and references for more detail) and provide recommendations for which might be best suited to our farm given our mission. These recommendations ought to be taken with the following caveats: the mission statement is not yet written in stone, we have not yet decided exactly what we will plant, and certain barriers to deciding on markets remain. For example, one such barrier to some of these markets is distribution. The student farm currently has no vehicle of its own. According to Bud Markhart (personal communication, March 30, 2005), the field plots have flatbed trailers that would be appropriate for transporting produce on the St. Paul Campus or perhaps to the Falcon Heights Farmers' Market. However, for longer distances we may require a more secure method of transport. Note also that the markets I summarized do not make a comprehensive list of our options. We did not, for example, consider a roadside produce stand that would exploit afternoon rush-hour traffic on Cleveland and Larpenteur. The recommendations that follow should not be followed to the exclusion of other options that might arise in the future.

Bearing such qualifications in mind, I would recommend the student farm focus more attention on the following marketing options: the University of Minnesota Farmers' Market, the University of MN Student Housing Cooperative, the Falcon Heights Farmers' Market, Hopkins School District, and Second Harvest.

The University of Minnesota's Office of Human Resources is focusing increasingly on employee health concerns as part of the UPlan insurance program. This has led to the initiation of a Farmer's Market on the East Bank, to begin this summer. The Farmers' Market will give us the opportunity for outreach to students and staff on the Minneapolis campus, and will give administration more exposure to our St. Paul Campus project. In addition, we will be providing healthy food to people within our community.

Marketing to the UMN's Student Housing Co-op would provide similar benefits but on a smaller scale. The Student Co-op would give us an opportunity to reach out to a group of UMN students that have an inherent interest in sustainably grown food, and these 28 people could all end up working on the farm at some point, or if nothing else they'll tell other students what great food they're eating and provide the base for a future student farm CSA! Since these students are also resourceful, gourmet chefs they could also co-author the student farm's first cookbook.

The Falcon Heights Farmers' Market is nearby and that is its primary advantage. Direct marketing provides us with some flexibility in setting our own prices. However, it might be worthwhile to identify gaps in what is sold at that market before we jump in.

Hopkins School District is a good opportunity to develop a unique niche market relationship with an educational institution. I could also visualize a student research project related to this, about how to develop markets (or exploit existing ones) for very specific products.

Second Harvest is a charitable non-profit organization that collects food donations for food banking and nutritional support programs. They will pick up the food. As a "marketing" option, Second Harvest is profitable because we could advertise at Farmers' Markets that our unsold food will go towards Second Harvest, or we could put up a donation jar next to our farm stand for Second Harvest. I see no disadvantage to developing a good relationship with such an organization.

These recommendations need to be commented on, and further refined as the process of planning our farm continues. We ought to choose markets that we can learn from in our first season and build flexibility and responsiveness into whatever marketing plan we choose. This means having more than one marketing outlet and not over-valuing the bottom line.

References:

Ashling, Jared. 2005. Initial Market Analysis: Hopkins School District. University of Minnesota Student Farm Master Plan.

Ashling, Jared. 2005. Initial Market Analysis: University of Minnesota Farmer's Market. University of Minnesota Student Farm Master Plan.

Campbell, David. 2005. Initial Market Analysis: Student Farm CSA. University of Minnesota Student Farm Master Plan.

Kissing, Lisa. 2005. Initial Market Analysis: Roots and Fruits. University of Minnesota Student Farm Master Plan.

Markhart, Bud. 2005. Initial Market Analysis: Second Harvest. University of Minnesota Student Farm Master Plan.

Noy, Brian. 2005. Initial Market Analysis: Falcon Heights Farmers' Market. University of Minnesota Student Farm Master Plan.

Zeigler, Seth. 2005. Initial Market Analysis: Student Housing Cooperative. University of Minnesota Student Farm Master Plan.

Market	Type of Market	Author of Master Plan Submission	Products?	Quantity?	When Products are needed?
Student Farm CSA	CSA	David Campbell	diversity, diversity throughout the season	determinded by farm manages and number of CSA members	seasonally, length of season depends on us
MPLS Campus Farmer's Market	Farmer's Market	Jared Ashling	fresh fruits. vegetables and cut flowers	no limit on quanity	Wednesdays from July 13th - August 24th
Falcon Heights Farmer's Market	Farmer's Market	Brian Noy	locally grown (with/ in 50 mile radius) produce, meat, dairy, eggs, flowers	no limit on quanity	Tuesdays in the summer
Hopkins School District	Institution	Jared Ashling	locally grown organic fruits & vegtables; particularly heirloom and unusual varieties	flexible; our role would be supplementary	mostly during the school year, but also for summer programs
Roots & Fruits	Local Wholesaler	Lisa Kissing	organic produce, cheeses, soy products, dry goods	everything we produce	year round
Second Harvest	Other	Bud Markhart	any vegetables except potatoes	flexible	year round
University Student Housing Coop	Other	Seth Zeigler	produce	28 eaters live at the Co-op but quantity can be flexible; can absorb seasonal fluctuations in production	year round?
Hampden Coop	Local Cooperative Grocery	David Campbell	produce	flexible	flexible
North Country Coop	Local Cooperative Grocery	Andy Kranz-McGuire	produce	flexible	flexible

Market	Distribution	Packaging	Profitability
Student Farm CSA	drop off points or direct distribution	resuable boxes, possibly from a co-op market	probably -low overhead, low packaging & shipping costs; but unclear if we could get enough members to buy shares
MPLS Campus Farmer's Market	bring to the farmer's market	no specific guidelines, but produce must meet MDA standards (there will be a UMN environmental Health and Safety Rep inspecting at the market)	probably -$70.00 vendor fee covers the whole 7 week season; they estimate 400-500 customers
Falcon Heights Farmer's Market	bring to the farmer's market	none needed	yes- control over pricing and low transportation costs
Hopkins School District	Bring to the school or work with the school's distributor	unclear, probably minimal packaging required.	yes- they will buy from us and our costs would be packing/shipping
Roots & Fruits	discuss further if we choose to work with them	discuss futher if we choose to sell to them; they have a specific uniform packaging we would conform to	yes- we would be paid and our products would be marketed as a homegrown UMN product; however we would be paid less pre-organic certification
Second Harvest	they pick up	produce should be clean with roots removed, boxed or bagged	no- they do not pay for produce and we would still have processing / packaging costs
University Student Housing Coop	unclear whether they pick up or we drop off	variations in quality and size are acceptable within limits, raw and whole produce preferable.	yes- prices comparable to Roots & Fruits could be paid minimal packaging & shipping costs
Hampden Coop	we deliver	conform to their requests	yes
North Country Coop	we deliver	conform to their resquests	yes

Market	Current Suppliers	Other Comments
Student Farm CSA	none this would be an unexploited niche	could be run by the student farm exclusively or jointly with other growers
MPLS Campus Farmer's Market	none, this is a brand-new market in 2005 (they hope for 20 vendors per week)	the market is being started by the UPlan Employee Wellness Program to encourage healthy eating among UMN students and employees
Falcon Heights Farmer's Market	about 60 other producers sell at the market	added selling point of being "right across the street"
Hopkins School District	Roots & Fruits, SYSCO	particular interest in yellow & red pole beans, red carrots & purple tomatoes
Roots & Fruits	numerous local producers	they demand exclusivity (!) and we would have to be responsible to market to roots & fruits needs; roots and fruits is a cooperative business
Second Harvest	a variety of local sources	they are a non-profit and donating to them will result in a warm, fuzzy feeling that money can't buy
University Student Housing Coop	currently supplied by one CSA, Roots & Fruits and a supplier in Wisconsin.	This co-op consists of UMN students who make sustainably grown food a priority
Hampden Coop	unknown	none
North Country Coop	unknown	none

Market	Conclusion
Student Farm CSA	A student farm CSA would give us some self-determination about how to run the farm. However, it may not be the best option for a first season; I would reccomend pursuing this in the future, and after doing some market analyses of how feasible this model would be.
MPLS Campus Farmer's Market	Participating in the UMN Farmer's Market would heighten our visibility on campus, particularly on the East Bank. This would be a great opportunity for outreach, teaching and recruiting nre student farm volunteers / managers- not to mention would earn us credibility with the administration.
Falcon Heights Farmer's Market	Our primary advantage at the Falcon Heights Farmer's Market would be the proximity to our farm. Competition from and to existing vendors might be an issue- identifying gaps in the market's current offerings would be a good strategy.
Hopkins School District	This is a particularly interesting opportunity from the education part of our mission. Because the school district is not picky about quantity, it could be a unique niche market to fill by providing specific varieties.
Roots & Fruits	While this owuld probably be profitable and is a local cooperative business, the exclusivity clause is a big drawback
Second Harvest	Donating food to second harvest us a very appropriate activity for a student-run farm. The biggest decision to be made is wheather we want to grow things specifically for Seconrd Harvest or if we should arrange for them to pick up our "leftovers" from other marketing attempts.
University Student Housing Coop	Selling to the student housing cooperative would not only be profitable, but would keep our distribution chain local and further build our outreach mission with the University Community.
Hampden Coop	none
North Country Coop	none

Trial CSA

Contributor: David Campbell
Date Submitted: 3/25/05

Key word: CSA

Abstract:
An increasingly popular method of buying fresh, organic, local food is by joining a CSA. A CSA is a Community Supported Agriculture. The student farm has the opportunity to use this model for selling our products, developing a strong community atmosphere, connect the farm with individuals outside the student group, and do all this under a flexible system that may provide more leeway than other markets could.

Community supported agriculture systems are being hailed as the saviour of the family farm and one of the most direct ways to connect consumer to producer, creating local food systems. A CSA provides many benefits to the farmer, the consumer, and the land. The system works like this. People buy a share in a farm ... usually around 300-400$ per season for a bushel of veggies, fruits and flowers every week. Each farm has different products it provides, some providing egg and meat shares, wild mushrooms, and interesting heirlooms unavailable through other markets.

The three-fold benefits of this system leaves little room for hidden costs associated with other markets. Hidden costs such as food traveling thousands of miles, polluting the environment and using huge amounts of fossil fuels to get to them. Conditions for the farmers growing the food and perhaps most importantly is the concern of what is actually used to grow the food and what cancerous chemicals still reside on it, on the land, and in the water. Conventional agricultural practices typically disconnect farmers from the consumers and the community. Most farmers just drop off at the grain elevators and never see their corn or wheat again. These worries however, don't usually apply to a CSA. Each consumer knows their farmer, what conditions he
or she is working in, how they grow their crops, and where it comes from. The farmer is guaranteed a few things as well. Selling at a farmer's market or to a grocery store might set a farmer up for producing for what won't get purchased. If no one shows at the market because of rain, for example, no vegetables will be sold, and all of the farmer's products may be doomed to rot. A CSA member has already shelled out the cash for their product and probably won't let it rot. The farmer also doesn't have to put all their eggs in one basket, so to speak. In fact, the opposite is necessary, resulting in more biodiversity and preservation of heirloom varieties. This is because a farmer with a CSA has to plan out the season to provide a variety of crops every single week. In another setting, the farmer is usually required to have X amount of X crop by X date. With this system, and enough planning, one can build in safeguards to prevent total failure in a season. By planting many different varieties with many different characteristics the farmer is prepared for different situations. So, say a mondo wave of disease rips through the countryside decimating all of one type of crop ... It's not such a big deal because that farmer who operates a CSA will have a dozen or a hundred other crops to take it's place for next week's baskets. This system is beneficial to the land as well because, though it's not always the case, most CSA's are grown with organic/sustainable techniques, and have that factor of biodiversity built in to it. This alleviates the landscape of
sterilized tracts of a single species dominating environments with tons of
toxic inputs applied to keep it free of any other organisms.

Other benefits of a CSA to the Student Farm would be: The availabilty of a market (we have an entire campus of possible buyers). The relaxed nature of the system, wherein we make the choice of how many members, and how much product we must produce each season. The system could also achieve our goal of outreach to folks other then the students in the class by, perhaps, offering discount prices to volunteers, having field days and education days with our members, and creating a vested interest in our farm for other people than us.

I believe starting small with a maximum goal of 15 members at either half bushels or whole bushels. Distribution would be organized by the students at either drop off points, or direct delivery (probably just a drop off point on St. Paul campus). Boxes would have to be attained, but I imagine one of the local co-ops would donate 20 reusable boxes. I believe a profit is attainable because of the low overhead and short chain of events between product and consumer. CSA's, other than growing it yourself, are the most direct way of becoming a part of the system that produces your food.

Minneapolis Campus Farmers Market

Contributor: Jared Ashling
Date Submitted: March 25, 2005

Keywords: Minneapolis Campus Farmers market,

Abstract: An interview conducted with the coordinator for the Minneapolis campus farmers market in question and answer format.

Who is running the program? Who is the anticipated consumer? How much interest has there been?

1) I am an employee of the Uplan Wellness program, which is part of the University's Employee Benefits/Human Resources department. The reason our department is interested in having a Farmer's Market on campus, is because it is believed to have positive influence in the eating habits of employees. Therefore, the anticipated consumer are U employees, but students are of course welcome (and general public as well, but they will not be targeted in any way through marketing). At this point, we have no solid evidence of interest other than what we have heard through word of mouth. Since all of the details are not yet in order, we have not publicized the event. However, the people we have been in contact with are very excited about the possibilities.

What products do they want? Specific varieties of vegetables, quantities?

2) Because this market is new to the University, we have been advised by the department of Env't Health and Safety to start small by only selling fresh fruits, vegetables, and cut flowers at the market. As for what specific types of fruits/veggies, that is up to each individual vendor. Our goal is to have approximately 20 different vendors at the market.

When do they need the products? Specific season, and market days?

3) The market will be held every Wednesday beginning July 13 and going through August 24. Vendors can set up there stands from 10-11a.m. It will be open for business from 11a.m.-2p.m, and take-down and clean-up will be from 2-3p.m. Each vendor will be required to participate in all seven weeks of the market. The location we have chosen is Church St. on the Minneapolis campus, between Washington Ave and the Tate Lab of Physics (this portion of the street is closed to through traffic). Vendors will line the sidewalks, being sure to stay off the turf and street. A small fee of $70 is required from each vendor, which covers participation in the market for the entire seven weeks.

What distribution & packaging will be needed?

4) We have no specific packaging guidelines, however there will be an inspector at the market each week from the U's department of Env't Health & Safety (I believe they follow the regulations of the MN Dept of Agriculture) to be sure everything meets their guidelines. Regarding distribution, the only regulation that comes to mind is that we are not allowing vendors to sell anything they have previously purchased from a distributor; each vendor must sell his/her own goods.

Who are they currently getting their produce from, and who will the competitors in the market be?

5) As of right now, the participants/vendors in the market are uncertain. We are in the process of putting together a communications packet including an invitation to join the market, as well as a Standard Use Agreement to be signed with rules, fees, etc. As I think I already mentioned, our goal is to have approx. 20 vendors which is estimated to sustain a market of about 400-500 customers. However, each vendor may have completely different products. We have obtained a list of possible vendors in the area from the manager of the Minneapolis Farmer's Market (the one on Nicollet Mall).

Jill Thielen
Farmer's Market coordinator
612-626-4161
thie0208@hr-mail.ohr.umn.edu

Falcon Heights Farmer's Market

Contributor: Brian Noy
Date Submitted: March 22, 2005

Keywords: Falcon Heights, St Paul, farmer's market, retail, marketing

Abstract:

Falcon Heights Farmer's Market information for the 2005 season and responses to the guiding marketing questions.

The Falcon Heights Farmer's Market is located almost directly across from our field in the Twin City Coop parking lot and is operated through the St Paul Farmer's Market. It is open from 8-12 every Tuesday from June 1-October 26. There are 60 stalls available but are filled for the season. If it appears that we would want to be part of it next summer, we should request a spot before the fall (contact information on adjoining page).

- Type of Market: Open air farmer's market
- Who: The market is operated by the St. Paul Farmer's Market
- What products do they want? All locally grown produce, meat, dairy, eggs, and flowers. Everything (minus a few exceptions that cannot be produced locally) must be grown within 50 miles of St Paul.
- How much do they want and when do they need the products? No limit and on Tuesday mornings.
- What distribution & packaging will be needed? We will sell directly to the customers and there is no packaging needed.
- Who is currently supplying them? (competition) There are approximately 60 other distributors selling at the market.
- Can we make a profit? Yes, many others seem to and we have control over the prices. We also have the benefit of having little transportation costs and time, being able to harvest during the market (others at the farm could harvest only what is in demand that day so as not to over harvest), and the appeal of being grown right across the street.

Contact:
St Paul Farmer's Market: spmkweb@aol.com
References:
Falcon Heights Farmer's Market. http://www.ci.falcon-heights.mn.us/Community/farmersmarket.html. March 22, 2005.
St Paul Farmer's Market. http://www.stpaulfarmersmarket.com. March 24, 2005.

Hopkins School District

Contributor: Jared Ashling
Date Submitted: March 23, 2005

Keywords: Market Considerations, Hopkins School District, Bertrand Weber
Considerations for Markets

Abstract: Summary of meeting with Bertrand Weber, director of Royal Cuisine, the food program for Hopkins School district.

- Type of Market: Farm to School

- Who: Hopkins School District food program Royal Cuisine, which includes these schools:

Hopkins High School
2400 Lindbergh Dr.
Minnetonka, MN 55305
952-988-4523

West Junior High
3830 Baker Rd.
Minnetonka, MN 55305
952-988-4408

Glen Lake Elementary
4801 Woodridge Rd.
Hopkins, MN 55343
952-988-5207

Eisenhower Elementary
1001 Highway 7
Hopkins, MN 55305
952-988-4139

Meadowbrook Elementary
5430 Glenwood Dr.
Golden Valley, MN 55422
952-988-5107

Fair School
3915 Adair Ave. No.
Crystal, MN 55422
763-971-4513

St. Johns
1503 Boyce Rd.
Hopkins, MN 55343

North Junior High
10700 Cedar Lake Rd.
Minnetonka, MN 55305
952-988-4807

Alice Smith Elementary
801 Minnetonka Mills Rd.
Hopkins, MN 55343
952-988-4207

Katherine Curren Elementary
1600 Mainstreet
Hopkins, MN 55343
952-988-4957

Gatewood Elementary
14900 Gatewood Dr.
Minnetonka, MN 55345
952-988-5257

IDDS
10 South 10th Street
Mpls, MN 55403
612-752-7146

Mainstreet School of Performing Arts
1320 Main Street
Hopkins, MN 55343
952-224-1347

- What products do they want? The Hopkins School district is interested in locally grown organic fruits and vegetables. They have a particular interest in Heirloom varieties and unusual fruits and vegetables. Bertrand Webber, the director of food services at Hopkins, likes to use these unusuals to spark children's interest in healthy foods. Bertrand specifically mentioned yellow and red pole beans, red carrots, and purple tomatoes.

- How much do they want and when do they need the products? The amount of products required is flexible. The school district feeds over 9000 students grades k-12 ; their needs could never be met by what we would produce. Instead, we would be supplementing the schools provider. Also, while there would be less of a need for produce during the summer months, the need still exists, due to summer school and other summer programs.

- What distribution & packaging will be needed? Products would need to be distributed to the school or to their distributor.

- Who is currently supplying them? (competition) Roots and Fruits produce? CISCO?

- Can we make a profit? Yes, Bertrand Weber was excited about purchasing produce from the U of M student farm, and bringing students to the farm for tours. Our costs would include packing and shipping.

Roots and Fruits Cooperative

Contributor: Lisa Kissing
Date Submitted: March 22, 2005
Revision Date:

Keywords: Roots and Fruits Cooperative Produce, purchasing, prospective buyer, pricing, exclusivity

Abstract:

Roots and Fruits Cooperative Produce is a wholesale distributor in the Twin Cities Area. The distributor is interested in purchasing our future product as long as we sell to no other source. More specific information on purchasing can be obtained as the farm defines its own market plans.

Roots and Fruits Cooperative Produce serves groceries, school districts, and the top restaurants of the Twin Cities. They specialize in high quality foods such as organic produce, cheeses, soy products, and dry goods. They stand as one of the largest buyers of organic produce in the area. Despite their large size, the distributor has proven to be very cooperative and friendly. The Purchasing Manager Mark Vollmer quickly answered Roots and Fruits' needs. They are willing to buy and distribute about everything we produce, within the limits of market demand. Because this is wholesale, not retail, obscure products without market demand are not desired. Tomatoes seem to be a hot item at the moment. They are willing to take our produce even before organic certification is complete. However, the price for non-certified foods is lower. With or without certification, a profit could be made. The product would be marketed as a homegrown sustainable product of the University. They are currently supplied by many sources across the country and locally. The distributor is large enough that a supply from the student farm should not endanger fellow local producers already supplying Roots and Fruits.

Most importantly, the distributor demands exclusivity. If the student farm chooses Roots and Fruits, we can not sell to any other source. Whatever the farm produces, they want it all. Mark encouraged the student farm to check back with Ron Laudy for more details after we had progressed further into our planning process. Our final market considerations should be solidified after we know what we are to grow and to whom we will sell. Packaging and distribution were one of these details he preferred not to discuss until we have finalized our planning. It is clear, however, that packaging would be of a uniform variety used by Roots and Fruits.

Any inquiries into Roots and Fruits Cooperative Produce purchasing may be directed toward:

Our Specific Purchaser: Ron Laudy (612-617-8448 or ronl@rootsproduce.com)
Purchasing Manager/Sales Manager: Mark Vollmer (612-617-8474 markv@rootsproduce.com)

References:

Vollmer, Mark. Telephone interview. 22 Mar. 2005.

Second Harvest

Contributor: Bud Markhart
Co-Contributors:
Date Submitted: March 11, 2005
Revision Date:

Keywords: Second Harvest, Market Analysis

Abstract:
Intitial information on Second Harvest as a market sink.

Type of Market: Institution / Other

Who: Second Harvest

What products do they want? Any Vegetables except potatoes

How much do they want and when do they need the products? Any amount, Any Time

What distribution & packaging will be needed? Not too dirty, roots removed, boxed or bagged.

Who is currently supplying them? (competition) variety of sources.

Can we make a profit? No.

References:
None.

Students' Housing Co-op

Contributor: Seth Zeigler
Co-Contributors: None
Date Submitted: March 3, 2005
Revision Date:

Keywords: Students' Co-op, local markets, buyers, customers

Abstract:

The Students' Co-op is run and owned by its 28 occupants who reduce both their economic and ecological costs of living through shared resources and cooperation. The Students' Coop works very hard to buy sustainable organic foods from local and ethical suppliers, and is also very accepting and understanding of the risks inherent in small sustainable agriculture. Thus, the Students' Coop is a great potential customer, especially for products that may otherwise be difficult to sell.

The members of the Students' Co-op are overwhelmingly ecologically minded, and one of their foundational premises is that at least some of the money saved through group living should be spent on understandably more expensive but environmentally conscious products, like sustainable food.

I am one of two food managers at the Students' Co-op, and we currently subscribe to one CSA, purchase a large amount of produce (we strive to provide a diet rich in fruits and vegetables to our approximately twenty food plan members) from Roots and Fruits, and purchase some frozen fruits and vegetables and dry goods from a supplier in Wisconsin. Our CSA share will supply us with a good deal of fresh produce, but we can certainly use more, and with a little effort can even absorb some of the fluctuations in output that the Student farm will undoubtedly experience. I purposefully work to encourage understanding of variations in sustainable products, like blemishes or small size, and feel confident that the members of the Co-op would be much more accepting of these than other consumers. Furthermore, we have extremely flexible purchasing power and Lora and I can decide on short notice to purchase food that the Student Farm may otherwise not be able to deal with, like possible leftovers from the Minneapolis Campus Farmer's Market.

The Student Farm also expects little in the way of processing or packaging. We prefer our food raw and whole, and although unpalatable portions that can provide organic matter should be removed at the Student Farm we do not expect anything more. This invitation holds anytime we have room in our fridge and as long as our food plan members remain satisfied.

As to price, I will bring it up at a meeting, but I would predict that comparable prices to Roots and Fruits would be best. I should hope that this is enough to turn a significant profit for the Student Farm, but of course, circumstances and coordination always allow for changes.

North Country Co-op

Contributor: Andy Kranz McGuire
Date Submitted: April 5, 2005

Keywords: North Country Co-op, marketing, prospective buyer

Abstract: North Country Co-op is a very likely buyer of produce from the student farm. The relationship is rather informal and the student farm will have to play it by ear rather than plan ahead for specific products that they would like to buy from the student farm.

North Country Co-op is a worker owned, cooperatively managed grocery store that specializes in local and organic foods. Although they are enthusiastic about the student farm as a potential customer, they could not say which foods they would be most likely to buy from the student farm. The way we are to go about selling our produce to them is to call one to three weeks ahead of estimated harvest dates and inquire about specific produce at that time.

One buyer stressed the importance of providing a farm/land history report. They would like to know what was grown and what chemical treatments were applied during which years. The more detailed the better.

Contact: (612) 338-3110
First ask for Victor produce and then Scott if Victor is not available.

North Country Co-op – 20th & Riverside Ave. S
www.northcountrycoop.com – open 8am to 9pm everyday

CROPPING SYSTEMS

This Section Contains: Page

Cropping System Summary

System	Bio-intensive	Permaculture
Crops	Dozens of different crops, ranging from annuals to perennials	A mixture of annuals and perennials with an emphasis on perennials. natives when possible but not neccessary.
Principles Met	The method is based upon older styles. however reasearch opportunities are available to test methods posed.	Hemenway's heavy emphasis on performance is something that many at the farm agree with and he is focused on biodiversity, minimal disturbance and soil building.
Space	Space is minimal and claims 6 times more productivity than conventional	His designs for keyhole beds minimize space used and should be incorporated in bed sizes around 10' by 10'. This is flexible though and can be worked with.
Labor	Method is based on hand tiled soil and intense compost, so lots of early work, the planting is designed to reduce later work of weeding and watering	His systems reduce the amount of labor needed by planting in succession, using no till practices, planting with perennials (which means less planting every year, but more pruning and management in some cases). His mulching techniques reduce the need for watering and fertililizing and his focus on biodiversity creates a systems of self management
Infrastructure	create 3 foot wide by up to 20 foot beds and some irrigation	Plants and mulch materials
Rotation	includes rotation plans and incorporates green manures	The keyhole beds could be used in conjunction with rotation, but perennials don't rotate
Costs	hand tools	perennial plant stock
Conclusion	plant design creates microclimates, reducing need to water and weed, use of companion plantin, intense production go along with other methods and would fit in well at the farm.	This book describes innovative methods of creating homescale food independence while increasing biodiversity, reducing risk of erosion and pollution, and does so while creating a more efficient model of food production per area.

System	Four Season Harvest	New Organic Grower
Crops	Mainly for plants that are capable of staying in good harvestable condition during the winter using cold frames, tunnels or greenhouses such as green onions, lettuce, carrots, etc.	Rotation he describes a potato / squash, root crop, bean, tomato, pea, brassica, corn back to potato rotation. He also goes into more plants , but calls this the fool proof eight.
Principles Met	Meets our objective of sustainability by allowing for vegetable production in colder areas (saving growers from having to heat greenhouses with fuel of importing produce from far away) It is also an innovative idea, not demonstrated often.	Organic, small scale polyculture is the focus of the book and meets our principles. He doesn't speak on perennials, herbs or wildlife, however.
Space	Can be big or small	The author designed the system specifically for a farm setting of 5 acres with the purpose of feeding a small family.
Labor	Labor required for building the cold frames, tunnels or greenhouse, also for regular watering	Requires hand labor, makes recommendations for some machines and tools.
Infrastructure	Infrastructure would be getting the materials and space for building	Tools and greenhouse space are what this system requires.
Rotation	successional planting would provide a form of rotation	Coleman heavily emphasizes crop rotations. Rotation he describes a potato / squash, root crop, bean, tomato, pea, brassica, corn back to potato rotation.
Costs	building materials and building time	Costs would be new tools if we went with what he recommends.
Conclusion	This method would be great to undertake, but would require a lot of up front work. If materials were available, its possible. If successfully pulled off, it could extend our season by a month in both spring and fall when prices for organic and local would be at a premium.	"The New Organic Grower" system would be great for the farm. He emphasizes crop rotation and companion planting, and his advice and plans could go a long way in helping us. All systems would fit nicely together.

Biodynamic Farming

Contributor: Brian Noy
Date Submitted: March 22, 2005

Keywords: biodynamic, French intensive, John Jeavons, compost, fertilizer, planting, transplanting, moon phase

Abstract:

This paper provides an overview of the biodynamic/French intensive method, offers considerations for planting and raising produce, and is proceeded by a summary of how this method could be used in our farm. This summary is based upon the book How To Grow More Vegetables (than you ever thought possible on less land than you can imagine) by John Jeavons. The book explains the entire of process of creating a biodynamic system; ground preparation, composting, planting, watering, and intensive planning.

What crops does this style work for?
This works for all vegetable crops and the system is dependant on a great diversity of species. The manual provides space, water, nutrient, and light requirements for dozens of different crops

Does this style meet any of our principle requirements? (attracts wildlife,perennial, experimental, etc.)
The system encompasses fruit trees and other perennial plants to attract pollinators and predators for pest control. Although the method is based upon centuries of similar styles of production, there have only been a few decades of scientific research leaving plenty of opportunities to experimentation.

How much space is required to utilize these methods?
Space is minimal and it claims to be the most efficient system of vegetable production (up to 6 times more productive than conventional agriculture).

How much labor is required for this method?
The foundation of the method is a well, hand-tilled soil and intense composting. Both these take some time in the beginning but the system is designed to reduce later work. Plants are spaced so that the shade out and deter weeds.

What infrastructure is required for this method?
Crops are grown on 3 foot wide beds that need to be carefully tilled the first year. There also needs to be some irrigation.

Does this method address rotational issues? How?
Crop rotation is necessary and there are plans for rotating crops within the same growing season. Some of the nutritional needs are fulfilled through companion plantings of different complementary crops.

Are there any up front costs associated with this method?
Basic hand tools are the only things needed for tillage. Offsite compost will be needed until compost can be produced from garden waste.

What are the benefits and drawbacks?
Soil preparation is labor intensive in the beginning but does result in higher yields later on. This option could be used for a portion of the field and compared in terms of labor and yields to other methods.

Extended summary:
The biodynamic/French intensive method of horticulture is the art of creating a cropping system which is in harmony with

the soil, climate, biology, and gravitational forces of the land. The French intensive method emerged in the late 1890's and began with producing crops grown on wide beds and close enough together so that plants could create a mini climate underneath the foliage. Rudolph Steiner developed these methods into the biodynamic system. The system relies on organic compost preferably created from on-site waste, gravitational phases of the moon, and companion relationships that allow complimentary plants to control pests and enhance growth.

This method claims to be able to provide one person a year's worth of vegetables on just 100 square feet of land, even in a 4-6 month growing season. Production is based on careful preparation and care for the soil. The soil should be tilled to a depth of 24 inches and formed into raised beds with a thin covering of compost. Care should be taken not to turn over the soil and allow for the retention of established soil layers in order to maintain the biological organisms that live at certain depths.

Labor is limited by planting in patterns that allow crops to naturally defend against insect damage and weed competition. Close spatial planting allows for the development of mini climates that conserve water use and deter weed growth. Companion plants provide certain services to each other that reduce pest damage (example: marigold odor discourages tomato pests) or encourage the growth of each other (example: marjoram and oregano are known to benefit the growth and flavor of surrounding plants).

Although the method has been tested and monitored extensively, it leaves plenty of opportunities for experimentation. The manual contains extensive charts on fertilization, crop requirements and factors for growth, diagrams on soil preparation and planting, and suggested garden plans.

Important considerations:
Bed preparation:
- Beds should be raised 3-5 feet wide and tilled to a depth of 24 inches using the double-dig technique.
- When tilling, attempt to allow soil to retain the same vertical position and avoid mixing. Most beneficial organisms live in the top few inches and mixing will kill them in the lower layers.
- Cover with a layer of fresh compost and gently mix into the top few inches.

Fertilizing
- Testing of moist soil should be done at least two weeks after the introduction of any input or compost and at the end and beginning of the growing season.
- Compost is preferred over organic fertilizer inputs but these inputs may be necessary for a few years until the soil is well recovered.

Composting
- Humus (the product of composting) is superior to fertilizer inputs because nutrients are well contained, released slowly, and delivered in the proper ratios.
- The biodynamic compost recipe consists of three main ingredients; materials with high carbon content (saw dust, leaves, wood shavings), nitrogen-rich material (cut grass, manure, vegetable waste), and soil (which contains beneficial anaerobic bacteria).

Planting and transplanting:
- The biodynamic method uses the gravitational forces of the moon to aid in plant growth.
- Most seeds should be planted just a couple days prior to the new moon. The increasing lunar gravity will create a mini "tide" assisting in germination.
- Transplant seedlings at the full moon. Decreasing lunar gravity (and the corresponding increase of the earth's gravity) will stimulate root growth. The extra moonlight also enhances leaf growth.

Watering:
- Water should be applied to mimic natural, gentle rainfall and should never be sprayed onto with force which creates erosion, plant shock, and compaction.
- Some plants such as tomatoes and melons may be harmed by having wet leaves in humid climate so watering

should only be done to the soil if possible. However, other plants benefit from being sprayed from above to remove dust and insects.

- Preferably should be done during the last few hours of sunlight to prevent evaporation due to midday sun and wind. It should also be done early enough before evening to give enough time for water to evaporate off of leaves.
- Water everyday so that the soil stays evenly moist.

See the manual for extensive planning charts and diagrams along with detailed information on space and plating requirements for vegetables.

Resources:

Jeavons, John. How to Grow More Vegetables: And Fruits, Nuts, Berries, Grains, and Other Crops Than You Ever Thought Possible on Less Land Than You Can Imagine. Ten Speed Press, 6th edition. 2002.

Permaculture

Contributor: David Campbell
Date Submitted: 3/25/05
Key words: Polyculture, permaculture, perennials, plant community, guild
Abstract:
Toby Hemenway in his book "Gaia's Garden" outlines a quietly revolutionary way of living. He advocates the use of permaculture on a home-scale level, calling for each person to reduce the impact they have on the landscape by growing their own food in an ecologically sound way instead of purchasing food raised in massive, environmentally devastating monocultures. His ecological soundness is grounded in biodiversity for soil microbes, insects, and plant life. He advocates soil building techniques, water conservation, plants that function on many levels, attracting beneficial insects and birds, establishing plant communities and guilds, and growing your own food forest.

Hemenway defines permaculture as landscape designs that are modeled after Nature, yet includes humans, that are both ecologically and economically sound. Identified are three ecological principles that one should observe and follow in order to achieve this. They are: finding a niche, gardening in succession and backyard biodiversity.

By 'finding a niche', Hemenway means that in nature, every organism works a certain role which affects and is affected by every other organism around it. In a garden setting, mimicking a plants natural niche will reduce the effort on the part of the grower. Instead of forcing a niche on a plant, one discovers its inherent nature and works with it to attain some benefit, whether it be food, pretty flowers, or wildlife attraction. By 'gardening in succession', he expands on the idea of finding a niche by observing the transition of organisms on the field. One plants niche may be to shoot up right away in spring and die back in summer. Another plant fits in there because it grows slow during spring only to give fruit during the heat of summer. By recognizing this movement, we succeed one plant with another. 'Backyard biodiversity' means having a multitude of organisms in your garden. This will then reduce your load as a grower by providing habitat for natural enemies of pests, producing nutrition on site, suppressing weeds, and making sure to always get a harvest regardless if one crop fails.

Hemenway also gives us some advice he's garnered from observing nature. Build the soil; choose perennials over annuals, grow three dimensionally with multiple stories utilizing various crops of differing sizes, and create plant communities with stacked functions. To build soil, one can compost, sheet mulch (in-bed composting by applying heavy layered mulches) and cover crop with green manures. He recommends perennials over annuals because of their staying force on the land (which gives wind breaks, helps guard against erosion, helps buffer nutrient runoff from the site, helps capture water, can be vines, trees, or low to the ground plants. Growing three dimensionally adds to your surface area of light reception, leading to more production. And designing plant communities with stacked functions allows for plants to do what they can do best, without being hindered, working in harmony with the other plants in the community. 'Stacking functions' is placing plants together in a community where it will perform several beneficial tasks. These tasks could be wildlife cover, fiber provider, food provider, shading, water trap, etc.

The keyhole garden bed is advocated here as well. This bed design winds a path through an area rather than placing straight rows with paths as wide as the rows. Basically instead of a path wrapping around a garden, a garden wraps around a path. This provides the most efficient use of production space versus path space. The keyhole beds can be rotated each year the same as a row or raised bed setup omitting perennials. This could easily be undertaken on the student farm. This style could work for most crops that we'd want to grow depending on how we wanted to situate the plants.

He also advocates plant guilds, or interconnected organisms working together in harmony. Among these guilds are many designs incorporating perennials and native attractants. These guilds are, in temperate climates, just being explored and experimented with, though indigenous people have had native and exotic gardens fused together providing food for centuries. This falls perfectly within our scope of principles. Discovering new combinations and guilds and validating them could become an ongoing research project on the farm.

Another technique that can be used with the keyhole design is to plant polycultures that once planted the day of last frost, along with a few transplants the 3rd or 4th week in, don't require any more work other than harvesting.

Of course, soil preparation either by composting, sheet mulching or cover cropping would be required for soil fertility, which would add to the necessary work load. These polycultures would probably not be conducive towards growing larger plants like tomatoes or peppers unless very strategically placed.

The requirements for this system would be: newspaper, lots of organic matter for soil building and mulch the plant seeds or transplants. The infrastructural requirements would be strong backs willing to do work and the only costs I can recognize would be for the plant materials themselves, seeing that news paper, mulch and people could be obtained for free.

Four Season Harvest

Contributor: Jesse Sadowsky
Date Submitted: March 24, 2005

Keywords: four season harvest, row cover, cold frame, winter garden, tunnel, greenhouse, plant protection, extended harvest

Abstract: The Four Season Harvest cropping system may be a viable option for the student farm. Through the use of the heat trapping quality of cold frames, tunnels, and non-heated greenhouses, the growing and harvest seasons for most crops can be extended well beyond their normal range for our climate.

Cropping System:

Four Season Harvest

Description of cropping style:
Includes the use of season extenders such as cold frames, high and low row covers, stone walls, and winter-hardy plants, either alone or in combination.
Includes: (Type of cropping systems, describe each)
Cold frame: A simple box that is bordered by a wood on the sides and glass or plastic on top. It is used to protect many crops from weather extremes and extend the growing and harvest season.

Tunnels, high and low: A system in which woven plastic is draped across curved supports over a row of plants. It can be a low tunnel which is maybe 1-2' above plants and covered on its base by soil or other support, or a larger high tunnel, which a person can walk through. They can be used in tandem to, in effect, warm the area inside the tunnel by 3 USDA hardiness zones.

Mobile Greenhouse: A greenhouse on rails or wheels which can be moved over 3-5 areas throughout the year. An example for a 3-site setup is as follows: Lettuce is started in site 1 in early spring. The mobile greenhouse is slid to site 2 after lettuce can be safely be left unprotected. The greenhouse is then utilized for tomato or other tropical-native plant sets. When weather is plenty warm for tomatoes, the greenhouse is wheeled to site 3, a home for heat loving melons or other annuals of tropical origin that normally do not ripen reliably in our northern climate
What crops does this style work for?
The Four Season Harvest Method was designed mainly to take advantage of the ability of winter hardy crops (green onion, lettuce, carrot, etc.) to maintain harvest quality under the provided winter protection. Protected plants grow little, if at all, in winter, but they are maintained in a harvestable state longer, sometimes year round. Used in combination with succession planting, land gets utilized all four seasons instead of in the normal summer growing season.
Does this style meet any of our principle requirements? (attracts wildlife, perennial, experimental, etc.)
The style is experimental because I am not aware of its principles be taken advantage of by mainstream ag. It is also sustainable because the system traps the warmth provided by sun in the cold months but does not require heating like commercial greenhouses.

How much space is required to utilize these methods?
Open to discussion

How much labor is required for this method?
Most labor will be required to build the cold frames, tunnels, and possibly a mobile greenhouse. Tunnels require the least labor, while cold frames and greenhouses would require some basic carpentry skills. After the structures are in place,

they would need to be vented on warm, sunny days (automatic temperature-activated ventilated arms are available) and watered, as the plastic or glass acts as a barrier to the planned overhead irrigation.

What infrastructure is required for this method?
Cold frames, tunnels, greenhouses.

Does this method address rotational issues? How?
Proper rotation would probably be more difficult as several crops are grown in the same area over the course of a year.

Are there any up front costs associated with this method?
Up front costs include materials needed for construction of various structures. Most of what is needed is fairly inexpensive (2x4's, bolts, hoops, woven plastic). Glass could get expensive, but second hand storm windows could be used.

Source of info:
Four Season Harvest – Eliot Coleman

Any conclusions you have for application to the student farm- Is this a good choice? Why?
The Four Season Harvest style would be an excellent project of research for an ambitious intern. If done properly, it could allow an extra month of growing season in both spring and fall. It would allow for us to tap into markets after the main (summer) growing season, when there is often more time available and markets may be willing to pay a premium for local, sustainably grown fresh produce.

The New Organic Grower

Contributor: Lisa Kissing
Date Submitted: March 24, 2005
Revision Date:

Keywords: The New Organic Grower, cropping style, labor, crop rotations, green manure, companion plantings, machinery, Grelinette

Abstract:
Elliot Coleman's The New Organic Grower is a comprehensive guide to small scale organic farming/gardening. The cropping style is created for family vegetable farms under 5 acres. Efficient labor, careful crop rotation, the use of green manures, animal manure, and season extension are all doctrines of this cropping style. The style is very applicable to the student farm and should be referenced and used at length. The style only applies to vegetable farming however.

The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener covers everything one would need to know about creating and sustaining his own small scale organic vegetable garden. Basic methods, tools, and marketing skills are covered. Overall, this method focuses on small family farms because according to the author, "Small farms are where agricultural advances are nurtured" (xi). The author's ideal farm size for vegetable production ranges from ½ to 5 acres. Therefore, this cropping style fits nicely within the limit of our 1 acre plot. Produce is emphasized for this small agricultural system because the perishable quality of fruits and vegetables makes them particularly valuable for local agricultural distribution.

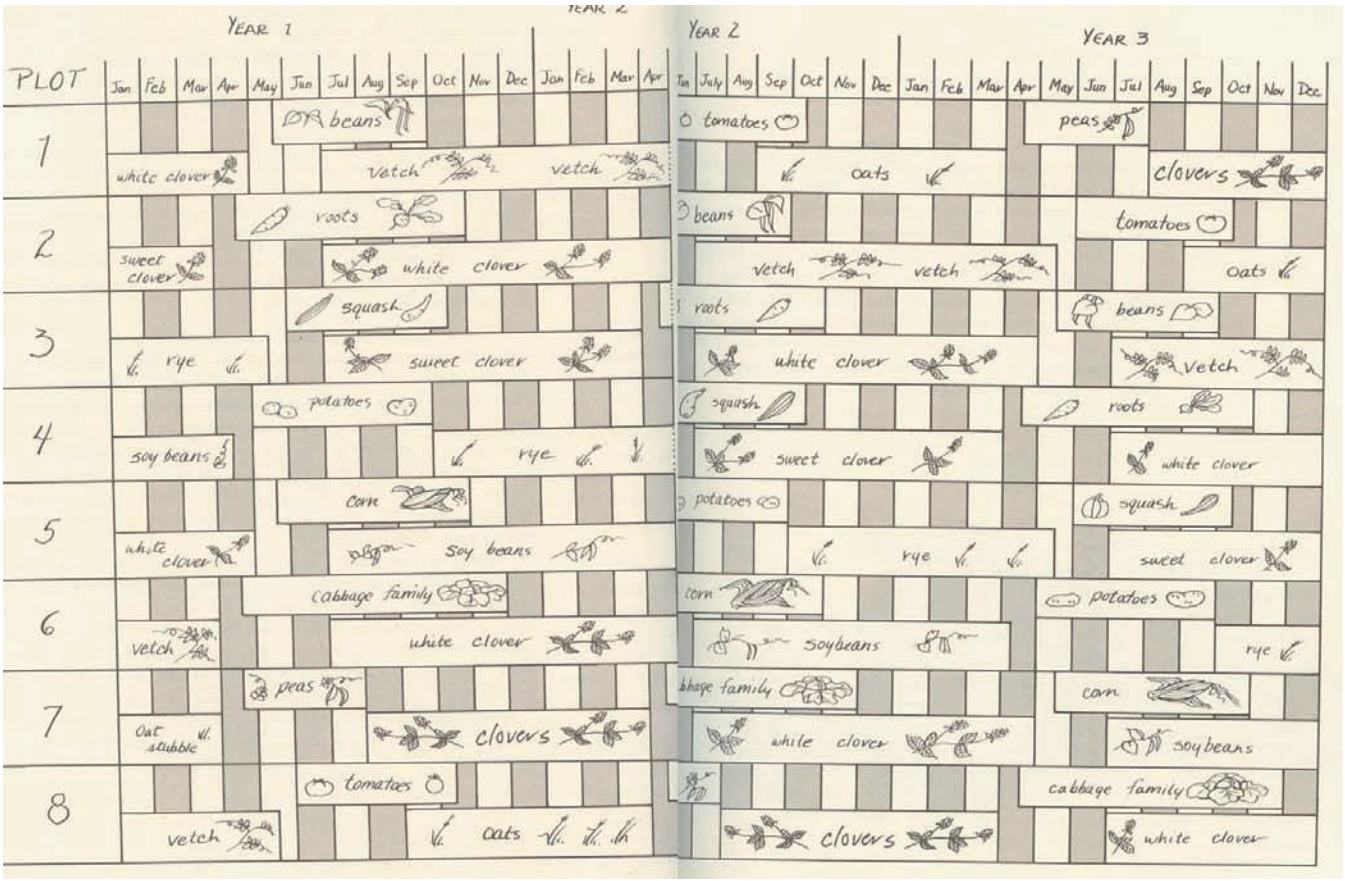
Overall, the system concentrates on four areas: (1) "how to simplify production techniques, (2) how to locate the most efficient machinery and tools, (3) how to reduce expenditures on purchased supplies, and (4) how to market produce in the most remunerative manner" (3). The method attempts to make farming easy by working from a plant's natural drive to succeed. In other words, following the principals of the student farm, Elliot Coleman stresses working with natural cycles to ensure careful management. Careful management includes efficient labor, crop rotation, green manures, animal manure, and season extension.

First, efficient labor is addressed. The book's main purpose is to guide family farms. Where the student farm can possibly be seen as a family because we are passionate about our work, we will have a much different task force. The student farm will have a more abundant, less constant, and more variable work dynamic. The New Organic Grower estimates that its method will require a minimum of 2.5 people per acre full time. This is number is difficult to quantify for the more variable labor force provided on our farm. Personally, I do not believe this number will be difficult to obtain, and therefore, this method is quite feasible for the student farm. The method also suggests dividing tasks by who does them the best, which is a fabulously efficient system.

"Crop rotation is the single most important practice in a multiple-cropping program," according to Elliot Coleman (50). Using 24 basic vegetables and fruit crops, The New Organic Grower outlines time-proven rotation suggestions. As general rules, crops of the same family should not be planted in the same plot back to back. Also, deep roots should follow shallow roots in rotation to replenish organic material below the soil. After the description of many different options, a fool proof eight crop rotation was presented: potatoes/squash, root crops, beans, tomatoes, peas, the cabbage family, sweet corn, and back to potatoes. Manure application is also another factor to determine within rotations. Greens, squash, corn, peas, and beans want to be planted on the year of manure application. Cabbages, tomatoes, root crops, and potatoes want to be planted the year after manure application.

The author is quite ecstatic about green manures. Green manures incorporate beneficial plants into a cropping system not to produce a profit, but to improve soil fertility. Green manures may over winter legume crops planted after harvest to

increase soil nitrogen and provide winter cover in the case of rye. They can also take the form of main crops sustained for up to 3 years in place of a market crop. In this case, the legumes give the soil a nice long break from intense crop production. The green manure is often grazed in this long time span. This type of green manure cropping is probably not best for our non-pasture farm. The third type of green manure takes the form of under sown crops, also known as companion plantings. The author highly recommends companion plantings after his own experience. Companion plantings have been common in small grain farming for centuries, but are fairly new to vegetable gardening. Rows of low growing shade tolerant legumes are grown between crop rows to supply the vegetables with natural nitrogen and weed protection throughout the growing season. Four to five weeks after a cash crop is planted, a companion planting may be seeded between rows. Particular green manure crops and their compatibility with the 24 main crops defined earlier are outlined. Each of these green manure systems is highly encouraged by Green Lands Blue Waters, one of the student farm's possible partners. Green manures provide a wonderful experimental opportunity, particularly in the new methods of companion plantings. The student farm should not ignore this particular crop management technique. Below is a chart from the book outlining possible crop rotation possibilities with green manure options.



The use of animal manures is discussed. The farm should have access to manure and could utilize this type of soil enrichment quite easily. Lastly, season extension tries to push crops earlier into spring and later into fall. The less time soil is left exposed the least possible erosion will occur. Extending the season is also a drive of the Green Lands Blue Waters initiative. On another note, soft structures around crop rows allow greens and other crops to be grown nearly all year around and benefit from off season higher prices.

At the advice of The New Organic Grower, initial investments should include various tools and machinery. In addition, greenhouses, irrigation, seeds, and land are obviously needed. Each of these is currently covered on the farm. Particular machinery suggested includes a walking tractor, a one-row seeder, soil-block equipment, hoes and hand tools, carts and

wheelbarrows, an under sowing seeder for companion planting. The funding for capitol on the student farm is limited, so many of these of these might not be feasible to purchase. Also, the grounds maintenance may provide comparable equipment. One particular tilling tool seemed particularly loved by the author: the Grelinette. This deep tillage tool, also called a broad fork, would be a good investment for the farm. The tool works best for tilling in the fall. It is recommended as the perfect tool for a one acre space. However, the true form of the tool with a wooden handle and parabolic teeth of the fork has been tainted by engineering mass producers. Obtaining a Grelinette of true form and function may be a little tricky to find.

The New Organic Grower is a wonderful resource and a great guideline for the student farm. The cropping style parallels the size, needs, and potential crops of the farm. In addition, the author's farming experience is mainly in New England. Accordingly, many tips on growing in a cool climate exist that could prove very useful to our Minnesota farm. Being a system for vegetables, perennial crops, wildlife habitat, and herbs are not covered in the system. But the student farm could easily use Elliot Coleman's guidance for its organic vegetable production.

References:

Coleman, Eliot. The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener. 2nd ed. White River Junction: Chelsea Green Publishing, 1995.

Amsel, Sheri. Illustration. The New Organic Grower: A Master's Manual of Tools and Techniques for the Home and Market Gardener. 1989: 80-81.

SYSTEM COMPONENTS

This Section Contains: Page

Components Summary

Contributor: Seth Zeigler
Date Submitted: March 31, 2005
Revision Date:
Keywords: methods, companion planting, synergism, composting, chicken tractor, foliar feeding
Abstract:
This is a summary of the very diverse category labeled methods and their potential implications for the Student Farm. Obviously, this will be somewhat biased, but I will try to suppress my personal opinions in evaluating each. Much more detailed and telling information can be found in the specific entries for each of these.

Plants naturally exist in very complex and dynamic systems and often have synergistic effects upon each other, and we will inevitably be forced to deal with plant interactions on the Student Farm by the very nature of sustainable agriculture. We must keep the ground covered as much as possible to sustain local biota, prevent leaching, and mitigate erosion, and this not includes both maintaining cover throughout the season and planting at high densities and diversities. The field of companion planting is incredibly intricate with uncountable variables and relatively little truly scientific research, and it is essential that we diligently observe and record the specific relationships we see on the Student Farm. Until we discover for ourselves the best combinations, there is a wealth of folklore and anecdotal knowledge to build upon.

No matter how technologically advanced we are, we still exist in an ecosystem that continuously cycles the very finite minerals and nutrients of this planet. Nitrogen and even potassium and phosphorus are commonly added to agricultural lands in synthetic forms to replace the exported plant materials, but these commodities contain many more macro and micro nutrients that are essential to either plant growth, animal health, or both, but continually leave without being replaced or often even considered. Fortunately, we do not have to worry about the narrow range of nourishment provided by synthetic fertilizer, but to be sustainable we must ensure that we replace all of these elements of life that leave the Student Farm in the form of produce or even volatized or leeched molecules. Composting is our best solution to both limiting these losses and reincorporating outside replacements. The potential sources of compost are almost unlimited, the greenhouses, local lawns, the stockpens, the University's food service, the Student's Co-op (I can start hauling it up immediately), and the only necessary inputs are time, effort, and tools that we will already have or can easily build, depending upon the method that we choose. Rate of composting is very much dependant upon the effort put into it, and with enough work finished compost can even be produced in one month. Increasing organic matter levels is also desirable because even if all nutrients are abundant soil texture, structure, aeration, and water retention can all be improved. Thus, I strongly recommend that we rapidly pursue a composting program.

Foliar feeding is the spraying of soluble compounds, in our case those made from organic sources like plants, onto the foliage of crop plants to protect from diseases or pests or ameliorate some form of deficiency. Different crops respond in different ways depending upon how well they can absorb the substance through their leaves, with succulents benefiting little and cucurbits very responsive, even to the degree of burning the leaves. Of course, if foliar feeding is used in response to a deficiency the benefits will be very short term, and some other intervention, like the application of compost to the soil, is necessary. Foliar feedings are usually applied twice a week and only require labor, starter cultures and containers to brew the tea, and a small uncontaminated sprayer.

Chickens can provide many benefits, both by converting what would otherwise be compost to very high quality protein and by helping to control certain pests, like plum curculio in fruit trees, but they also, as animals, require more steady attention and much more University oversight to ensure that they are properly cared for. Thus I advise that we certainly keep the possibility in mind but wait until other more pressing Student Farm activities and programs are well established before pursuing chickens farther.

References: Other Master Plan entries

Companion Planting

Contributor: Andrew Montain
Date Submitted: March, 24 2005
Date Revised: April 14, 2005

Keywords: Interactions, competition, commensalisms, protocooperation, exudates, rooting zone

Abstract: Companion planting leads to various plant interactions at variable proximities. Neutralism describes and interaction where there is no positive or negative effect on their plant. Distance between plants is important. An attached table (5.1) lists all possible types of biological interactions. Beneficial effects include increased yield, reduced insect damage, reduced disease damage, ect. Examples are included of the benefits of 'weeds'. Increases plant diversity while maintaining greater ground cover because often more dense spacing of plants. Requires more planning and planting time, but can reduce weeding time and combined yield is higher for the space used. Companion planting experiments should be documented on the Student Farm.

Companion planting leads to various plant interactions at a variable proximities. Neutralism describes and interaction where there is no positive or negative effect on their plant. Absolute neutralism may not ever occur in nature, but a lack measurable or observable interaction beyond where two plants' root-zones connect or canopies overhang is the norm. There is also a lack, especially in temperate cropping systems, of measured positive interactions between plants at a distance were an interaction is "On".

The negative effect on row crops interacting with weeds has been documented nearly ad infinitum, but it is not always the case. Soil from the rhizosphere of Western Ragweed Ambrosia psilostachya markedly stimulated the growth of several other species growing in the same field (Neill and Rice, 1971). Also, an increase in wheat grain yield when grown in mixed stands with corncockle Agrostemma githago as compared with pure stands has been observed (Gajic et al., 1976). Applying the isolated exudates produced by corncockle increased yields of both nitrogen-fertilized and unfertilized stands (Gajic et al., 1976). These are examples of protocooperation (see table 5.1) (Radosevich et al., 1997) involve the beneficial leaching of nutrients and also have been demonstrated to include many vegetable crops, grains and grasses (Nicollier, et al., 1985).

Carrots Love Tomatoes is full of folklore and anecdotes, but there are no references to scientific literature. Yet, some advantages of companion planting can be observed by simple observation. Plants that provide physical support (grasses) to vining crops (legumes) are well documented. Plants with roots distributed mostly near the soil surface will extract different nutrients and water than those plants with roots distributed mostly deeper in the soil. This can reduce competition and is a driver for the diagramming of root distribution by species.

Reduced pest damage has been scientifically documented in companion planting in two cases to my knowledge. These examples of commensalisms involve tomato, which absorbs chemicals from nasturtium that deters whitefly, and marigold which fumigates the soil beyond the radius of its own root system.

Companion planting increases plant diversity while maintaining greater ground cover because it often takes the form of more dense plant spacing. Will require more planning and planting time, but can reduce weeding time and combined yield is higher for the space used.

Yield models (Figure 5.14) (Radosevich et al., 1997) should be developed at the farm based on experimental companion plantings. Yield is an important measure that should be compared to marketable yield thus accounting for impact of companion planting on disease, insects and appearance. It is also important to note the impact on the next planting.

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Composting

Contributor: Charlie Wamstad
Co-Contributors:
Date Submitted: March 23, 2005
Revision Date:

Keywords: composting, methods, recycling

Abstract:
Composting the act of recycling organic material into soil that can be used as fertilizer. There are many different methods of recycling each unique to the type of residue and waste that is created and how fast the material is composted into soil.

Method: Composting
Description of method: Compost can range from passive - allowing the materials to sit and rot on their own - to highly managed compost pile.
Passive composting involves the least amount of time and energy on your part. This is done by collecting organic materials in a freestanding pile. It might take a long time (a year or two), but eventually organic materials in any type of a pile will break down into finished compost. More attractive than a big pile of materials sitting in your yard is a 3-sided enclosure made of fencing, wire, or concrete blocks, which keeps the pile neater and less unsightly. Add grass clippings, leaves, and kitchen scraps (always cover these with 8" of other material). The pile will shrink quickly as the materials compress and decompose. Wait a year or two before checking the bottom of the bin for finished compost. When it's ready, shovel the bottom section into a wheelbarrow and add it to your garden beds. Continue to add greens and browns to have a good supply of finished compost at the ready. After the first few years, most simple piles produce a few cubic feet of finished compost yearly. Managed composting involves active participation, ranging from turning the pile occasionally to a major commitment of time and energy. If you use all the techniques of managing the pile, you can get finished compost in 3-4 weeks
What type of cropping system does this work for? All types of cropping systems (anything with carbon in it)
Does this style meet an of our principle requirements? Yes this system allows us to experiment on composting different plants and the analysis of the contents of the soil product and then using it on the plants that will benefit the most from the compost.
How much space is required to utilize this method? Composting will take anywhere from a 20x20 foot are for a series of heap piles or bins to the entire field if we do a field composting method.
What infrastructure is required for this method? If we choose to go with the heap method than there are no infrastructure, but if we decide to build bins or buy a tumbler than we would have infrastructure considerations.
Does this method address rotational issues? How? Composting can be done in a variety of different systems that can be moved around the garden. Composting can also take place on the field wide level that would be subjected to our rotation of crops. We can also build permanent bins that are not rotated about the Garden.

Are there any up front costs associated with this method? This depends on the composting method that we choose if we do a heap method than no but if we use an elaborate tumbler it could cost up to $500.
Following is a chart listing common composting materials

Type of Material	Use it?	Carbon/ Nitrogen	Details
Algae, seaweed and lake moss	Yes	N	Good nutrient source.
Ashes from coal or charcoal	No	n/a	May contain materials bad for plants.
Ashes from untreated, un-painted wood	Careful	Neutral	Fine amounts at most. Can make the pile too alkaline and suppress composting.

Beverages, kitchen rinse water	Yes	Neutral	Good to moisten the middle of the pile. Don't over-moisten the pile.
Bird droppings	Careful	N	May contain weed seeds or disease organisms.
Cardboard	Yes	C	Shred into small pieces if you use it. Wetting it makes it easier to tear. If you have a lot, consider recycling instead.
Cat droppings or cat litter	No	n/a	May contain disease organisms. Avoid.
Coffee drounds and filters	Yes	N	Worms love coffee grounds and coffee filters.
Compost Activator	Not Required, but okay	Nuetral	You don't really need it, but it doesn't hurt.
Cornstalks, corn cobs	Yes	C	Best if shredded and mixed well with nitrogen rich materials
Diseased plants	Careful	N	If your pile doesn't get hot enough, it might not kill the organisms, so be careful. Let it cure for several months, and don't use resulting compost near the type of plant that was diseased.
Dog droppings	No	n/a	Avoid
Dryer Lint	Yes	C	Compost Away. Moistening helps.
Eggshells	Yes	O	Breaks down slowly. Crushing shells helps.
Fish scraps	No	n/a	Can attract rodents and cause a stinky pile.
Hair	Yes	N	Scatter so it isn't in clumps.
Lime	No	n/a	Can kill composting action. Avoid.
Manure (horse, cow, pig, sheep, goat, chicken, rabbit)	Yes	N	Great source of nitrogen. Mix with carbon rich materials so it breaks down better.
Meat, fat, rease, oils, bones	No	n/a	Avoid
Milk, Cheese, Yogurt	Careful	Neutral	Put it deep in the pile to avoid attracting animals.
Newspaper	Yes	C	Shred it so it breaks down easier. It is easy to add to much newspaper, so recycle instead it you have a lot. Don't add slick color pages.
Oak leaves	Yes	C	Shredding leaves helps them break down faster. They decompose slowly. Acidic
Sawdust and Wood Shavings (untreated wood)	Yes	C	You'll need a lot of Nitrogen materials to make up for the high carbon content. Don't use too much and don't use treated wood.
Pine needles and cones	Yes	C	Don't overload the pile. Also acidic and decomposes slowly.
Weeds	Careful	N	Dry them out on the pavement and then add later.
Sod	Careful	N	Make sure the pile is hot enough, so grass doesn't continue growing

Troubleshooting Composting Problems

Problems	Possible Causes	Solution
Damp and warm only in the middle of the pile.	Pile could be too small, or cold weather might have slowed composting	If you are only composting in piles, make sure your pile is at least 3 feet high and 3 feet wide. With a bin, the pile doesn't need to be so large.
Nothing is happening. Pile doesn't seem to be heating up at all.	1. Not enough nitrogen	1. Make sure you have enough nitrogen rich sources like manure, grass clippings or food scraps
	2. Not enough oxygen	2. Mix up the pile so it can breathe.
	3. Not enough moisture	3. Mix up the pile and water it with the hose so that there is some moisture in the pile. A completely dry pile doesn't compost.
	4. Cold weather?	4. Wait for spring, cover the pile, or use a bin.
	5. Compost is finished.	
Matted leaves or grass clippings aren't decomposing.	Poor aeration or lack of moisture.	Avoid thick layers of just one material. Too much of something like leaves, paper or grass clippings don't break down well. Break up the layers and mix up the pile so that there is a good mix of materials. Shred any big material that isn't breaking down well.
Stinks like rancid butter, vinegar or rotten eggs.	Not enough oxygen or the pile is too wet, or compacted.	Mix up the pile so that it gets some aeration and can breathe. Add course dry materials like straw, hay or leaves to soak up excess moisture. If smell is too bad, add dry materials on top and wait until it dries out a bit before you mix the pile.
Odor like ammonia.	Not enough carbon.	Add brown materials like leaves, straw, hay, shredded newspaper, etc.
Attracts rodents, flies, or other animals.	Inappropriate materials (like meat, oil, bones), or the food-like material is too close to the surface of the pile.	Bury kitchen scraps near the center of the pile. Don't add inappropriate materials to compost. Switch to a rodent-proof closed bin.
Attracts insects, millipedes, slugs, etc.	This is normal composting, and part of the natural process.	Not a problem.
Fire ant problems.	Pile could be too dry, not hot enough, or has kitchen scraps too close to the surface.	Make sure your pile has a good mix of materials to heat up, and keep it moist enough.

Conclusion: I think that composting will allow us to utilize crop residue as an organic fertilizer in our garden.

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Compost Guide. Retrieved March 23, 2005, from http://www.compostguide.com/index.html

Chickens

Contributor: Seth Zeigler
Date Submitted: March 9, 2005
Revision Date:

Keywords: Chicken, poultry, hen, rooster, fowl, banty, cock, biddy

Abstract:

Agroecosystems often include animals, especially if they utilize resources that would otherwise be wastes, and the Student Farm could potentially convert unmarketable plant matter into high quality complete protein (a.k.a. eggs) with the help of chickens. Chickens may also be used as a form of biocontrol, especially in orchards. But before any of this can be considered, we must first decide if our group is willing to dedicate the necessary resources to this project, which will incur substantial university oversight to ensure that no mistreatment takes place and that the birds are being fed properly, especially if used for research.

Chickens are a perfect form of low input protein, both themselves and even more importantly through their eggs, which may convert far better than almost any other consumer at almost 1.5 to 1. Of course, this is under intensive, as opposed to sustainable, systems, but the point is that chickens can easily help balance a diet by recycling what would otherwise be compost into a truly complete and quick protein. Furthermore, chickens boast an array of agricultural benefits, like weed and pest control, and are simply a blast to have around. Who has ever seen a depressing chicken? They are fun and lively and vibrant, and even based on these psychological benefits alone banties were only a generation ago thought essential to many farms.

But before we decide to pursue poultry production, we must carefully decide if the benefit is worth our resources, especially human, when we will undoubtedly be very busy establishing the rest of the student farm. It may possibly be prudent to postpone poultry until other more crucial elements of the student farm are well established and flourishing.

Jacqueline Jacob has generously offered to help us if we decide to seek approval for chickens, but we must first designate at least one caretaker who will take animal care training, which may be done online or at workshops on campus. If the group decides that we should incorporate chickens, I for one will volunteer for this. But we must also find a faculty sponsor to oversee the project and seek IACUC approval, which will be slightly more tedious if the birds are used in some way for research, like chickens as biocontrol in fruit production. This is a very achievable goal, but we must first weigh the costs vs. the benefits. Jackie's reply follows:

"I'm willing to help with the filling out of the paperwork, and another professor in our department is on the IACUC committee and she is willing to take a look at the forms before they get submitted to make sure there is nothing that would be red-flagged"

References:

Email discussion with Jacqueline Jacob <jacob150@tc.umn.edu>

Foliar Feeding

Contributor: Jesse Sadowsky
Date Submitted: March 24, 2005
Keywords: seaweed, compost tea, fish emulsion, foliar feeding, kelp, sprays

Method: Foliar Feeding

Description of Method:
Plant leaves are sprayed with a liquid made from seaweed, compost, fish, or other soluble plant nutrient source. Foliar feeding remedies short-term nutrient deficiencies, provides disease resistance, and makes plants less susceptible to feeding by insects.

What crops does this style work for?
Works for any crop that can absorb nutrients through leaves (i.e. probably not too effective for succulents). Cucurbits more sensitive than most crops; leaves may burn easily.

Does this style meet any of our principle requirements? (attracts wildlife, perennial, experimental, etc.)
Foliar feeding could be a proactive way to ensure that plant health is maximized, therefore maximizing resistance to pests. One could design an experiment to demonstrate its effectiveness (or lack thereof) for different crops.

How much space is required to utilize these methods?
None.

How much labor is required for this method?
A biweekly spraying is all that would be necessary.

What infrastructure is required for this method?
A sprayer is required.

Does this method address rotational issues? How?
No.

Are there any up front costs associated with this method?
We need a sprayer that hasn't been used with chemicals that would conflict with organic certification. We also need the starting material (seaweed or kelp extract, fish emulsion, compost tea) that's req'd to "brew the tea".

Source of info: Cox, Jeff. Your Organic Garden, Page & Smillie. The Organic Almanac, and Ball, Jeff. Rodale's Garden Problem Solver

Any conclusions you have for application to the student farm- Is this a good choice? Why?
I think it's worth a shot, for research or just to try it out. I'm willing to spray (and have the fish mist blow back in my face)!

INVESTIGATING PERENNIALS

This Section Contains: Page

Apples

Contributor: Seth Zeigler
Date Submitted: March 30, 2005
Revision Date:
Keywords: Apples, Crab Apples, Pomes
Abstract:
The University of Minnesota is the largest breeder of apples in the Upper Midwest and has produced some unparalleled varieties that are grown around the globe, including Honeycrisp and Haralson. Apples are relatively conducive to organic agriculture, epitomize permaculture, and have great symbolic value in our culture and educational system and thus are a perfect crop for the Student Farm.

Apple trees vary in size depending upon variety, rootstock, and care, but can vary from substantial trees to little more than shrubs. Dwarfed and semidwarfed trees commonly produce earlier, often beginning within a few (3) years, but dwarfed versions often must be staked and are not as hardy as their semidwarf or standard counterparts (which more typically bear in 5 -7 years). Thus the crown of transplants may consume little more than a two foot diameter, but mature trees may range from ten feet to dozens and no more than arms reach in height to well over thirty feet tall. The M-26 or slightly larger M-27 semidwarf rootstocks are proven in our area, but the extremely cold hardy Russian B series of rootstocks are also recommended.

Apple transplants can be purchased many places and commonly cost $10-25 each, and Bailey nursery and St. Lawrence Nursery are both recommended.

Apples, like other trees, should be planted when dormant. They may require some watering until their roots are established, depending upon the season. The other major maintenance is pruning, which takes place in the late winter, and orchard sanitation, which is continuous but mostly involves removal of diseased or dead tissues and fruit. As already mentioned, there is immense variability in years to first harvest, harvest dates, annual versus biennial bearing, etc, but typical U of M varieties ripen as early as the beginning of August and as late as mid-October. Yields per tree on M-26 rootstock can run anywhere from 100 – 400 lbs, but as with any crop organic yields will most likely be lower than conventional. Some apple varieties, like Keepsake, Honeycrisp, and Haralson remain marketable in cold storage for long periods of time (some over 6 months), but it would be more advisable for the Student Farm to attempt to sell its crop much more promptly as cold storage is inherently unsustainable. Equipment needs and costs are minimal and typical of other crops, like pruning shears, shovels, and buckets. Time required for maintenance is likewise both flexible and rather compatible with other crops, as the two main inputs are pruning, which occurs when all crops are dormant and demands upon time are minimal and can be spread over a long period in late winter, and harvesting.

The keys to organic apple growing success are resistant varieties and orchard sanitation. One of the greatest threats is fireblight, a bacterial disease which is greatly aggravated by excessive vigor (rapid growth) which can be prevented by not over nourishing the tree and soil, by not thinning the developing apple crop too heavily, and by not pruning too much growth at any one time. Spraying usually simply encourages bacteria, not the trees, to evolve resistance.

Apple scab is a dark colored fungus that affects both the plant and the fruit based upon complex water dependencies, usually early in the season. Sulfur can be used to control scab, but good varieties and removal of infected tissues (and especially the decomposition or removal of cast leaves between growing seasons) are far more important and sustainable.

Cedar apple rust is another moisture dependant fungus that can prove problematic, but little can be done other than killing all cedar trees (the alternate host) within a half mile (certainly not sustainable) and growing resistant varieties. Unlike scab, rust does not cycle in the orchard more than once per year.

Plum curculio will very likely be our greatest problem. These little weevils lay their eggs in apples and the larvae then eat their way out. Even organic sprays typically kill more beneficials than pests, and one method of control is to actually spread a blanket below the tree each morning for three weeks after petal fall, shake the tree, and then roll it up and dispose of the curculios. Birds, especially wrens and bluebirds, also help, and some traps may prove beneficial.

Rodents are also problematic in that they may strip the bark of apple trees, especially during hard winters, or consume the roots. The most common solutions include mechanical barriers, traps, orchard sanitation, and in the case of voles not mulching so that their tunnels are more likely to collapse.

Birds likewise like to share the apple crop, commonly pecking at the fruit. Predator decoys, large scary eyeball covered balloons, and sound systems provide some protection.

Apple trees are very susceptible to road salt and simply can not be grown where it will wash or even blow in en masse.

At least two apple varieties must be grown within one hundred feet of each other for ample pollination, and some varieties are incompatible. Apples are a very well liked fruit in Minnesota and could conceivably be sold to almost any of our potential markets.

Recommended Varieties for resistance and hardiness:
Honeycrisp, Liberty, Haralson, Chestnut and Dolgo Crab, Red Baron, Honeygold, Sweet 16, Lakeland, and Keepsake.

References:

Phillips, Michael. The Apple Grower: A Guide for the Organic Orchardist. Chelsea Green Publishing Company: White River Junction, VT. 1998.

Professor James J. Luby – Horticultural Science
Lubyx001@umn.edu - 342 Alder Hall - ph: 612-624-3453 - fax: 612-624-4941

Apricots

Contributor: Jesse Sadowsky
Date Submitted: March 31, 2005
Keywords: Apricot, fruit tree, diseases, pests

Apricot Prunus armeniaca

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit Woody tree, 6-10 inches/year

Mature Height & Width:
Dwarf 7 ft height, 8 ft spread, standard 20-30 ft height, 20-24 ft spread
Immature Footprint: 5 ft

Mature Footprint: 20-30 ft spacing

2. Source of seedling, cuttings, plants, etc: St. Lawrence Nursery, NY, or locally

Size & Cost: 2-3 ft – $6

3. Planting, Maintenance & Harvest

Time of Planting: after ground thaws

Maintenance needed: heavy pruning, esp. if standard

Time of Maintenance: before bud break, not in fall

Harvestable product (What & How long before production begins?): fruit, 3-5 years

Time of Harvest: fall

Estimate of Yield: dwarf 1-2 bu, standard 3-4 bu.

Storage Conditions / Issues: cold storage 33-40 degrees F

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	Shovel, stakes	Stakes @ $2 ea.
@ Crop Maintenance	Hand pruner, saw pruner	$20
@ Harvest	-	-

Does the crop require irrigation? Until established, during dry spells

Human Resources
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month/ Tree											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				30min								
Maintenance				10min	10min	10min	10min	10min	10min	10min		
Harvesting								20min				

3 Most Common Pests & Diseases
Pest: aphids
Symptoms: curled leaves
Organic Control Mechanisms: water spray, insecticidal soap, sticky trunk wrap

Pest: gypsy moth caterpillar
Symptoms: defoliated tree
Organic Control Mechanisms: scrape eggs off tree in fall, Bt, trapping insects with burlap skirts

Pest: Mite
Symptoms: leaves stippled yellow
Organic Control Mechanisms: forceful spray of water, insecticidal soap

Disease: bacterial spot
Symptoms: pale green spots on leaves
Organic Control Mechanisms: copper based fungicide, prune and destroy infected parts

Disease: Crown Gall
Symptoms: Galls on crown or roots
Organic Control Mechanisms: remove with knife, treat with surgeon's paint, disinfect tools

Disease: scab
Symptoms: dark greenish spots on fruits
Organic Control Mechanisms: copper spray, sanitation

Marketing: Is there a market? yes
To whom: fresh roadside stafnd, csa, co-op, restaurants?
To Where: twin cities
When: august

Pollination: self-pollinating

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?
Other species in the Prunus genus may be more marketable. Time to establishment and production is a major drawback compared to some other considered perennials.

References

Page, Steve and Smille, Joe. (1995) The Organic Almanac – A Seasonal Guide to Healthy Fruit Trees.

Bali, Jeff. (1988) Rodale's Garden Problem Solver – Vegetables, Fruits and Herbs.

Asparagus

Contributor: Michelle Grabowski
Date Submitted: March 31, 2005
Revision Date: March 31, 2005

Keywords: Asparagus, perennial

Abstract: Asparagus is an herbaceous perennial that is productive for 15-20 years. Although care is required in bed establishment and initial planting, once established asparagus is relatively self sufficient as well as drought tolerant. It is a well known popular vegetable and should be easy to market.

Investigate Perennials:

Crop (Common Name & Botanical Name): Asparagus

Campus Expert & Contact Information: Dr. Carl Rosen and Dr. Vincent Fritz

1. Description: herbaceous perennial

Mature Height & Width: plant 12-18” apart in beds 4-5’ apart

Immature Footprint:

Mature Footprint: 1.5 ft x 2 ft

2. Source of seedling, cuttings, plants, etc: Johnny’s seed, Jersey asparagus farms

Size & Cost:

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: none

Cross Pollinator (variety if needed): none

Time of Planting: early spring after frost
Maintenance needed: field should be weed free prior to planting, fertilizer should be disced into the soil. A 6-8” trench dug, crowns are placed in the trench and covered with 2-3” of soil. As the plants grow, soil should be placed around the shoot until the trench is filled. Irrigation should be used in the first year but will not be necessary afterwards.
Time of Maintenance: weeding will need to be done in the spring and summer. A dying mulch could be planted in the early spring to reduce weeds late in the season.
Harvestable product : 8-9 weeks every spring after the first 2-3 years (spears need to be atleast pencil thickness to harvest)
Time of Harvest: spring – plant 2-3 yrs old
Estimate of Yield: 1,000-1,500 lbs/acre after established
Storage Conditions / Issues: once harvested spears need to be kept humid to maintain turgor. Standing spears in a tray of water in the cooler is usually enough. Cutting spears in the field instead of breaking them also helps.

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	Shovel or tractor for trench	Free - agronomy
@ Crop Maintenance	Seed for living mulch	
	Weeding tools	Johnny's and/or agronomy
@ Harvest	knives	Jersey farms, johnny's ($9 each)

Does the crop require irrigation? Only the first year

Human Resources (estimate)
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month/ plant										
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				30 min	30 min	10 min						
Maintenance				Weed 5 min		Weed 5 min						
Harvesting					2 hrs/acre	2 hrs/acre						
					3 days/wk	3days/wk						

3 Most Common Pests & Diseases
Pest: Asparagus beetle
Symptoms: feeding on stalks, defoliation of fronds
Organic Control Mechanisms: remove old stalks from the bed in fall, release chickens into beds to eat beetles

Pest: Asparagus aphid
Symptoms: witches broom, stunting and bushy growth
Organic Control Mechanisms: encourage natural predators, insecticidal soap, pyrethrums

Disease:Fusarium
Symptoms: wilting and yellow fronds, root rot
Organic Control Mechanisms: work salt in around infected plants, remove and destroy badly infected plants, Jersey cultivars are Fusarium tolerant

Disease: Asparagus rust
Symptoms: yellow orange spots early in the season becoming brick red and black later in the season
Organic Control Mechanisms: increase air movement around plants, Jersey cultivars are resistant

Disease: Purple spot
Symptoms: sunken purple lesions on stem
Organic Control Mechanisms: bury or destroy stalks each fall

Marketing: Is there a market? Yes
To Whom: Asparagus is a popular crop and could be sold wholesale or direct
To Where:
When:

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?
Yes, I think asparagus is a good crop for the student far. Although some initial prep work is required, this is not significant compared to the many following years of production. Planting the Jersey male hybrids is a must. They have good disease resistance and are solid producers.

References:
Missouri Agricultural Experiment Station (2005) Asparagus Cultivar Evaluation. Retrieved March 31, 2005 from http://aes.missouri.edu/swcenter/fieldday/page36.stm

Jersey Asparagus Farms, Inc. (2005). Retrieved March 31, 2005 from www.jerseyasparagus.com

Kuepper, G. and Thomas, R. (2001) Organic Asparagus Production. Retrieved March 31, 2005 from attra.ncat.org/attra-pub/asparagus.html

Blueberries

Contributor: Brian Noy
Date Submitted: April 7, 2005
Keywords: perennials, blueberries
Abstract:

Information on the requirements of growing blueberries, potential markets, diseases and pests.

Crop (Common Name & Botanical Name):
High-bush Blueberry: Vaccinium corymbosum
Low-bush Blueberry: Vaccinium angustifolium
(most bred varieties are crosses between the two)
Campus Expert & Contact Information:
David Wildung. (UMN Grand Rapids Outreach Center). dwildung@umn.edu. 218-327-4711
Emily Hoover. hoove001@umn.edu. 612-624-6220
Carl Rosen. rosen006@umn.edu. 612-625-8114

1. Description: Blueberries are a long-lived, slow growing woody perennial. They like sandy, pourous soil and a low pH of 4.5-5.5. Lowering of pH can be done easily with the addition of sulfur (which should be applied and tilled into the soil. Refer to UMN Extension for application charts.
Mature Height & Width: Most varieties grow up to 40-50 inches high and 30-60 inches wide. Northsky, a recommended variety grows much smaller.
Mature Footprint: Bushes should be planted 4 feet apart and have rows about 8 feet apart.

2. Source of seedling, cuttings, plants, etc: Nursery raised plants are propagated from cultures because these are more vigorous than those grown from cuttings.
Size & Cost: Two-year-old blueberry plants cost between $1 and $2, so it may cost between $1,000 and $2,400 per acre for plants.

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: Blueberries are insect pollinated, mostly by bees. Some varieties need to be cross pollinated and almost all varieties are benefited through cross pollination.
Time of Planting: Spring or fall. Spring is recommended and they can be planted as soon as field conditions permit.
Maintenance needed: Flowers should be removed to prevent berry production in the first two years. Trimming of branches is not really necessary for the first 5 years but pruning can encourage increased growth. After 5 years, older branches can be removed and should be cut to the ground level. Allow only 2-3 new canes to develop every year.
Time of Maintenance: Pruning should be done in late winter before buds develop.
Harvestable product (What & How long before production begins?): Harvest begins in third season, read below.
Time of Harvest: Early to middle July.
Estimate of Yield: There will be no harvestable produce the first two years. Properly managed plantings will yield 400 to 800 lb/acre the third season and 1,400 to 2,000 lb by the fourth year. Full crops of 4,000 to 6,000 lb/acre are generally harvested after six to eight years. Ideal conditions can yield up to 10,000 lb/acre. Michigan produces 4000-4500 lb/acre on average. Individual plants produce 3-12 lbs per season.
Storage Conditions / Issues: Most are canned or frozen once harvested. Freezing works very well for storage.

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting		
@ Crop Maintenance		
@ Harvest		

Does the crop require irrigation? Not needed but research has shown a 69% increase in yield when irrigated. Bushes have shallow roots and like well drained soil so irrigation is highly recommended. Having high organic content can reduce the need for water.

Human Resources (estimate)

Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month										
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting												
Maintenance												
Harvesting												

3 Most Common Pests & Diseases

Blueberries show strong potential for organic production since disease and pests are not common because of the lack of wild relatives in most areas. Fortunately, our field is isolated from any wild patches and their associated problems.

Pest: Cranberry fruit worm
Symptoms: Sometimes difficult to detect. Larvae is difficult to see without a hand lens.
Organic Control Mechanisms: Bt is moderately effective if used at first egg hatch.

Pest: Blueberry Maggot
Symptoms:
Organic Control Mechanisms: Not even chemical spraying is beneficial once eggs are laid in the fruit.

Pest: Japanese beetle
Symptoms: Leaves are skeletonized near the end of the summer
Organic Control Mechanisms: Traps have proven to exasperate the problem by attracting additional beetles.

Pest: Birds
Symptoms: Missing berries, fat and happy birds.
Organic Control Mechanisms: Netting or scare devises such as noise makers (sounds of distressed birds, gunshots) and visual objects (imitation predators, flashing ribbon).

Disease: Mummy berry
Symptoms: White mummy balls in rows

Disease: Anthracnose

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?

Probably not. Our soil isn't exactly conducive to blueberries although it should work by lowering the pH. It is difficult to say how it would fare economically without knowing a market price. We can produce 125-.5 pound per square ft (if the yields are 3-12 lbs and plants are space 4 ft by 6 ft). This should be compared to other perennials.

Resources:
Crop Profile for Blueberries in Michigan. http://pestdata.ncsu.edu/cropprofiles/docs/miblueberries.html.
Integrated Management of Blueberry Diseases
http://www.oardc.ohio-state.edu/fruitpathology/organic/blueberry/intro.html.
Kuepper, George L., Steve Diver. National Sustainable Agriculture Information Service. Blueberries: Organic Production. http://attra.ncat.org/attra-pub/blueberry.html.

Minnesota Impacts (MI). University of Minnesota. http://www.mnimpacts.umn.edu/impact.aspx?impactId=25

University of Minnesota Extension Service. "Commercial Blueberry Production in Minnesota and Wisconsin. http://www.extension.umn.edu/distribution/horticulture/components/2241-02.html

Butternut

Contributor: Andrew Montain
Date Submitted: April 7, 2005
Revision Date:
Keywords: Butternut, white walnut juglans cinerea, perennials, nut, tree, edible, veneer.
Abstract:
Juglans cinerea (commonly known as butternut, white walnut) is native to MN though the twin cities may be the upper limit of its range. There is at least one specimin growing well in a protected location on campus. Included below are expert contact info; description; planting, maintenance and harvest; equipment needs and costs; human resources; and most common pests and diseases. There is also the conclusion that this is a good potential crop, but further research is needed to be confident that it will be hardy in a windswept location. This may require a seed, seedling, cutting source of known hardiness.

Investigate Perennials:

Crop (Common Name & Botanical Name): Butternut Juglans cinerea

Campus Expert & Contact Information:
Stan C. Hokanson - Assistant Professor
Department of Horticultural Science

Phone: 612-624-1203
Fax: 612-624-4941
Email: hokan017@umn.edu

258 Alderman Hall
1970 Folwell Avenue
St. Paul, MN 55108

1. Description: woody perennial, slow growing, but fast as a seedling (Rink, 1990), tree is usually round-topped with a short, usually forked or crooked trunk and somewhat open, wide-spreading crown of large horizontal braches and stout, stiff branches. (Dirr, 1998)

Mature Height & Width: 40-60' X 30-50'; max 100' high (Dirr, 1998). Usually does not live longer than 75 years.

Mature Footprint: 4-5' Roots system may be deep, but also wide-spreading (Rink 1990).

2. Source of seedling, cuttings, plants, etc:
Out Back Nursery www.outbacknursery.com in MN has seedlings that should be hardy (to zone 3 in their catalog description) #2 $21.45, #5 $42.75, #15 $160.45 (these numbered pots are a little less than the volume in gallons of their number)

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: Butternut flowers from April to June, depending on location. The species is monoecious (separate male and female flowers on the same tree), and wind-pollinated. The male flowers are thick, green catkins that develop from axillary buds. The female flowers are shorter than the male flowers and occur on short stems arising in the axils of new leaves. Flowers of both sexes on an individual tree usually mature at different times. To ensure optimal pollination more than one tree may be necessary because of this lack of synchrony.

Time of Planting: Plant in fall to overcome dormancy, or stratify at 20-30C for 90-120 days then plant in early spring.
Maintenance needed: some pruning may be desirable, but not necessary
Time of Maintenance:
Harvestable product: sweet, oily nuts
Time of Harvest: Commercial seed-bearing age begins at about 20 years and is optimum from age 30 to 60 years. Good crops can be expected every 2 to 3 years, with light crops during intervening years. (Rink 1990)
Estimate of Yield: Thrifty trees may yield 9 to 35 liters (0.25 to 1 bushel) of cleaned seeds (Rink).
Storage Conditions / Issues:

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting		
@ Crop Maintenance		
@ Harvest		

Does the crop require irrigation?
No, but it grows best on streambank and is found most frequently in coves or on stream benches or stream terraces (Rink, 1990).

Special considerations:
Although the species is generally windfirm, it is subject to frequent storm damage (Rink, 1990).
Commonly associated trees:
basswood (Tilia spp.), black cherry (Prunus serotina), beech (Fagus grandifolia), black walnut (Juglans nigra), elm (Ulmus spp.), hemlock (Tsuga canadensis), hickory (Carya spp.), Oak (Quercus spp.), red maple (Acer rubrum), sugar maple (A. saccharum), yellow-poplar (Liriodendron tulipifera), white ash (Fraxinus americana), and yellow birch (Betula alleghaniensis). In the northeast part of its range, it is often found with sweet birch (Betula lenta) and in the northern part of its range it is occasionally found with white pine (Pinus strobus) (Rink, 1990)

Human Resources (estimate)
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting												
Maintenance												
Harvesting												

3 Most Common Pests & Diseases
Insects:
Enemies of butternut are often pests of associated trees as well. Some insects commonly found on butternut include wood borers, defoliators, nut weevils, lacebugs, husk flies, and bark beetles. The most serious insect pest at this time is the butternut curculio (Conotrachelus juglandis), which injures young stems and fruit. (Rink, 1990)

Pest: Sirococcus clavigignenti-juglandacearum
Symptoms: Dying branches and stems. Initially, cankers develop on branches in the lower crown. Spores developing on these dying branches are spread by rainwater to tree stems. Stem cankers develop 1-3 years after branches die. Tree tops killed by stem-girdling cankers do not resprout. Diseased trees usually die within several years. The disease is reported to have eliminated butternut from North and South Carolina. The disease is also reported to be spreading

rapidly in Wisconsin; between 1978 and 1983 the incidence of butternut canker in a young, isolated plantation increased exponentially from 5 percent in 1976 to 76 percent in 1983. By contrast, black walnut seems to be resistant to the disease. Melanconis juglandis fungus has been associated with secondary infections that cause some of the above symptoms. (Rink, 1990)
Organic Control Mechanisms:

Disease: Bunch Disease
Symptoms: Currently, the causal agent is thought to be a mycoplasma-like organism. Symptoms include a yellow witches'broom resulting from sprouting and growth of axillary buds that would normally remain dormant. Infected branches fail to become dormant in the fall and are killed by frost; highly susceptible trees may eventually be killed. Butternut seems to be more susceptible to this disease than black walnut. (Rink, 1990)

Marketing:
To Whom: Cabinet workers, veneer mills, farmers markets, groceries, confectionaries and bakeries.

Conclusion of use on Student Farm:
A good potential crop, but further research is needed to be confident that it will be hardy in a windswept location. This may require a seed, seedling, cutting source of known hardiness.

References:
Dirr, M.A., 1998. Manual of Woody Landscape Plants. Stipes Publ. Champaign, IL.

Rink, G. 1990. Juglans cinerea L. Butternut. In: Burns, R.M.; Honkala, B.H., tech. coords. Silvics of North America. Vol. 2. Hardwoods. Agric. Handb. 654. U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station: 386-390. http://www.wildwnc.org/trees/Juglans_cinerea.html

Cherries

Contributor: Jesse Sadowsky
Date Submitted: March 31, 2005
Keywords: Cherries, fruit trees, pests, diseases,
Abstract:
Sour cherries can be grown successfully in Minnesota if given a little extra TLC. A few cherry trees could be incorporated into the perennial section of the farm, taking up relatively little space compared to some other trees. However, market demand still needs to be established.

Sour Cherry Prunus cerasus

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit: woody perennial, tree, grows 6-10 inches per year

Mature Height & Width: dwarf 6-12 ft height, 8-15 ft width, standard 15-20 ft height, 25-35 ft width

Immature Footprint: 8 ft

Mature Footprint: dwarf 10-15 ft, standard 30 ft

2. Source of seedling, cuttings, plants, etc: St. Lawrence Nursery

Size & Cost: Price -- 2 to 4 ft. trees $17.00 each

3. Planting, Maintenance & Harvest

Time of Planting: after ground thaws

Maintenance needed: at least annual pruning, watering, possible pest mgmt

Time of Maintenance: late winter/ early spring, throughout growing season

Harvestable product (What & How long before production begins?): fruit, 2-4 yrs. if given a favorable location

Time of Harvest: July, early August

Estimate of Yield: dwarf 30-40 lbs, standard 80-100 lbs.

Storage Conditions / Issues: cold storage 33-40 degrees F

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	Shovel, stake for bracing	0, $2 per stake
@ Crop Maintenance	Hand and saw pruner, sprayer, Bt, sulfur, others	Pruners probably somewhere on campus, Bt and sulfur $10
@ Harvest	-	-

Does the crop require irrigation? Yes, until established and in hot, dry spells

Human Resources
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month/ tree										
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				30min								
Maintenance				10min	10min	10min	10min	10min	10min	10min		
Harvesting							20min					

3 Most Common Pests & Diseases

Pest: aphids
Symptoms: curled leaves
Organic Control Mechanisms: water spray, insecticidal soap, sticky trunk wrap

Pest: apple maggot
Symptoms: worms in fruit
Organic Control Mechanisms: sanitation, shallow cultivation, red ball sticky traps

Pest: Cankerworms
Symptoms: skeletonized leaves
Organic Control Mechanisms: dormant oil spray, Bt

Disease: Bacterial canker
Symptoms: heavy oozing
Organic Control Mechanisms: destroy infected limbs, disinfect, sanitation

Disease: Black Knot
Symptoms: black swelling
Organic Control Mechanisms: cut 4 inches below infection, burn pruned branches, cover wounds, remove infected trees in area, lime-sulfur spray

Disease: Sun scald
Symptoms: split bark
Organic Control Mechanisms: use burlap trunk wrap, especially in winter months, set up board as sun screen

Marketing: Is there a market? yes
To Whom: roadside market, co-ops, csa's?, restaurants?,
To Where: twin cities
When: fall, during storage, as value added product (jelly, preserves, pies, etc.)

Pollination: self-pollinating

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?
I think so, but the time needed for establishment is the main concern. Is this type of long term investment one of our priorities? Will people be around to harvest and market crops once trees become established?

References

Page, Steve and Smille, Joe. (1995) The Organic Almanac – A Seasonal Guide to Healthy Fruit Trees.

Bali, Jeff. (1988) Rodale's Garden Problem Solver – Vegetables, Fruits and Herbs.

Chestnut

Contributor: Seth Zeigler
Date Submitted: March 30, 2005
Revision Date:
Keywords: chestnut, American chestnut, Chinese chestnut
Abstract:
The American Chestnut tree once dominated many eastern forests and was highly valued for both its lumber (the trees were massive) and its nuts. Unfortunately, the chestnut blight was inadvertently introduced from the Old World and devastated the American trees which had no resistance. The blight only kills the above ground portion, although, and sprouts can still be found cyclically growing and dieing from these historic stumps.

American chestnut trees grew in excess of 100 feet in height and diameter in any sort of soil that was not poorly drained and is acidic (a possible concern for us). It is estimated that there were 3.5 billion trees, and they were often the tallest trees in a given forest. They grow rapidly for a hardwood, roughly on par with Tulip Poplar, and have a similar shape and form.

Our best option would be to plant the actual chestnuts in October, although they can also be started indoors.

Seeds and seedlings are supplied free after signing an agreement with the American Chestnut Cooperator's Foundation (ACCF) and at least a $20 per year donation that goes towards research and development. This organization is working with only native populations to attempt to breed resistant varieties through selection and intermixing of resistant genes from different populations. These trees are dubbed All American Intercrosses. Conversely, the American Chestnut Foundation (ACF) is attempting to develop resistance by crossing American and Oriental (which are relatively blight resistant) varieties and through radiation induced mutations. Very few of these trees have exhibited good natural form or blight resistance with any more than 50% American genes, though, and some of the All American Intercrosses have shown comparative resistance.

Only approximately 10% of the Chestnut seeds and seedlings distributed by ACCF inherit resistance to the Chestnut blight because these are lower performing crosses; all of their best trees must be kept for testing and breeding, Thus, natural selection after germination/transplant must be allowed to remove these. The blight fungus causes very conspicuous sunken cankers in the stems. Hypovirulence is a virus disease that attacks the blight fungus and slows its progress, but its effects are limited because the blight spreads very rapidly and the virus slowly. Inoculation with hypovirulence is recommended to increase chances of success.

The chestnut weevil lays its eggs in ripening nuts. The eggs hatch after the chestnuts drop and the larvae then eat their way out and winter in the soil. Thus both sanitation and poultry are great controls. Nuts can also be soaked with no harm in 49^ Celsius water for twenty minutes to kill the weevil. They should then be refrigerated.
Rodents and deer can prove very problematic at stripping bark and browsing, and must be controlled as with any other trees.

American chestnuts require at least two trees within 200 feet of each other to pollinate. They should begin to yield in five years. The nuts are very low in fat (less than 2%) and high in carbohydrates and should be refrigerated after harvest. Chestnut trees are very conducive to organic agriculture and require little care. Pruning can be done during hot and dry summer weather.

Of course, we could grow the much smaller and more blight resistance Oriental strains of chestnuts, but this may be a bad example for a University to set. Supporting the spread of native resistance, on the other hand, is well worth the $20 a year and could potentially draw a great deal of interest. Either way, commercial yields run anywhere from 100 – 500 lbs per

tree annually. It is also important to remember that hybrids are often male sterile. Hybrid seedlings typically cost $15. Hybrids should be spaced at least 25 feet apart.

I recommend serious discussion of chestnuts, but this is not as pressing as some other crops. The All American Intercross program is very commendable and could be a huge boon to sustainable agriculture and forestry. We are not within the American chestnut's native range, although, which decreases their desirability but may also decrease the blight incidence, and the story of the Chestnut blight is one of the greatest and most notorious of American natural tragedies. American chestnut trees are massive, but a small number could very conceivably add diversity and protection to the student farm without tying up too much land.

Enterprise / Task	Hours / Month										
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting		1	H	O	U	R	1	T	I	M	E	
Pruning							1					
Harvesting										1		
Processing			1								1	
Mulching												1

References:

American Chestnut Cooperator's Foundation. Restoration Efforts Growing American Chestnuts. Retrieved 03/27/05 from http://www.accf-online.org/grow.html & http://ipm.ppws.vt.edu/griffin/accf.html

Chestnuts USA: Washington Grown Chestnuts. Retrieved 03/27/05 from http://www.chestnutsusa.com/.

Northern Nut Growers Association, Inc. Growing Chestnut Trees. Retrieved 03/27/05 from http://www.icserv.com/nnga/faqchest.htm

Currants

Contributor: Megan Kranz McGuire
Date Submitted: May 2, 2005

Keywords: perennials, currants
Abstract:
Some currants are native perennials, which helps us fulfill our goal of mimicking natural ecosystems. Currants are also a good option to include in perennial guilds.

Crop (Common Name & Botanical Name):
"Red and white currants are both classified as members of the same species, Ribes sativum, while the less common European black currant is known as Ribes nigrum. Gooseberries of American origin are Ribes hirtellum or hybrids derived from this species, while the European type is Ribes uva-crispa." (Foulk and Hoover)
The European cultivars are not recommended for this region due to severe problems with pine rust, though growing red or white varieties should prove more strategic.

Contact on Campus: Emily Hoover, Horticulture Department

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit
Woody perennial, grows canes that must be prunes after fourth year.

Mature Height & Width: Height 3-5'; Width: same

Immature Footprint:

Mature Footprint: plant 3-4 feet apart in row 6-8 feet apart

Pollination: self-pollinating, but multiple varieties improves yield

2. Source of seedling, cuttings, plants, etc: mail-order catalogs provide the widest variety of cultivars, but check whether they are hardy for northern climates.

Size & Cost:

3. Planting, Maintenance & Harvest:

Time of Planting: Early spring, plant one inch deeper than in nursery—this promotes more root growth. "Plants may be spaced as close as three feet apart for a hedge-type system in rows at least six feet apart. Black currants are more vigorous and should be spaced four to five feet apart in rows at least eight feet apart." Prune canes to 4-6 above-ground buds after planting. Provide 2-4 inches of mulch. (Foulk and Hoover)
Maintenance needed: mulching, pruning. Fertilize in late fall with compost.
"During the first three years of growth, allow four or five canes to develop per year, removing only weak or damaged wood. Beginning in the fourth year, prune out the oldest wood annually in early spring before growth begins. In addition, remove any weak new growth. A mature bush should have 9 to 12 canes once pruning is completed. Fruit is produced on one-, two-, and three-year-old wood." (Foulk and Hoover)
Time of Maintenance: pruning yearly
Harvestable product (What & How long before production begins?): fruit on 1,2, and 3 year old canes
Time of Harvest: July

Estimate of Yield: Each plant can yield 4 quarts per year
Storage Conditions / Issues: "When using the fruit for jam, you should harvest it before it is fully ripe so that natural fruit pectin levels will be higher. Cool picked fruit quickly, placing it in covered containers or closed bags to maintain humidity levels and prevent drying when storing fruit in a frost-free refrigerator. Promptly cooled berries will keep in the refrigerator for up to several weeks." (F and H).

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	shovels	Minimal/borrowed
@ Crop Maintenance	pruners	"
@ Harvest	buckets	"

Does the crop require irrigation? "Because named cultivars have root systems that are fibrous and shallow, they do not tolerate dry sites without supplemental water. Keep in mind that trees not only cast shade, but compete for water and nutrients as well; a planting location beyond the canopy of shade trees is preferable." (F and H).

Human Resources
Enterprise / Calendar Matrix: (Worksheet 2.7) Per Plant

Enterprise / Task	Hours / Month										
J	F	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting			.5hr								
Maintenance: pruning needs will vary		.25			.25				.25		
Harvesting						2-6					
Watering					3	6	6				

Diseases and Pests:
"Currants and gooseberries do not require extensive spraying to control pests in the Upper Midwest; careful site selection and good cultural practices such as mulching, pruning, and sanitation will minimize pest problems. Powdery mildew can be a serious foliar disease in some years and some locations; for control of powder mildew or another specific insect or disease pest, contact your county extension office." (F and H)

Marketing: Is there a market? Maybe at farmer's markets, probably for jams.
To Whom: the CSA or farmer's markets or local coops or local restaurants
To Where: local people
When: summer or fall

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?

"Currants and gooseberries are highly tolerant of less-than-perfect sites. Although full sun will result in the healthiest, most productive planting, the shrubs can perform quite well on as little as half-day sun." (F and H). For this reason, currants may be a good crop to grow on the student farm. They may be a good addition on the north side of a perennial guild. Even if there are not extensive markets, I think that volunteers and student workers may enjoy eating the currants themselves.

References:

Doug S. Foulk and Emily E. Hoover. 2005. “Currants and Gooseberries in the Home Garden”
http://www.extension.umn.edu/distribution/horticulture/DG1122.html

For more on diseases and pests:
http://cecommerce.uwex.edu/pdfs/A1960.PDF

Gooseberries

Contributor: Lisa Kissing
Date Submitted: April 4, 2005
Revision Date:

Keywords: Gooseberry, propagation, planting, maintenance, diseases, harvesting, yield

Abstract:

Gooseberries are deciduous woody shrubs which produce an interesting seedy berry. They should be propagated by woody cuttings. Mulching, pruning, and picking at harvest require the most labor. Equipment is minimal. Markets exist in juices, fresh fruit, jellies and jams

American Gooseberry (Ribes hirtellum), European Gooseberry (R. grossularia)

Cultivars: Downing often is used for commercial processing and is hardy and productive, producing small green fruit. Pixwell is sold most often and is very productive, but the fruit is of only fair quality. Poorman is red-fruited, large, and flavorful. It is the best cultivar of the American types for the home garden. Several European cultivars are available from specialty nurseries. The fruit of the European types usually is larger and better flavored; however, they generally do not have as much mildew resistance as the American types

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Description: Gooseberries are deciduous shrubs, fast growing under optimum conditions to 3 feet tall and 6 feet wide. American types have weeping stems that will root wherever they touch the ground and can be invasive. Well adapted to cold climates.

Propagation: Plants can be propagated by stem cuttings. Well-rooted 1- or 2-year-old dormant plants are commonly used, cutting back the top portions of the plant to 6 to 10 inches

Planting: In fall or early spring, space plants 3 to 4 feet apart in rows 6 to 8 feet apart. Remove flower blossoms from plants in the first year to encourage plant establishment and growth for future years. Well-established plants can fruit for 10 to 15 years or more. The flowers are self fertile and pollinated by wind and insects, including bees. Gooseberries and currants can serve as alternate hosts to white pine blister rust (Cronartium ribicola), so should not be planted near pines.

Maintenance: Pruning should remove all canes older than 3 years old to encourage the growth of new canes. Prune

dormant plants in early spring just before growth resumes, usually in March or early April. In March, prune off and dispose of winter injuries, old, nonproductive canes and dry, dead wood. To prevent leaf spots, rake the ground clean around each plant in early spring. 2 to 4 inches of mulch around the bushes will keep the soil cool, keep weeds down, and retain moisture.

Harvest and Yield: Pick fully colored fruit as they appear, usually in late June or July. Each plant will produce between 5 to 7 pounds when mature (usually during the third or fourth year). Remove any flowers so that plants don't develop fruit during their first season of growth. Expect a light crop the second year and a full crop by the third.

Storage Issues: Gooseberries can be held for 3-4 weeks in a temperature from 31-32 degrees F and high humidity.

Equipment: Very little equipment is needed except rakes and human hand pickers.

Irrigation: No irrigation needed.

Pests and Diseases: Integrated Pest Management treatment of diseases and pests can be found at http://www.ars-grin.gov/cor/ribes/ribsymp/ribsymp.html.

Marketing: Markets exist in juices, fresh fruit, jellies and jams.

(Times for Pennsylvania)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
		X	X	X				X	X			Planting
		X	X									Pruning
			X	X								Rake Ground
					X	X						Harvesting
X	X	X	X	X	X	X	X	X	X	X	X	Management

References:

(1996). Gooseberry. California Rare Fruit Growers, Inc. Retrieved April 3, 2005, from http://www.crfg.org/pubs/ff/gooseberry.html

(March 2, 2000). Crop Profile for Gooseberries in New York. Retrieved April 4, 2005, from http://www.ipmcenters.org/cropprofiles/docs/nygooseberries.html

(February 4, 2001). Small Scale Fruit Production. Retrieved April 6, 2005, from http://ssfruit.cas.psu.edu/chapter10/chapter10d.htm

Grapes

Contributor: Peter Gillitzer
Co-Contributors: n/a
Date Submitted: April 1st, 2005
Revision Date:

Keywords: perennials, grapes

Abstract: Provides information on grape cultivation, maintenance, harvesting, equipment needs and common pests and diseases.

Grape, vitis

Description:

Grape vines are an excellent perennial for the student farm. By cultivating grapes we are bringing diversity to the farm, cultivating a potential cash crop and representing the University of Minnesota's many varieties. The Univeristy of Minnesota Department of Horticulture, through their viticulture program has concentrated on developing many wine grape varieties which include the classic Vitis vinifera cultivars, some of the better quality French hybrids, and cold hardy and disease resistant selections based on V. riparia, V. amurensis and V. acerifolia. There are, however, many roadblocks to grape cultivation. First, viticulture is a complex process that requires extensive knowledge and experience. Patience and experience is required to graft, prune and train the vines. Second, there are many different varieties, most which require some sort of processing and expertise. If the student farm chooses to cultivate grapes it's advised that we stick with the table and jelly varieties unless there are dedicated people willing to invest the time and energy in cultivating suitable wine grapes. That being said, grape vines are a aesthetically pleasing, beneficial plant that could benefit the student farm in many ways.

Mature Height and Width: varies according to training, usually kept under 6 feet tall and 2 feet in depth

Immature foot print: planted in rows 8 x 10 feet apart (approx. 545 plants/acre), propagated from roots.

Mature foot print: Woody vines are controlled on vertical trellises (bilateral cordon system, posts approximately 20ft apart) approximately 3.5-6 ft high and along continuous rows with a length to be determined. In other words, the vines mature footprint will be determined by the viticulturist care and training.

Planting, Maintenance and Harvest.

Time of planting: mid-May

Maintenance needed: annual trimming done in spring; trimmed to ¼ inch diameter wood or live tissue in vine; in first year vines are trained to stakes, then to trellis.

Time of maintenance: spring

There are three alternative weed control methods that can be used in viticulture. 1) tillage 2) straw mulch 3) living mulch of creeping red fescue. Clover is one of the primary weeds in need of control. According to a study done at Iowa State University, the straw mulch weed control was the best alternative weed control mechanism, competing with chemical herbicide in terms of effectiveness.

Harvestable Product: harvest yield is measured in "foch" grape yield (total yield per vine, cluster number and weight, berry weight).

Time of Harvest: late fall

Estimate of Yield: depends on variety

Storage Conditions/issues: grapes have a short shelf life and need to be processed soon after harvest. Depending upon the variety; winemaking, preserving or juicing are possibilities.

Irrigation: irrigation is needed at planting

	Equipment needs	Equipment costs
Planting	shovel, grafted root in water	provided
Maintenance	pruning shears	provided
Harvest	shears	provided

U of M Varieties	Type	Features
Blueball	table, juice, jelly	disease resistant
Edelweiss	table, juice, jelly	needs protection
Frontenac	red and rose wine,port	vigorous/disease resistant
Frontenac gris	white wine	vigorous/disease resistant
La Crescent	white wine	cold hardy/disease resistant
Swenson Red	table	needs spray program

Diseases.

Anthracnose (elsinoe ampelina)

Symptoms: black rot

Organic control methods:

Powdery mildew (uncinula necator)

Symptoms: white, powdery mold
Organic control methods:
Downy mildew (plasmopara viticola)
Symptoms: white, whispy mold
Organic control methods:

Marketing:
Table grapes would be easy to market because of the uniqueness of a cold hardy table grape variety that could be made into preserve or eaten fresh. Wine grapes may be more difficult to market because they would need to be processed into wine, a process that appears to require extensive knowledge and large amounts of time.
Univeristy of Minnesota contacts.
Jim Luby, small fruit breeder
lubyx001@umn.edu 612-624-3453 Horticultural Science
Peter Hemstad, grape breeder
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Anna Katherine Mansfield, enologist
mansf007@umn.edu +1 651-994-0457 Horticulture Science (Hort Research Center, Excelsior, MN)

References:

Iowa State University (2004) ISU Viticulture program.

University of Minnesota (2004) "Grape breeding at the University of Minnesota." Retrieved April 1st, 2005. <www.winegrapes.coafes.umn.edu>

Minnesota Hardy: showcasing new and enduring plants for you landscape. University of Minnesota. 2004.

Hazelnuts

Contributor: Lisa Kissing
Date Submitted: March 30, 2005
Revision Date:

Keywords: Hazelnuts, Corylus, propagation, planting, maintenance, diseases, harvesting, yield

Abstract:

Hazelnuts are large woody shrubs which grow to a mature height and width around 10 to 15 feet. They should be propagated by seedlings. Weed control, pruning, sucker control, and disease maintenance are essential. Irrigation and fertilization should be carefully monitored. Nuts can be harvested, dried, stored, and sold for shelled nuts, flavorings, and confectionary uses.

Hazelnut, Filbert (Corylus avellana) of the Birch family

Main hazelnut cultivars differ by region: Turkey 'Tombul', Italy 'Tonda Gentile della Langhe', Spain 'Negreta', US 'Barcelona'. Pollinizers are 'Daviana', 'DuChilly', and 'Butler'.

Turkey and Italy grow most of the world's hazelnuts. The United States captures around 3% of the world market and 99% of domestic hazelnuts come from Oregon.

The most commonly known European hazel does not have the cold hardiness and disease resistance for the Upper Midwest. Breeders have produced a usable cold hardy resistant hybrid by crossing the European hazels with two American Hazel species. Hot summer temperatures, windy conditions, and low humidity should be avoided in most varieties however.

Hazelnuts are large woody shrubs. In Europe, they are grown as shrubs, but in the United States they are found as a single trunk for mechanical harvest. Mature plants will form 6-8 feet in diameter and 10- 12 feet high.

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Propagation: Four month old "tubeling" seedlings are the preferred propagation and have a wide price range from two dollars to twenty depending on the source.

Planting: 10 to 20 feet is commonly given between mature trees. "Tree spacing is generally triangular or square," According to Mike's Fruit Crops. Pollen can travel 60 feet. Pollinizers must be planted within this radius, usually one pollinator per 8 trees. Different varieties may not be compatible in terms of peak flowering and pollination timing. Spring is the best time to plant hazelnuts, but planting through September will suffice. More information can be found at www.badgersett.com.

Maintenance: Weed control in the first years is very important. Low lying companion plantings can ensure that weed competition will not get out of hand.

Most hazelnuts form on new wood, so pruning is important. Material removed from pruning can be used for biofuel. Pruning will also lessen limb breakage from ice and snow. Hazelnut vigor goes down every five years. So, a five year rotation plan of pruning should be alternated among the trees. "One successful method has been to remove 1/2 the fruiting area from 1/5 of the trees annually, yet leaving as large a framework as possible," according to Agfact. Prune carefully, however, because infections from wood rots can begin from large pruning cuts. When the pollen has shed and the catkins have fallen pruning should begin.

Sucker control can be very time-consuming. Suckering can be lessened if trees from nurseries are root-pruned when planted and basal buds are removed.

Fertilization can kill young trees. However adolescent and older trees are in need of nitrogen, potassium, and boron. Around 6 years old, trees will need Boron. It should be applied mid-May to early June.

Diseases can be a concern. Eastern filbert blight (EFB) is particularly hazardous to North American hazelnuts. Hybrids are available resistant or immune to the blight:

- Susceptible
- Daviana
- Ennis
- TGDL
- Casina
- Negret
- Dundee
- Newburg
- Tonda
- Romana

- Intermediate
- Barcelona
- Butler
- Hall's Giant
- Willamette

- Resistant
- Tonda di
- Giffoni
- Gem
- Lewis
- Clark

- Immune
- Gasawa
- VR series
- Gamma
- Delta
- Epsilon
- Zeta

Harvest and Yield: The shrubs start producing nuts when 3-4 years old, and can continue to do so for up to 40-50 years. Each tree produces around 3-4 lbs of hazelnuts (highly variant on species). An unusual flowering habit ensures that fertilization will occur in July and the nut will mature by late August. The fruit is found in clusters from one to twelve nuts. Nuts abscise from the base of a leafy husk in late august. The nut does not become free of the husk, however, until the husk dries and opens six weeks later. Nuts drop naturally during a 6 week period beginning in September.

European producers harvest mostly by hand and United States producers are primarily mechanized harvesters. Hazelnuts can easily be harvested by cheap hand rakes. The ground underneath the trees should be kept debris-free to make sweeping for nuts easy. Blank nuts decrease quality and can be found by placing nuts in water. The floaters are black. The final nuts should be dried to 8-10% moisture and can be stored for one year at 36-40 degrees F.

Premium nuts are sold in the shell and focuses on appearance. The nuts may be cracked and used for flavoring, cereals, confectionery, and in canned mixed nuts. Badgersett.com says, "Midwest USA market is not established; the crop is too new. Active growers intend to market jointly processed and developed value-added regional specialties before expanding to commodity sales. Commodity markets potentially larger than soybeans. No kidding."

Equipment: Tree planting spades, pruning shears, and hand rakes are available through the University. If more mechanized equipment is desired, The American Heartland Hazelnut Association (AHHA!) coordinates equipment use between growers. High bush blueberry pickers can be used to harvest hazelnuts as well.

Irrigation: As long as areas have adequate rainfall and high humidity, the trees do not need added irrigation. Non-maritime climates may need irrigation. Water content is tied to nut quality. First and second year watering is essential of an inch per week.

Oregonhazelnuts.org provides this annual calendar of planning, maintenance, and harvesting:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
				X	X	X	X	X				Planting
X	X											Pruning
	X	X										Fertilizing
			X	X	X	X	X					Cultivate
		X	X		X					X		Weed Control
			X	X	X	X	X					Sucker Control
				X								Foliar Boron Application
				X								Sun Scald Protection
							X	X				Pre-Harvest Care
								X	X			Harvesting
X	X	X	X	X	X	X	X	X	X	X	X	Management

References:

(July 14, 1999). Crop Profile for Hazelnuts in Oregon. Revised: September 2, 1999. Retrieved March 23, 2005, from http://pestdata.ncsu.edu/cropprofiles/docs/orhazelnuts.html

Olsen, Jeff. (June 19, 2003). Nut Growers Handbook. Retrieved March 23, 2005, from http://oregonhazelnuts.org/handbook.htm

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Hazelnut or Fibert - Corylus avellana L. Mike's Fruit Crops. Retrieved March 23, 2005, from http://www.uga.edu/fruit/hazelnut.htm

Stahl, Liz. (May 24, 2004). Third Crop Options: Hybrid Hazelnuts. Retrieved March 23, 2005, from www.berbi.org/thirdcropoptions/Hazelnuts.doc

Kiwi

Contributor: Brian Noy
Date Submitted: April 7, 2005

Keywords: perennials, kiwi

Abstract:

Information on the requirements of growing kiwi in Minnesota.

Crop (Common Name & Botanical Name):
Kiwi: *Actinidia kolomikta*

1. Description: The "Artic Beauty Kiwi" is the only variety hardy enough to produce fruit in Minnesota. It grows as long-living vine and the fruit is hairless and grape-like in shape and size. The taste is similar (but a little sweeter) than the commercial varieties. They grow best in well drained soil (with a pH of 5.5-7.5) and on partially-shaded, wind-protected sites.
Mature Height & Width: It will grow 10 feet tall and about three feet wide when supported.

2. Source of seedling, cuttings, plants, size, cost, etc: I found an 18" plant for $20 on the east coast. Call local nurseries for availability.

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: Only the female plants produce fruit and a male must be planted along with it to allow for
Time of Planting: Spring or fall.
Maintenance needed: Trimming of the vines. Only one main trunk should be allowed to grow from the ground. It should be covered in the winter for protection.
Time of Maintenance: Pruning should be done in late winter and in July if absolutely necessary.
Harvestable product (What & How long before production begins?): Berries should develop 1 to 2 years after planting.
Time of Harvest: Early August to September.
Estimate of Yield: N\A
Storage Conditions / Issues: Best eaten fresh and can be eaten a week or two after picking if refrigerated.

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting		
@ Crop Maintenance		
@ Harvest		

Does the crop require irrigation? N\A

Human Resources (estimate)

Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting												
Maintenance												
Harvesting												

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?

Although it would be super cool to grow kiwi on the farm, this would not be the best plant for us. It does take some material and work to support it and prepare it for winter and it requires both sexes. There is no current market for Minnesota kiwi but I would assume that there would be a definite niche for local organic kiwi.

Resources:

Hordsford Gardens and Nursery. http://www.horsfordnursery.com/new/plants/fruits_trees_and_bushes/html/fruits_2.html

Jill MacKenzie. “Growing Kiwi in Minnesota.” University of Minnesota Extension Service. http://www.extension.umn.edu/projects/yardandgarden/ygbriefs/h248kiwi.html

Maple- Syrup

Contributor: Mike Petefish
Date Submitted: March 30, 2005

Keywords: planting, maple, tree, perennial, syrup

Abstract:

Investigating the possibility of planting maples and producing organic maple syrup. Here is some various information to assist in the investigation.

Investigate Perennials:

Crop (Common Name & Botanical Name): Norway Maple - Acer platanoides
Other varieties actually work better for sap collection but didn't list all of them

Campus Expert & Contact Information: unavailable, talk to Bud

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit: Woody perennial

Mature Height & Width: 40-50 ft. however smaller versions more suitable for gardens may be grown

2. Source of seedling, cuttings, plants, etc:

Size & Cost: seeds may be ordered on-line or shrubs may be bought and transplanted. Seeds are small transplants vary in size. Seeds are inexpensive.

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: Self pollinating

Time of Planting: Spring
Maintenance needed: Pruning of leaves and braches
Time of Maintenance: 50 hours total
Harvestable product (What & How long before production begins?): sap; tree needs to be at least five feet tall before they should be tapped. Maples grow from 1-3 ft. per year depending on the variety and the environment.
Time of Harvest: 4-6 weeks

Estimate of Yield: 5-15 gallons per tap hole

Storage Conditions / Issues: maple sap needs to be boiled right away to make syrup; unopened maple syrup will keep indefinitely. If it molds simply bring it to a boil and skim the mold off the top.

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	none	
@ Crop Maintenance	Tree trimming equipment	
@ Harvest	spiles, buckets, brace and bit, 5 gallon collection bucket, a large clean plastic garbage can for a reservoir, and an evaporator.	Have to order a catalogue to get specific tool costs

Does the crop require irrigation? No

Human Resources (estimate)

Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				X	X							
Maintenance							x	x	X	X	X	
Harvesting		X	X	X								

3 Most Common Pests & Diseases

Pest: Aphids

Symptoms: loss of leaves

Organic Control Mechanisms: introduce predatory insects

Pest: Scales

Symptoms: The insect forms a cottony mass on the lower sides of branches.

Organic Control Mechanisms: Horticultural oil sprays

Pest: Bores

Symptoms: tree will stop growing

Organic Control Mechanisms: keep trees healthy

Disease: Verticillium wilt

Symptoms: wilting and death of branches

Organic Control Mechanisms: fertilize with something that has a high N content and lightly prune

Disease: Girdling roots
Symptoms: lack of trunk flare at ground level
Organic Control Mechanisms: remove those particular roots

Disease: leaf scorch
Symptoms: scorched looking leaves, brown and dead
Organic Control Mechanisms: water the tree

Marketing: Is there a market? Yes
To Whom: Syrup wholesalers
To Where: mostly New England
When: Christmas and the holidays is when the bulk of maple syrup is sold

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not? I think logistically it might be kind of hard but none the less it would be cool to have on the farm.

References:

http://www.massmaple.org
http://hort.ifas.ufl.edu/trees/ACEPLAE.pdf
http://www.treehelp.com

Maple- Woody Ornamental

Crop (Common Name & Botanical Name): Acer saccharum Sugar Maple

Campus Expert & Contact Information:
Stan C. Hokanson - Assistant Professor
Department of Horticultural Science
Phone: 612-624-1203
Fax: 612-624-4941
Email: hokan017@umn.edu

Address:
258 Alderson Hall
1970 Folwell Avenue
St. Paul, MN 55108

I'm not sure what was meant by Maple, and to what end they were thinking of growing them, so I took the liberty to assume that we would grow them to a certain size and them sell them as ornamental trees to consumers. Also I took the liberty to focus on the Sugar Maple, as it is a local tree (unlike the invasive Norway Maple) and more likely to survive Minnesota winters (unlike the Japanese maple that would command a higher price). Also other hardwood ornamental trees could fall under the following evaluation.

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit:
   Woody Perennial, Rate of growth is about 1 ft a year, it's a tree that grows up right with an oval to round crown.

Mature Height & Width: Not important, at sale they would be 4-7 ft. tall and 3-6 ft. wide.

Immature Footprint: Limited on an individual tree, but groups of trees, even small ones, would have an effect on the soil as far as nutrient availability around their immediate area and on the soil in which they are located.

Mature Footprint: Not really relevant, on our small one acre it would be totally impractical to have mature maple trees as they have no commercial value, (not enough for syrup, takes to long for lumber), also large trees rob a large surrounding area of nutrients and water and creates lots of shade.

2. Source of seedling, cuttings, plants, etc:
Seedlings: can be found on people's farms or forests were we have permission to remove seedlings; seedlings could be purchased from nurseries that specialize in that (Lee Nursery in northern Minnesota can sell us one foot tall seedlings for less then a buck a seedling but transportation/shipping might be expensive)
Seeds: can be sprouted in seedbeds,

Cuttings can be sprouted but the rooting rates tend to be low however with cuttings we could propagate specific cultivars that would fetch a higher price

Size & Cost: Free for natural seedlings, cuttings, or sprouted seeds, around .85 to $5.00 for purchased seedlings from 6 in. to 2 ft.

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: seedlings would be planted in the garden and then grown out to 4-6ft. where they would be dug up and then balled up or potted to be sold (most likely direct sale, more on that later) to homeowners who would plant them as ornamental trees. Little maintenance would be required other then the occasional pruning to ensure a straight trunk. No pollination needs to occur.

Cross Pollinator (variety if needed): None

Time of Planting: Spring
Maintenance needed: A little pruning to insure a straight trunk
Time of Maintenance: depends on how many trees we have, but a skilled person could easily prune a tree in a couple of minutes, this is a low maintenance plant.
Harvestable product (What & How long before production begins?): The tree it's self is the finished product. The tree is slow to moderately growing at about one ft. a year, so depending on our starting cutting size and how big we want them it should take 4-6 years
Time of Harvest: Spring
Estimate of Yield: Depends on number of seedlings
Storage Conditions / Issues: None

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	Shovel, trowel, nothing special	Labor costs
@ Crop Maintenance	Pruning shears	Labor costs
@ Harvest	Shovel, burlap, pots? Bailing twine? It all depends on the method one would choose	Labor and supplies

Does the crop require irrigation? Drip irrigation would be a benefit in that it would make for bigger trees quicker, but Sugar Maples are native to the area and wouldn't require it.

Human Resources (estimate): I'm going to estimate for ten trees, numbers can be adjusted accordingly, the following chart will be calculated in man (or women) hours
Also for planting, the seedlings would be planted in May but the seeds would be planted in a seedbed in Aug. Also I have now idea how I would estimate the time to dig up a 6ft tree and prep it for sale, or were I would find that information.
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting	0	0	0	0	1	0	0	1	0	0	0	0
Maintenance	1-2	0	0	0	0	0	0	0	0	0	0	0
Harvesting	0	0	0	0	10-30?	0	0	0	0	0	0	0

3 Most Common Pests & Diseases

Little to no pests or diseases, and nothing to be concerned about, also for all of these, healthy trees rarely get affected, usually only sick trees are vulnerable, so the best control mechanism is to have healthy trees, but here are 3 that sometimes show up.

Disease: Anthracnose

Symptoms: "The disease resembles, and may be confused with, a physiological problem called scorch. The disease causes light brown or tan areas on the leaves. "(U.S dept of Forestry)

Organic Control Mechanisms: None, there are fungicides that can be applied but that's not organic, for the most part the tree needs to be culled if it gets to bad, if it gets to bad it probably means that it was sick in the first place, a healthy tree should pull through on it's own.

Pest: Aphids

Symptoms: There's freakin aphids all over the place! but also excessive leaf drop.

Organic Control Mechanisms: Natural garden predators. Ladybugs/beetles.

Condition: Scorch

Symptoms: "Scorch symptoms are light brown or tan dead areas between leaf veins. The symptoms are on all parts of the tree or only on the side exposed to sun and wind." (U.S Dept of Forestry) It's caused by excessive wind and drought

Organic Control Mechanisms: Water the tree during droughts or times when there is a lot of wind

Marketing: Is there a market? Yes, since nurseries sell them, people must buy them.

To Whom: Direct Sale to Homeowners looking to have a slow to moderately growing tree in their yard with beautiful fall foliage

To Where: Direct sale off the farm or campus

When: In Spring, after the last frost.

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?

It's hard to say, when I started I was strongly against it but now I'm waning. So I'll break it down into pros and cons (also these pros and cons can be used for other ornamental trees that we might want to grow out and sale)

It's an easy tree that doesn't require a lot of maintenance. I feel there is a pretty ready market out there and I think we could sell any decent tree we grow so long as it's not more then 10 any given year. If we have a lot of extra space it could be beneficial. Price varies greatly but we're talking $25-60 and up for a well established sugar maple (low end

would be for a regular Sugar maple, $60 for an exceptional specimen of an exceptional cultivar.)

We're talking 25 square ft. minimum for an established tree. However we could grow them closer together when they're younger. With negligible space for there first year, 9 square ft. for 1-3 year olds, and then 25 sq ft. for 4-6 year olds. It would be 4-6 years for a single harvest, we could stager out harvests but that would take up more area. Also we could do bi-annual sales, and plant every other year.

There are many different models we could use but here's an example one: A bi-annual harvest staggered and spaced as mentioned above for the ten trees per harvest would take up about 350 ft. and bring in $250- $600+ dollars every other year during the spring when we wouldn't have any other income. Other models could include 5 trees every year, or just a few.

I think the question that needs to be asked is how much room would we be able to devote to this plant, and how does it's profitability per area compare with other plants. If we find our self with more room then we know what to do with then I say go for it. If another plant is more profitable for the area then we should perhaps go with that.

On a side note, I just looked it up and specific cultivars tend to be genetically copyrighted, we would have to look into which ones we could use.

Mushrooms:
Shittake, Oyster, and Portobello

Contributor: Ben Jordan and David Campbell
Date Submitted: April 13th, 2005
Revision Date: April 13th, 2005

Keywords: Shittake, Mushroom, Perennial

Abstract: Shittake (Lentinula edodes), Oyster (Pleurotus ostreatus), and Portobello (Agaricus brasiliensis) mushrooms are three varieties of mushrooms whose viability and suitability for both indoor and outdoor production, on organic substrates, suit themselves well to our farm. With an expected yield of between ½ - 1 lb. per cubic ft. of organic substrate, this product will yield 5-10 punds per 10 foot row outdoors, or per 6 ft. hanging bag indoors. Though delicate, well researched and careful cultivation will lead to a potentially profitable niche market.

Crop (Common Name & Botanical Name):	Shittake (Lentinula edodes) Oyster (Pleurotus ostreatus) Portobello (Agaricus brasiliensis)
Campus Expert & Contact Information:	David J. McLaughlin Curator of Fungi Bell Museum
Description:	Mushroom Perennial
Expected Rate of Growth:	4-6 weeks primary mycellial growth 2-4 weeks secondary fruiting body growth
Mature Height & Width:	3-7” width at cap ¼-1” width at stem 1-6” height
Immature Footprint:	0” above ground during primary mycellial growth. Outdoor rows for mycellial network will be 12”W x 8”D x 10ft. Wide Indoor bags will be 6 ft. tall and will be 14-16” in width
Mature Footprint:	see Mature Width and Height

Source of Spores and Tissue Samples:	A. Bell Museum Fungi Collection B. Forest Mushrooms (store bought)
Costs:	Spores from Bell Museum costs are still in negotiations, but will be negligible Store bought mushrooms will be between $5 - $10 for fresh samples (As a note, both varieties will be used in order to test theory about viability of sotre bought mushroom tissue samples that are cultured in potato dextrose agar into usable innoculant.
Planting, Maintenance & Harvest	
Male /Female Pollination Needs:	none
Cross Pollinator (variety if needed):	none
Time of Planting:	Initial tissue samples are taken in early April, in order to grow into viable mycellial network Stage 2 substrate is inoculated in jars in late April Final production substrates (bags and rows) are inoculated in mid-May, well after last potential frost for outdoor beds
Maintenance Needed:	Daily maintenance of initial tissue samples cultured in agar will be needed to fight off potential bacterial infections. Weekly maintenance and checking of humidity and temperature levels for inoculating substrates will be needed for 4 weeks during stage 2 Daily – Weekly maintenance of 1 hour will be needed for final production stages, to fight off bacterial infection, and check humidity and temperature levels. Potential administration of nutrient compound in final weeks may also be needed.
Time of Maintenance:	not specific (1 hour)

Harvestable Product: Mushrooms

Date of Harvest: Mid July - August

Estimate of Yield: 15-30 lbs - Outdoor
20-30 lbs - Indoor

Storage Conditions / Issues: Mushrooms sold wet must be stored in 40-60 Farenheit, in a sealed container. Must be sold within 10-14 days, depending on quality of packaging.

Mushrooms that go unsold for 10 days can be dried to extend sales period to 3 months

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	Petri dishes Potato Dextrose Agar Scalpel Laminar Flow Hood Autoclave Autoclave-able 30 - 50 oz. Jars Autoclave-able 2 – 5 L bags Softwood Organic Substrate Manure Organic Substrate Vermiculite Reflective Row Covers and Tarps	$0 – Horticulture, Agronomy (if not, estimated cost for 3 outdoor rows and 6 indoor bags is $200, less autoclaves and hoods)
@ Crop Maintenance	Water	
@ Harvest	Knives, Cooler	

Does the crop require irrigation? No

Human Resources (estimate)

Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				20	20	-	-	-				
Maintenance				10	10	20	20	20				
Harvesting				-	-	-	20	20				

Most Common Pests & Diseases

Disease:	Bacterial Infection (various)
Symptoms:	On Fruiting Body: bluing of caps and stems, reduced yield
	In Mycelium: bluing of external faces
Organic Control Mechanisms:	Manual removal via scalpel, cauterization, and isolation
Disease:	Molds (various)
Symptoms:	On Fruiting Body: white, yellow, brown fuzz, reduced yield
	In Mycellium: white, yellow, brown fuzz
Organic Control Mechanisms:	Manual removal with scalpel, cauterization & isolation
Pest:	Phorid, Sciarid and Ceciomyiid flies
Symptoms:	Cross infection, reduced yield
Organic Control Mechanisms:	Use of insect parasitic nematodes, including tylenchid and rhabditid

Conclusion:

Yes, this is a great crop. While it is potentially risky to grow if the expenses would have to be taken by the farm, due to our access to these resources, it makes it viable. The research opportunity is very promising, and the niche market is extremely profitable. In addition, the labor for the mushrooms is already covered for the summer, as the reviewer (Ben Jordan) is interning for this work.

Peanut

Contributor: Jared Ashling
Date Submitted: March 30, 2005

Keywords: Peanut production

Abstract: An investigation of peanut production potential for the student farm

Crop: Peanut
Description: Peanut is planted as an annual legume. It flowers continuously. Once the flower is pollinated, the petals fall off and the ovary starts to enlarge. The budding ovary grows a small stem which drops to the soil, and the embryo penetrates the soil, where the peanut starts to form. This process is called pegging.

Mature Height and Width: 3-4ft wide
Immature Foot Print: N/A
Mature Footprint: 3-4ft
Source of Seedlings: Seed Savers catalogue

Size and Cost: $500-600 an acre
Planting, Maintenance, Harvest
Time of Planting: Valencia varieties require only 95 to 100 days to reach maturity, while some of the Virginia, Spanish, and runner market types need 140 days or more. Optimum planting date is generally determined by soil temperatures above 60°F for five or more days in succession
Maintenance needed: Approximately three months before planting, fields should be plowed as deep as necessary to turn under all surface residues. Valencia peanut varieties are typically planted at 75 to 100 lb/A. Lower seeding rates are more commonly used on single-row beds, while the higher rates are used on double-row plantings. Plant populations vary from 60,000 to 80,000 plants per acre
Time of Maintenance: Before pegging, an application of lime will double the yield.
Harvestable Product: Peanut pod with nuts
Time of Harvest: in fall, after frost
Estimated of Yield: 430-2117 pounds per acre
Storage Conditions/Issues: unsure

Equipment Needs and Costs

At planting: none, planting can be done by hand or machine

For Maintenance: hand weeding, application of fertilizer or lime by machine

At Harvest: special harvest equipment required, dirt must also be separated from seeds, and seeds must be dried.

Irrigation:
Stage (duration of stage) irrigation requirements
Germination (1-2 weeks); needs irrigation
Early growth (5-6 weeks) ; does not need irrigation
Nut development (8-9 weeks) needs irrigation
Maturation (5-6 weeks) needs some irrigation

Planting Date: when soil temp reaches 60 degrees F
Maintenance Date: Depends on pegging date
Harvest Date: after frost (as late as possible, peanuts need a long season)

Most common pest and diseases
Pests: Thrips, usually within the first 6-8 weeks
Symptoms: Crinkling of leaves, stunting of plant growth
Organic control methods: under favorable conditions, plant can outgrow damage

Pest: Potato leaf hopper
Symptoms: injured leaves turn yellow-brown and curl downward, June-August
Organic controls:

Pest: Southern Corn Rootworm (immature stage of the spotted cucumber beetle)
Symptoms: feeding on pegs and peanut under soil
Organic controls: identification and removal of adults

Pest: Spider mites
Symptoms: foliage turns brown and drops off
Organic controls: increase beneficial insects,. Avoid mowing grassy areas near fields

Disease: Peanut is susceptible to fungus and disease; Southern Stem Rot, Rhizoctonia pod and limb rot, Sclerotinia blight, Cercospora leaf spot, and nematode damage.
Symptoms:
Organic Control Mechanism: Best non-chemical way to control these disease and fungus problems are a 4 year rotation, sanitation of plant residual materials

Conclusion

The peanut may not be the best plant for large scale production on the student farm. It needs long seasons, and is very sensitive to soil conditions, fungus, and disease. There has not been much research about peanut production in Minnesota, and it is not currently being grown here on any large scale. It is possible to do small scale novelty production of various peanut varieties. The Seed Savers yearbook offers a number of varieties (even a maroon and yellow one) that could possibly bring in a premium price.

Sources:

Virginia Agricultural Experiment Station, 2005 Peanut Production Guide
http://www.vaes.vt.edu/tidewater/peanut/

Purdue University, Alternative Field Crop Manual, Peanut
http://www.hort.purdue.edu/newcrop/afcm/peanut.html

Pear

Contributor: Michelle Grabowski
Date Submitted: March 31, 2005
Revision Date: March 31, 2005

Keywords: pear, tree, fruit

Abstract: Pears are a tree fruit better suited to warmer climates. Although some varieties do grow this far north, their fruit is not very marketable and the lack of hardy dwarf root stocks makes them very large plants.

Investigate Perennials:

Crop (Common Name & Botanical Name): Pear, Pyrus communis

Campus Expert & Contact Information: Dr. Emily Hoover – Dept. of Horticulture

1. Description: woody tree

Mature Height & Width: 20-30 ft tall depending on rootstock, most dwarf rootstocks are not hardy in MN

Immature Footprint: depends on age

Mature Footprint: 140-200 sq ft

2. Source of seedling, cuttings, plants, etc: Possibly Minnesota Landscape Arboretum or Department of Horticulture

Size & Cost:

3. Planting, Maintenance & Harvest
Site – prefers a sheltered site with no wind but not a cold pocket. Needs 3/4 day sunlight
Male /Female Pollination Needs: none

Cross Pollinator (variety if needed): Must have 2 different cultivars for pollination

Time of Planting: bare root should be planted just after frost, potted plants can be transplanted throughout summer

Maintenance needed: young trees should be staked and pruned, Tree must be pruned every year, weeding 18” around trunk
Time of Maintenance: while dormant in late spring
Harvestable product (What & How long before production begins?): pears
Time of Harvest: Fruit will not ripen on tree, pick when fruit feels waxy and lenticels have turned brown.
Estimate of Yield:
Storage Conditions / Issues: Fruit must be kept refrigerated to 40F away from other produce with strong smells.

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	shovels	Free - agronomy
@ Crop Maintenance	Pruning sheers	Free - horticulture
@ Harvest	Ladders and baskets	?

Does the crop require irrigation?

Human Resources (estimate)
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting						1-2 hr/ plant						
Maintenance			Prune 1 hr/plant	Weed 15 min/ plant	Weed 15 min/ plant	Weed 15 min/plant	Weed 15 min/plant	Weed 15 min/plant				
Harvesting												

3 Most Common Pests & Diseases
Disease: Fireblight
Symptoms:
Organic Control Mechanisms: prune 12” below infection, sterilize tools between cuts, do not over fertilize

Disease: Pear Scab
Symptoms: olive colored spots on leaves and twigs early in season, darken and turn corky with age
Organic Control Mechanisms: Rake up leaves in fall and destroy, use organic fungicidal at 1/4-1/2” leaf stage

Disease: sooty bloch, fly speck
Symptoms: small dots or smudges on fruit
Organic Control Mechanisms: promote good air circulation around plant, destroy pruned twigs, don’t plant near brambles

Pest: many including codling moth, plum curlicu, apple maggot
Symptoms:
Organic Control Mechanisms: not severe in MN, monitor use organic spray and phermone traps if needed

Marketing: Is there a market? Unlikely many MN pears are small and hard we may convince people to buy them at farmers markets and through CSA
To Whom:
To Where:
When:

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?

Pears prefer to grow in zone 5 and can be grown in good spots in zone 4b. The twin cities campus is in zone 4a. There are cultivars that will grow in this zone and even colder. The fruit of these trees is small, hard, and of questionable marketability and edibility in some cases. Many are ornamental. The trees grow very large and 2 cultivars are needed to produce fruit. I feel that the fruit produced by pear trees would not justify the large space they would take from the farm.

References:

Roper, T.R., Mahr, D.L., and McManus, P.S. (2005) Growing Pears in Wisconsin. Retrieved March 30, 2005 from cecommerce.uwex.edu/pdfs/A2072.PDF

Foulk, D. and Hoover, E. (2003) Growing apples and pears in Minnesota home gardens. Retrieved March 30, 2005 from www.extension.umn.edu/distribution/horticulture/applepear.html

Plum

Contributor: Andy Kranz McGuire
Date Submitted: April 5, 2005

Keywords: plum, perennial, fruit tree

Abstract: The results of a preliminary investigation of plum propagation for the student farm.

Crop: Plum, Prunus spp.

Some hardy varieties:
-Alderman – Horizontal branching habit, one of Bud's favorites.
-Pembina
-Pipestone
-Waneta – Early ripening fruit (early August).
-Mount Royal – The hardiest of European plums available, said to survive no further north than the Twin cities.

Plums require pollen from an alternative variety growing within 100 yards.
Some options for pollen sources are:
-Compass
-South Dakota
-Toka – Said to be the best of the pollenizers and has good fruit in its own right.
-Underwood – Among the earliest fruit setters (early August); said to be a high-quality and very hardy.

*DISCLAIMER: The following information is specific to the Alderman plum, although much of the information applies to other varieties.

Description: Woody perennial, edible-fruit bearing tree.
Form / Habit: Small tree, "round headed and spreading"
Mature Height: 12-15' Width: 15-18'

Time of Planting: Bare-root plants should be planted in early spring, after the ground is workable but before the weather warms. Bare-root plants should be dormant at planting time.
Potted plants can be planted any time during the growing season and may be leafed out at planting time.
Maintenance needed: Both bare-root and potted plants need regular watering the first year.
Harvestable product: The fruit is clingstone (flesh sticks/clings to pit/stone) and oval to heart-shaped. Average fruit size

is 1 to 2 inches in diameter and 2 inches in length. The skin is burgundy-red and smooth and has little or no bloom. The flesh, which is bright golden-yellow, is sweet, juicy, and moderately soft. Fresh fruit quality is excellent, being notably sweeter than other cultivars commonly grown in the north-central United States. The fruit also can be used for preserves. Trees are precocious, bearing fruit as early as one year after planting.
Time of Harvest: Mid- to late August.
Storage Conditions / Issues: Refrigerate stone fruits promptly after harvest in perforated plastic bags or loosely covered containers. Keep the refrigerator at a temperature of 32-40°F. Cherries will keep only 3-5 days, while plums will keep 3-5 weeks when promptly refrigerated.
Irrigation: Regularly during the first year, after planting.

*Pest and disease information below applies to all the hardy plum varieties.

Pest: PLUM CURCULIO
Symptoms: In spring, adults feed on buds, blossoms, leaves and new fruits. Feeding scars appear as shallow cavities on the fruit surface. The major injury occurs from the laying of eggs by the curculios (weevils). A small cavity is made in the fruit for the egg; then a crescent-shaped cut is made adjacent to the egg pocket. The early feeding and egg-laying punctures can cause marked scarring and malformation of the fruit. Early feeding on the surface of peaches often causes severely deformed fruits known as “cat-faced” peaches.
Larvae hatching from the eggs feed inside the fruit until they are fully grown. On some fruits, few if any of the young larvae survive to maturity if the fruits continue to grow on the tree.
The mechanical injury by adults in feeding and egg deposition can cause premature fruit drop. When the summer brood of adults appears, feeding cavities again can be found on the fruits.
Organic Control Mechanisms: Mechanical control, by jarring the sluggish beetles from trees in the morning and capturing them on sheets, was an early method of control, and can still be practical today on a small scale. Natural control of the curculio results from winter mortality, attacks by birds and other predators, and from parasites. Pick up fallen fruit two to three times a week, put it in a plastic bag, tie it tightly and place it in the trash can. This will help keep larvae in fallen fruit from developing in the soil and, if done regularly, should lessen the damage done by this insect.

Pest: PEACHTREE BORER
Symptoms: The peachtree borer attacks healthy bark near the soil line, usually just below the ground line or in the lower 30 cm (12 inches) of the trunk. (Fig.1.) Borers can kill young trees when trunks are girdled by feeding. Borers feed on the growing inner bark of trees, and tunnel between the inner bark and the sapwood. The bark eventually peels off of damaged areas. Damage weakens the tree and predisposes it to attack by other pests and diseases. A gummy mass mixed with sawdust is usually found on the outer bark at the place where a borer started an attack. Entries are often found where there are cankers or wounds caused by other factors such as winter injury.
Organic Control Mechanisms: Natural control - Ants, spiders, and lacewings prey on larvae in exposed locations, and birds feed on larvae and adults. These natural enemies are not capable of adequately controlling borers.
Mechanical control - In the spring at the time buds are bursting, insert a knife or wire into holes that indicate where borers are located, with the intention of smashing the larvae. This can also be done in late fall.

Pest: BIRDS and SQUIRRELS
Bud says these are the biggest problems with his own plum tree.

Disease: BLACK KNOT
Symptoms: Slight swellings or cracks in the outer bark. Bark ruptures and a light yellowish growth fills the crevices of the swollen area. A velvety, olive green layer of spores covers the knots.
Organic Control Mechanisms: Application of lime sulfur or Bordeaux mixture after pruning may help reduce the number of new infections (Organic?)

Disease: BROWN ROT
Symptoms: Flowers and/or fruit turn brown. Fruit may shrivel and drop from the tree.
Organic Control Mechanisms: Avoid wounding the fruit during the growing season. Remove and destroy all infected plant material, including fallen fruit.

Disease: PLUM POCKETS
Symptoms: small, white blisters on immature fruit; blisters enlarge as the fruit develops and soon encompass the entire fruit; Infected fruit becomes abnormally large (3-4 times its normal size), misshapen, and bladder- like with a thick, spongy flesh;
Organic Control Mechanisms: Removal of infected fruit will help reduce the number of these spores. If infection has been severe in past years, plum pockets may be controlled by a single spray of lime sulfur or Bordeaux mixture applied before the buds swell in early spring (Organic?)

Marketing: Plums are delicious, they sell to the coops and farmers markets.

Conclusion: Planting one (+ pollenizer) or more varieties of plum would be a good crop because it is recommended for the home gardener and small scale producer (that's us). Further details on organic control of pest and disease may be found at http://www.attra.org/ by searching for "plum."

References:

Communication and Educational Technology Services, University of Minnesota Extension Service. (2005). Alderman Plum. Retrieved March 28, 2005, from http://www.extension.umn.edu/distribution/horticulture/DG2704.html

Foulk, Doug S. (2003). Edible Plums for Minnesota Home Gardens. Retrieved March 28, 2005, from http://www.extension.umn.edu/yardandgarden/YGLNews/YGLN-May1503.html#plums

Foulk, Doug and Emily Hoover. (1997). Growing Stone Fruits in Minnesota Home Gardens. Retrieved March 28, 2005, from http://www.extension.umn.edu/distribution/horticulture/DG1125.html

Raspberries

Contributor: Megan Kranz McGuire
Date Submitted: April 6, 2005

Keywords: perennials, raspberries, blackberries

Abstract:

Information on the requirements of growing raspberries, potential markets, diseases and pests.

Crop (Common Name & Botanical Name):
Raspberry (Rubus cariensis, Rubus idaeus, Rubus strigosus)
Black raspberry (Rubus leucodermis)
Blackberry (Rubus allegheniensis, Rubus fruticosus)
thimbleberry (Rubus parviflorus)

Contact on Campus: Emily Hoover, Horticulture Department

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit
Woody perennial, growth rate will be new canes each season as well as expanding root area if unchecked. Form is cane growing from root base in reds and yellow, though not blacks.

Mature Height & Width: Height 3-4'; Width: spreads

Immature Footprint: Red raspberries: plant 2 to 3 feet apart in rows six feet apart; maintain plants at twelve inches in width. Black raspberries should be planted 4 feet apart in row 8 feet apart.

Mature Footprint: Twelve inches per plant plus space between row, if planted in multiple rows.

Pollination: self-pollinating, insects help to pollinate

2. Source of seedling, cuttings, plants, etc: I could not find any organic raspberry plant supplier through a web search, though I am sure they must exist. Raspberries are easy to propagate by division, so if we can make a deal with someone who has some plants, we may be able to get them cheaply.

Size & Cost: $9/plant?

3. Planting, Maintenance & Harvest: "Composted manure is a good source of nutrients and can be incorporated prior to

planting at a rate of 3½ cu. feet/100 sq. feet, to improve soil structure and provide nutrients. On established plantings, apply the same rate for plant nutrition."

Time of Planting: Early spring

Maintenance needed: mulching, pruning, training

Time of Maintenance: pruning yearly, depends on type

Harvestable product (What & How long before production begins?): some berries fruit on second year canes, others on first year canes

Time of Harvest: summer or fall depending on variety

Estimate of Yield: 25 ft, one row wide can yield 2500 to 4000g

Storage Conditions / Issues: raspberries deteriorate quickly. They can be frozen or refrigerated to prolong life. "Raspberries are not stored commercially. If held at all, as for day or two, they should be kept at 31 to 32F, and high humidity, 90 to 95%." (Food Resource)

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	shovels	Minimal/borrowed
@ Crop Maintenance	pruners	"
@ Harvest	buckets	"

Does the crop require irrigation? Maybe. Sandy soils require watering, and raspberries have shallow roots (top 2 feet of soil), so they may require watering.

Human Resources

Enterprise / Calendar Matrix: (Worksheet 2.7)

This really depends on which variety we plant and how many. The varieties vary so widely in pruning requirements and harvesting times. I will just assume, for example, a variety that bears fruit July through September and needs pruning in March. Times are per plant

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				.5hr								
Maintenance			.25									
Harvesting							2-6?	2-6	2-6			

3 Most Common Pests & Diseases

Organic Control Measure for all diseases and insects:

"Good cultural practices will usually reduce insect and disease problems, as healthy canes recover rapidly. A number of insect pests induce wilting of the cane, either at the tip or the entire cane. Removal and disposal of infested canes is sufficient control in most instances. Picnic beetles, also called sap beetles, can become a severe nuisance soon after berries begin to ripen. They are attracted to all types of overripe fruit. Frequent picking will help reduce the amount of overripe fruit and decrease the area's attractiveness to the beetles.

A limited number of diseases affect raspberries. Cultural practices that limit the spread of diseases include planting certified disease-free plants, destroying wild or abandoned brambles near the garden, and removing weak and diseased plants in established plantings. After harvest, remove and destroy canes that have fruited or are weak; improve air circulation by proper thinning and pruning and by controlling weeds." (Behrendt)

Fungal and Bacterial Diseases:

anthracnose

Symptoms: "In late spring, red-purple oval lesions appear on the primocanes. The center of these lesions later turns pale brown to ash gray, while the margins become raised and purple. Lesions usually girdle the cane causing it to die, dry, and crack. Infected primocanes that survive winter usually produce irregular, lateral branching and irregular fruit." (Behrendt)

Surviving canes may also suffer tip dieback.

Organic Control Mechanisms: A dormant season application of lime sulfur can be applied in early spring as the buds begin to swell, but before leaves appear. I'm not sure if this is organic, but the other suggestion was fungicide.

spur blight
Symptoms: "Infected primocane leaves develop a brown 'V' shaped lesion with yellow borders, and even tually fall from the plant." (Behrendt)

Cane blight
Symptoms: "Visual symptoms are typically expressed the following spring as lesions on the floricanes. These lesions appear black, brown, or gray and contain black pimple-like pycnidia. Lesions often extend through several internodes on one side of the cane. Infected canes tend to be brittle and often break near the lesion. Cane blight causes wilting, death of axillary buds and lateral branches, and death of the cane." (Behrendt)
Organic Control Mechanisms:

Gray Mold
Symptoms: "Blossom blight and fruit rot. Gray mold can also infect senescing leaves and canes. Infection typically begins on young flowers, but quickly spreads to fruit during cool, wet weather." (Behrendt)
Organic Control Mechanisms:

Disease: Raspberry mosaic disease
Symptoms: typically causes yellow-green leaf mottling, leaf blistering, leaf tip browning, and/or stunting.
Organic Control Mechanisms:

Disease: Raspberry leaf curl virus
Symptoms: typically causes curling and distortion of dark green leaves. Infected plants appear stunted and contain

excessive branching.
Organic Control Mechanisms:

Marketing: Is there a market? Yes, stores often sell raspberries shipped from California.
To Whom: the CSA or farmer's markets or local coops or local restaurant, such as the Ecopolitan
To Where: local places because shipping would be very tricky
When: summer or fall—very shortly after picking

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?
Raspberries have much potential. Their height may shade other crops, however. Black raspberries may be a better choice because they require less maintenance since they do not spread through root growth, choking out other plants. Also, they are less frequently grown, so perhaps we could find a niche market. Perhaps local restaurants would buy unusual organic berries for pies or fruit dishes.

References:

More information on planting, pruning, watering, etc:
http://www.farminfo.org/orchard/raspberry-m.htm

"Organic Methods of Raspberry Production and Root Rot Control"
http://agsyst.wsu.edu/RaspberryReport2001.pdf

Hoover, Emily. "Raspberries for the Home Garden" http://www.extension.umn.edu/distribution/horticulture/DG1108.html

Oregon State. Food Resource
http://food.oregonstate.edu/faq/uffva/raspberry3.html

Behrendt, Chad J. "Raspberry Diseases"
http://www.extension.umn.edu/distribution/horticulture/DG1152.html

Perennial Investigation Rhubarb

Contributor: Charlie Wamstad
Co-Contributors: Date Submitted March 30, 2005
Revision Date: April 6, 2005

Keywords: perennial, Rhubarb, investigation

Abstract: This is an investigation or Rhubarb as a perennial species to be used in the student farm.

Crop (Common Name & Botanical Name): Rhubarb (Rheum)

Campus Expert & Contact Information: Janna Beckerman
Extension Plant Pathologist

1. Description: Type (woody or herbaceous perennial, annual, etc.), expected rate of growth, Form / Habit
Herbaceous perennial continuous growth from April to September, plant in a Basel rosette, hardy plant grows in most soils and extreme weather conditions.
Mature Height & Width: 2-3 feet tall and up to 4 feet in diameter

Immature Footprint: 1 foot by 1 foot

Mature Footprint: 4 feet in diameter

2. Source of seedling, cuttings, plants, etc: plant separations or Daisy Farms 28355 M-152 Dowagiac, MI 490047 1-269-782-6321

Size & Cost: 6-12$ per plant

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: none

Cross Pollinator (variety if needed): none

Time of Planting: spring
Time of Maintenance: Trimming of seed pods 5 min
Harvestable product (What & How long before production begins?): 1 year
Time of Harvest: spring, early summer

Estimate of Yield: variable depending on age and conditions 25 to 50 stems per year
Storage Conditions / Issues: fresh product refrigerate for a few weeks

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	shovel	20$
@ Crop Maintenance	Knife	5$
@ Harvest	Knife	

Does the crop require irrigation? No

Human Resources (estimate) variable on plant numbers
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting				X	X							
Maintenance				x	x	x	x	x	x			
Harvesting				x	x	x	x	x	x			

Most Common Pests & Diseases: Rhubarb is generally never affected by pests or diseases

Disease: Leaf Spots
Symptoms: yellow green or red spots on leaves, doesn't affect vegetable quality
Organic Control Mechanisms: Select and plant healthy propagation stock in sunny, well-drained, fertile soil. Maintain good weed control. Fertilize heavily in spring to promote rapid growth and less in the fall following harvest. Remove infected leaves as soon as disease appears and destroy all plant debris following the first frost.

Marketing: Is there a market? Yes
To Whom: Farmers markets and Co-ops

To Where:
When: spring and summer

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not? Yes, because this is a very hardy low input perennial that we can harvest for most of the growing season. People also like rhubarb for cooking and freezing to make desserts.

References:

The Rhubarb Compendium. September 1, 2004. Retrieved March 30, 2005 from www.rhubarbinfo.com

Daisy Farm. (2005). Retrieved April 6, 2005 from www.daisyfarm.net

Sunchoke

Contributor: Michelle Grabowski
Date Submitted: March 31, 2005
Revision Date: March 31, 2005

Keywords: Sunchoke, Jerusalem artichoke, beneficial insect, tuber, flower

Abstract: Sunchokes are an easy to care for native herb that will bring beneficial insects to our garden and provide marketable flowers and tubers.

Investigate Perennials:

Crop (Common Name & Botanical Name): Sunchoke, Helianthus tuberosus

Campus Expert & Contact Information: ?

1. Description: Perennial Herbaceous flower with tuber like roots

Mature Height & Width: Can get 10ft tall and 10ft wide without pruning

Immature Footprint: 1 ft x 1 ft

Mature Footprint: 10 ft x 10 ft without pruning

2. Source of seedling, cuttings, plants, etc: Johnny's seeds carries these as well as several others, Harmony Valley Farms in Viroqua, WI produces these for their CSA and could be approached for a small donation of tubers.

Size & Cost:

3. Planting, Maintenance & Harvest
Male /Female Pollination Needs: none

Cross Pollinator (variety if needed): none

Time of Planting: spring right after frost or fall after first frost, once planted do not need to replant every year, simply leave a few root pieces in the soil when harvesting.
Maintenance needed: stake if want to maintain full height or cut back to height desired, harvest roots each year from outside of bed in to prevent plant from spreading across garden
Time of Maintenance:
Harvestable product (What & How long before production begins?): harvest root tubers after one full growing season. Flowers can be sold as cut flowers as well. Will flower the first season.
Time of Harvest: Harvest 2 weeks after flowers have faded, can leave in ground and harvest as ground thaws in spring. Frost is said to improve flavor of root tubers
Estimate of Yield: 2-5lbs per plant
Storage Conditions / Issues: best to leave tubers in ground until needed, refrigerate once harvested.

Equipment Needs & Costs:

	Equipment Needs	Equipment Costs
@ Planting	shovel	Free - agronomy
@ Crop Maintenance	Flower shears	Free - horticulture
@ Harvest	Shovel, totes	Free- agronomy

Does the crop require irrigation? No

Human Resources (estimate)
Enterprise / Calendar Matrix: (Worksheet 2.7)

Enterprise / Task	Hours / Month											
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec
Planting					5 min/ plant							
Maintenance												
Harvesting				30 min/ plant								

3 Most Common Pests & Diseases
none known

Marketing: Is there a market? Yes
To Whom: Mississippi Market other coops
To Where:
When: These may take some education to sell, many people will not recognize them. I have seen them sold early spring in local food coops so there is some information out there. They are easy to cook and a familiar taste (somewhere between potato and water chestnut) and customers should catch on quickly. Flowers may also be a marketable summer product.

Conclusion of use on Student Farm: Is this a good potential crop? Why? Why not?
Sunchokes would be an excellent choice for the student farm. These plants are natives, easy to maintain, and handle all kinds of environmental conditions. The flowers draw beneficial insects to the garden and are marketable. The tubers provide fresh produce first thing in the spring or late in the fall so we can choose when to market them.

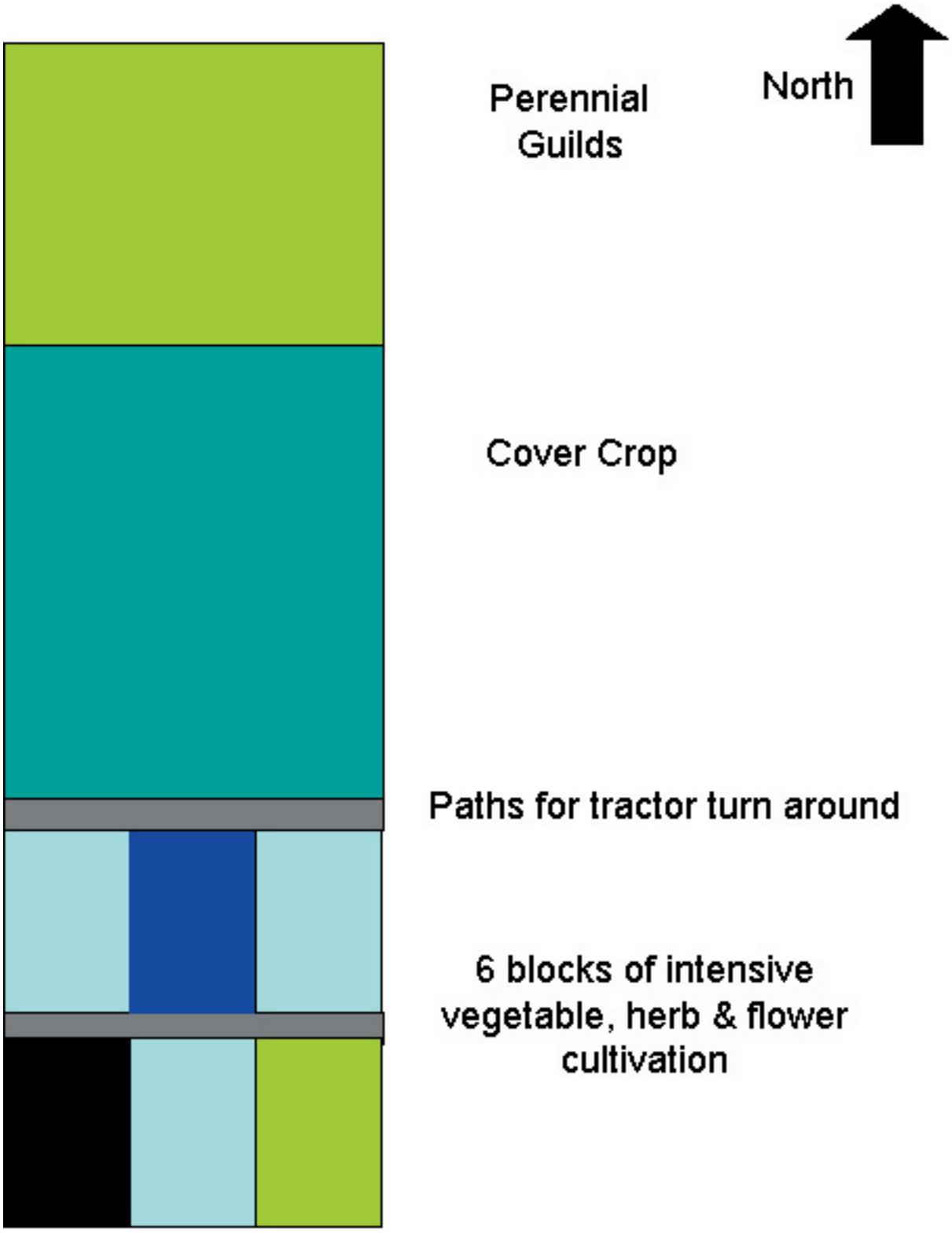
References:
Floridata marketplace (2003) Floridata: Helianthus tuberus. Retrieved March 30, 2005 from www.floridata.com/ref/h/heli_tub.cfm

FARM LAYOUT

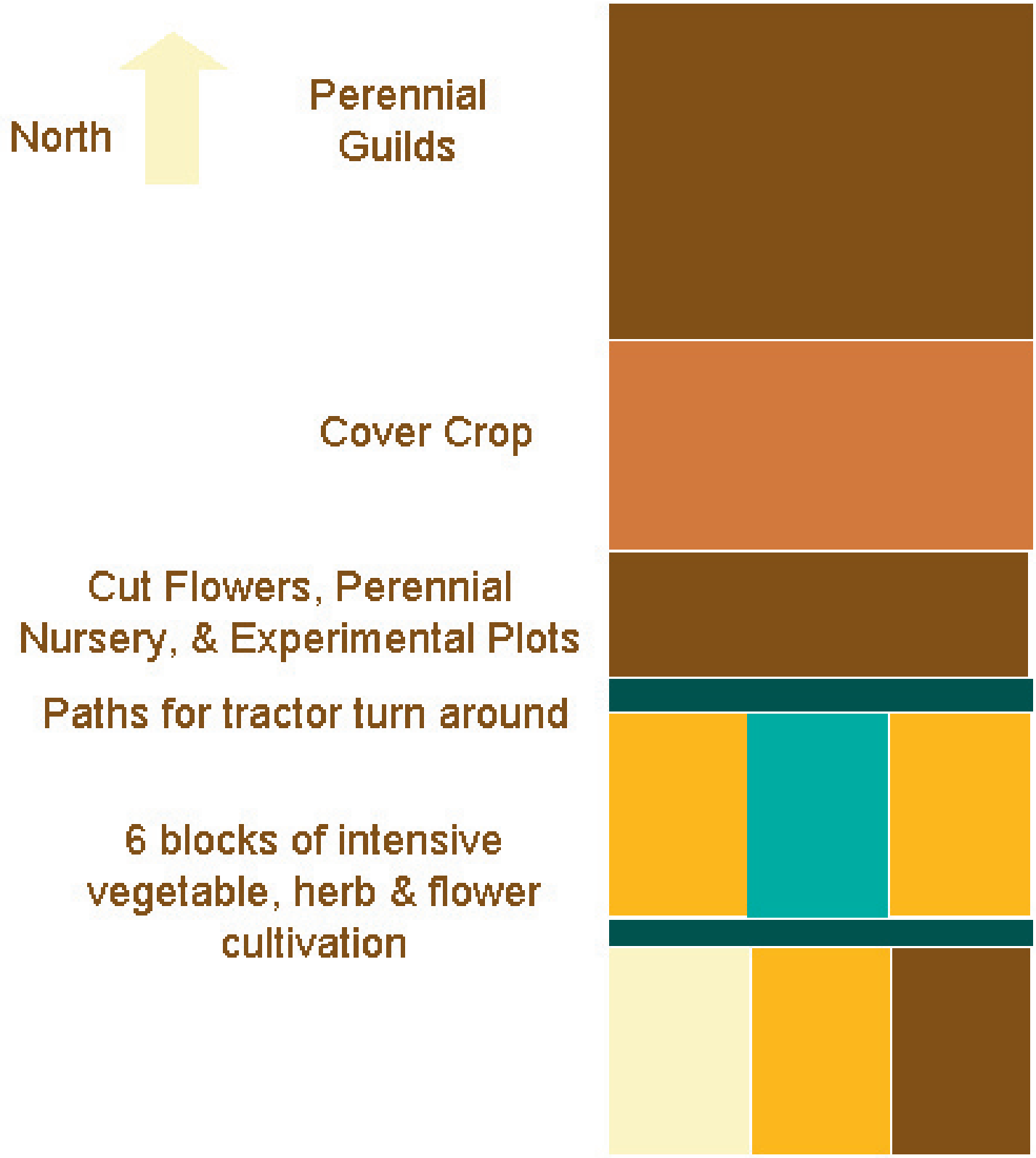
This Section Contains: Page

Plot Layout

Original Layout from Spring 2005 Class

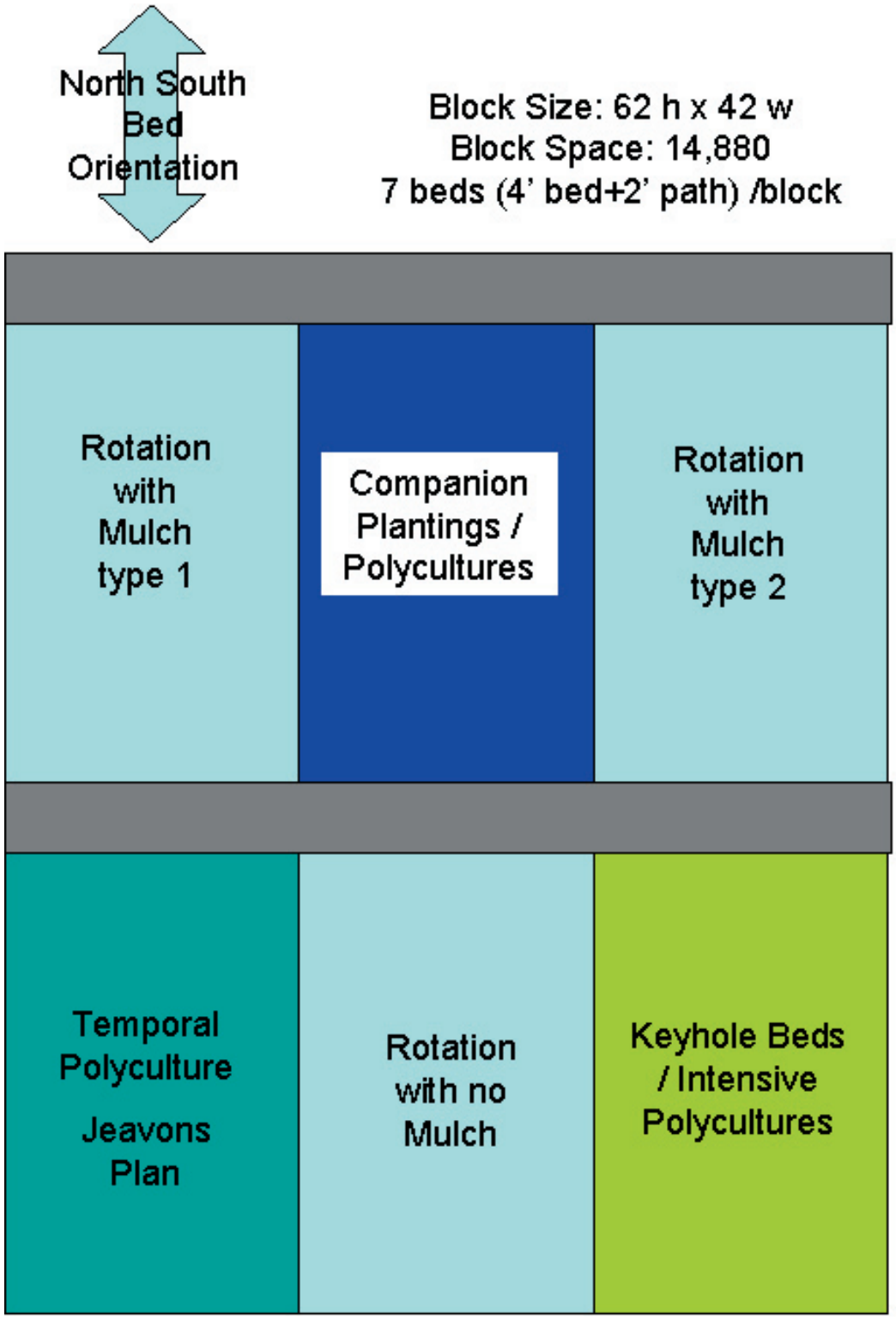


Summer 2005 Actual Farm Layout



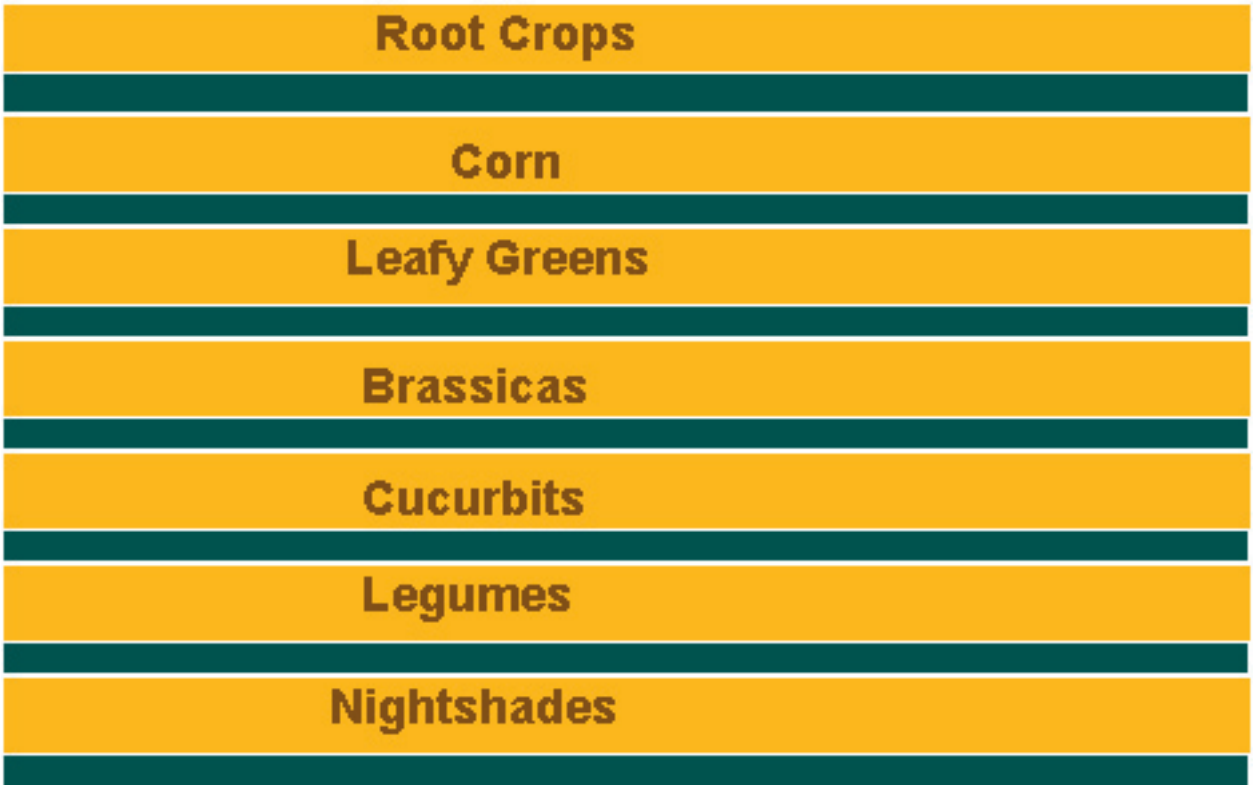
Block Layout

Spring 2005



Monoculture Block Layout

Based on Eliot Coleman's New Organic Grower Crop Rotation



Keyhole Gardens

Contributor: Seth Zeigler
Date Submitted: May 2, 2005
Revision Date:

Keywords: Keyhole Garden, polyculture, mandala companion planting,

Keyhole gardening is a system of polyculture that offers numerous benefits but is relatively little known or used, and thus it is a perfect subject of study, comparison, and evaluation on the student farm.

Keyhole gardens are named such because in their most simple design they are round with one path leading from the perimeter to a slightly enlarged open center. The major goal of this layout is to minimize walking areas and maximize growing areas, and the keyhole name alludes to the fact that from above this design looks like the metal keyhole plate on a door. The access trail typically enters from the south so as to admit sunlight and good ventilation, and all pathways can range anywhere from one to one and a half meters, depending upon traffic. Keyhole gardens can be adapted to cover larger areas by utilizing the mandala pattern, which adapts to a larger diameter keyhole garden by including a ring of trail between the outer edge and the central hub. Additional widened areas may be scattered along this ring and the periphery to further increase access in an even larger keyhole garden. Keyhole gardens may also have more unusual shapes, like that of a tree, that allow them to fill areas available or are more appealing to gardeners and visitors, possibly even harboring little hideaways for study or being designed as a labyrinth with an elusive but tranquil heart used for mediation and reflection. Bud had a great sketch of this.

Keyhole gardens attempt to more closely emulate natural communities, and thus they host a number of plants that ideally interact synergetically and replicate a succession throughout the growing season. This salmagundi can also help confound pests, which are already somewhat deterred by far more random planting patterns than the typical row system. These synergies can be physical, as in the case of sage, sunflowers, and corn protecting delicate greens from intense evening heat, or chemical, as in the case of aromatics protecting their neighbors from pests.

The keyhole garden layout accepted for the far southeast student farm plot of approximately 42 by 65 feet includes five individual keyhole gardens. The space between these may be utilized for such things as keyhole protectors, like sunchokes on the northwest sides, for flowers, for composting, or simply reduced to insignificance by modifying the shape of each keyhole garden to be a rounded rectangle. The largest of these two keyhole gardens will be identical in dimensions at approximately 31 feet in diameter and thus the only two mandala type keyhole gardens. They will be oriented on the east end of the plot, one directly north of the other and with three feet of trail between them at their closest point. They will receive identical care other than planting and harvesting, and one will demonstrate Jajarkot's system and

the other Ianto's. Both of these are recommended by Gaia's Garden and have supposedly proven themselves well, so we will determine how transferable they are to our area.

Ianto's system is the simpler of the two, and begins two weeks prior to the last frost with the greenhouse planting of cabbages. After the last frost radish, dill, parsnip, calendula, and lettuce are directly seeded into the garden. Whenever seeding multiple species or even varieties at once it is important to first use the appropriate fraction of the recommended seeding rate (five varieties here so one fifth if a one to one ratio of all is desired) and second to seed each independently. If the seeds are mixed first and then applied the most aerodynamic and dense will end up farthest from the seeder and the garden will be stratified, despite the attempt for a polyculture. This should equate to one seed every few inches. Beginning in the fourth week, the radishes can be pulled and replaced with cabbage. By the sixth week caretakers can start thinning the luscious lettuce, and they must be careful as always when keyhole gardening to pull the roots while harvesting to ensure that it truly is thinning and making room for the expansion of remaining plants and incorporation of new ones. Once the soil reaches 60^ F some of this removed lettuce can be replaced with bush beans, garlic, and even buckwheat, which is grown for its greens.

Jajarkot's system is similar, but starts in the greenhouse with not just cabbage, but also cauliflower and broccoli. After the last frost mustard greens, arugula, purslane, shiso, buckwheat, radishes, chard, lettuce, carrots, fennel, dill, coriander, onions, leeks, garlic, chives, fava beans, and bush peas are all planted. Obviously, some of these may easily be one foot or greater from their nearest kin. Starting as early as the second week, some of these may be thinned and replaced with the greenhouse starts, which are spaced approximately eighteen inches from each other. Finally, once the soil temperature reaches 60^F, bush beans and basil may be thrown into the mix.

Directly west of the path between these two will be a smaller (~ 15 feet in diameter but possibly rather ovate) keyhole garden with a single path and hub that will feature the native three systems polyculture of corn, beans, and squash. This system is begun by seeding three to four multi-staking corn seeds into holes about 3 feet apart. The corn is then hilled lightly as it grows to conserve moisture and capture solar warmth. After about two weeks two or three bush bean seeds are added to each hill and vining squash seeds are planted between them. If we wish we could also experiment with an early groundcover that these would replace, like greens, or simply wait to hand dig the rye or other fall and winter cover crop until necessary.

The remaining two keyhole gardens will also only feature a single entrance path and central hub, although they will necessarily be much more ovate and only nine feet across at their narrowest point but up to twenty two feet at their widest if the central keyhole is perfectly round. These two will compare some polyculture of our choosing, most likely including a gamut of nightshades in both and comparing the effects of various legumes by including them in one keyhole garden but not the other.

References:

Toby Hemmingway. Gaia's Garden: A Guide to Home-scale Permaculture . Chelsea Green Publishing, 2001.

Biointensive Polyculture

Contributor: Peter Gilitzer
Date Submitted: May 2nd, 2005
Revision Date:

Keywords: temporal polyculture, biointesive, John Jeavons

Abstract:

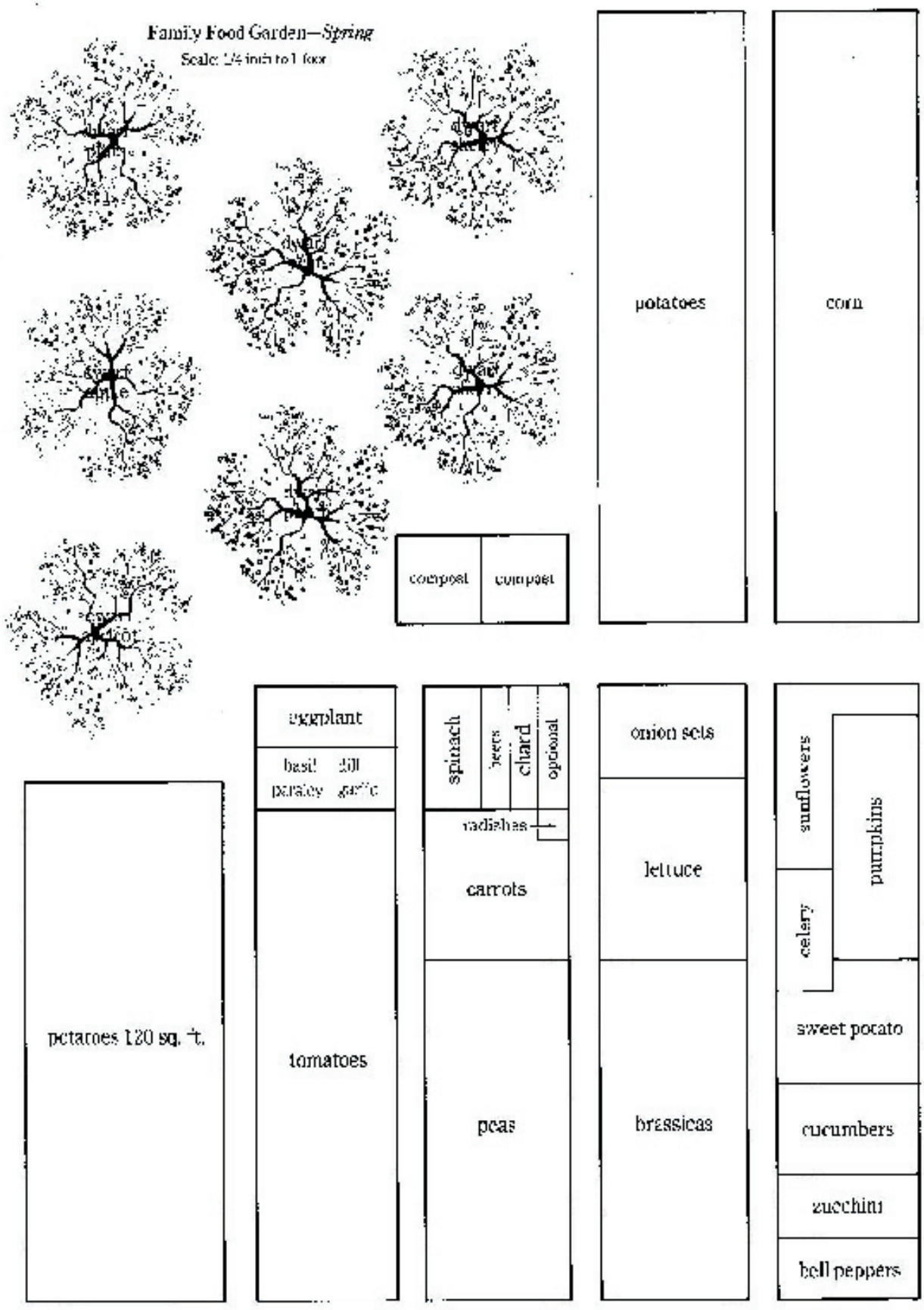
This serves as a recommendation to student farm interns for designing and managing a temporal polyculture system of production adapted from Jeavon's book, How to grow more vegetables.

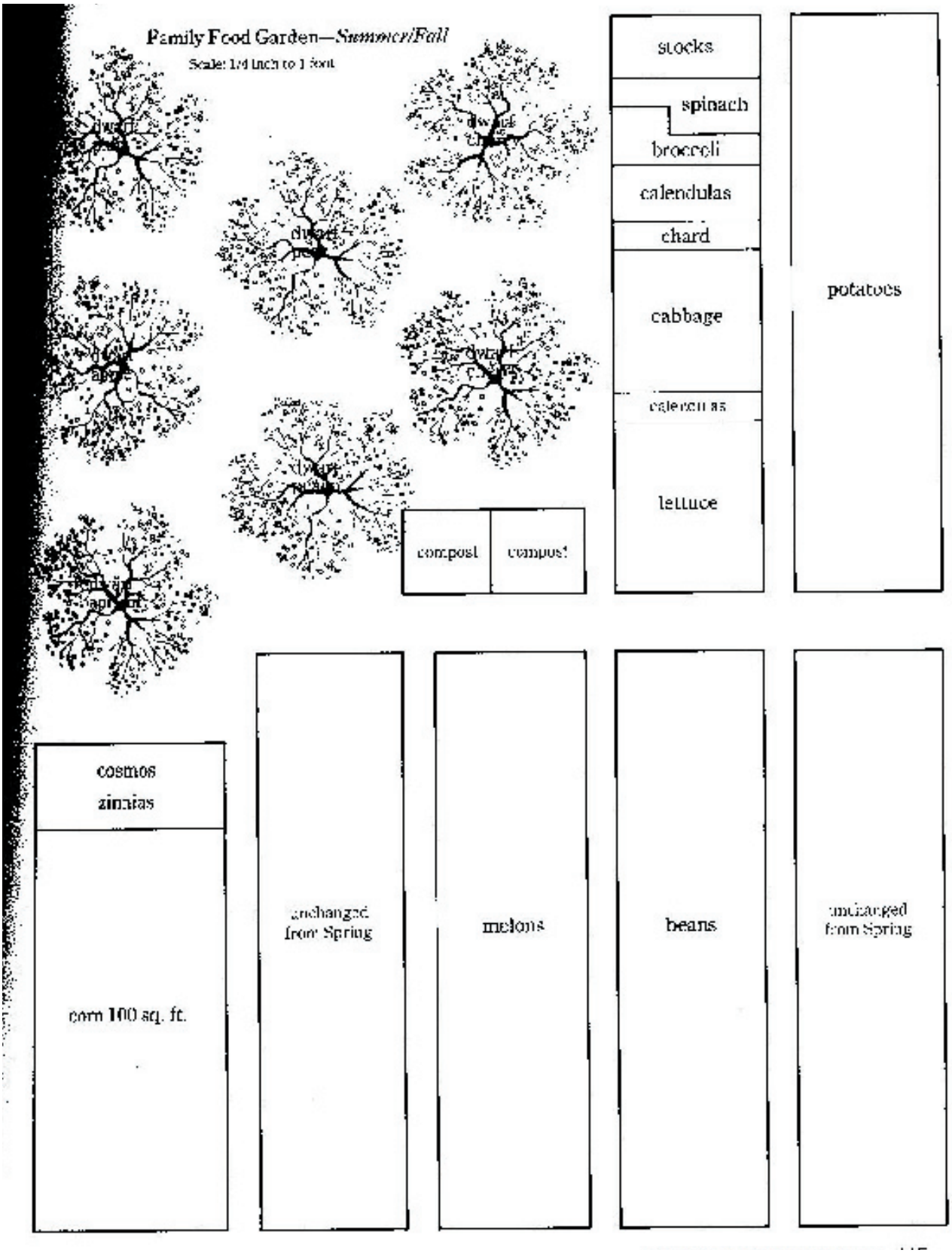
John Jeavons, an internationally known designer of small-scale, sustainable food production techniques, has developed a four person family food garden that combines elements of interplanting, companion planting and biointensive agricultural techniques. I believe Jeavon's plan would be a fascinating and educational model to implement on the student farm. His recommendations consist of specific instructions (seeds required, plant spacing and intensity, layout, timelines, etc.,) for designing and managing this production technique. I have adapted his recommendations to fit our space and made suggestions to fit the Minnesota growing season.

Jeavon's biointesive model uses less water, land and off-farm inputs, like fertilizers and machinery, to achieve the same yields and productivity used in a more conventional model. The model mimics natural ecosystems by intermingling crops that minimize competition and compliment one another in terms of sunlight exposure, nutrient needs, moisture levels and growing conditions. In addition, Jeavon's plan is an excellent model for the student farm because of the yield potential and space limitations. The model may also fulfill the student farm's guiding principle of providing an extension resource by demonstrating high-yield, low-input vegetable production techniques. The following pages provide detailed instructions, general principles of polyculture production and include a layout map that reworks Jeavon's model to fit the student farm plot.

References:

Jeavons, John. How To Grow More Vegetables. Ten Speed Press, 1991.


Family Food Garden—Spring
Scale: 1/4 inch to 1 foot
potatoes
corn
compost
compost
eggplant
basil dill
parsley garlic
tomatoes
spinach
beets
chard
optional
radishes
carrots
peas
onion sets
lettuce
brassicas
sunflowers
pumpkins
celery
sweet potato
cucumbers
zucchini
bell peppers
potatoes 120 sq. ft.


Family Food Garden—Summer/Fall
Scale: 1/4 inch to 1 foot
stocks
spinach
broccoli
calendulas
chard
cabbage
potatoes
lettuce
compost
compost
cosmos
zinnias
corn 100 sq. ft.
unchanged from Spring
melons
beans
unchanged from Spring

Companion Plot

Contributor: Michelle Grabowski
Date Submitted: April 28, 2005
Revision Date: April 28, 2005

Keywords: companion plant, field map, allies, enemies, intercrop, polyculture

Abstract:

Companion planting is an intercropping system that uses knowledge of plant growth requirements of different crops to create planting combinations that reduce competition, deter pests and pathogens, and encourage productivity of all plants in the bed. This polyculture system has great promise for organic agriculture, limited space gardening, and the student farm at the University of Minnesota.

Companion planting is a type of intercropping that takes into account a variety of plant growth factors to match neighboring plants. Combinations are made to reduce competition for space, nutrients, water, and light. In addition plant growth habit, time to maturity, root depth, shade tolerance, pest and pathogen susceptibility and resistance, and spatial distribution are taken into consideration. Flowers and herbs are incorporated into beds to repel insect pests and attract beneficials.

Companion planting has been used by gardeners for hundreds of years and a wealth of garden lore is available. In recent years, companion planting has been examined in multiple scientific studies. Studies related to pest and pathogen protection are perhaps the most commonly examined areas of companion planting at the scientific level.

Several well-known companions like basil with tomato, and radish with lettuce, will be used on the student farm. In addition, new combinations like potato with peas and lettuce, and Kale providing afternoon shade for pepper will be tried. Notes should be taken throughout the growing season in regards, to yield, plant health, and pest problems. With this information, the following year's plots can be created.

References:

McClure, S & Roth, S (1994). Rodale's successful organic gardening companion planting. Pennsylvania: Rodale Press.

Growing guide. (2005) Johnny's Seed Catalog.

Jeavons, John. How to Grow More Vegetables: And Fruits, Nuts, Berries, Grains, and Other Crops Than You Ever Thought Possible on Less Land Than You Can Imagine. Ten Speed Press, 6th edition. 2002.

Companion Bed Layout

Flowers: Cos = Cosmos, Aly = Alyssum, Cat = Catnip, Mar = Marigold, Cal = Calendula, Nas = Nasturtium

Cos	Kale-Pepper-Green Onion	Aly	Sunflower-Winter Squash-Parsley/Dill/Chives	Cat	Beets-Onion-Carrot-Parsley	Mar	Radish-Lettuce-Radish	Nas	Corn-Corn-Soy-Soy-Corn-Corn	Cal
Cat	Tomato-Basil-Lettuce	Cal	Broccoli-Beets-Radishes-Beets-Cucumbers	Nas	Chard-Kohlrabi-Chard	Aly	Dry Beans-Spinach-Carrots	Cos	Broccoli-Parsley-Dill-Cilantro-Cabbage	Mar
Cal	Chard-Cucumber-Parsnip	Mar	Corn-Pole Bean-Summer Squash	Aly	Kale-Pepper-Cilantro	Cos	Tomato-Pole Beans-Cucumber	Aly	Sunflower-Winter Squash-Parsely/Dill/Chives	Nas
Mar	Broccoli-Parsley-Dill-Cilantro-Cabbage	Cat	Corn-Bush Bean-Pumpkin	Cal	Peas-Potatoes-Lettuce	Co	Sunflower-Winter Squash-Parsley/Dill/Chives	Nas	Chard-Cucumber-Parsnips	Aly
Nas	Peas-Potatoes-Lettuce	Mar	Eggplant-Bushbean-Lettuce	Cos	Dry Beans-Spinach-Carrots	Aly	Corn-Corn-Soy-Soy-Corn-Corn	Cat	Eggplant-Bush Bean- Lettuce	Cal
Cat	Tomato-Basil-Spinach	Aly	Corn-Pole Bean-Summer Squash	Cal	Broccoli-Beets-Radishes-Beets-Cucumbers	Mar	Chard-Kohlrabi-Chard	Cat	Kale-Pepper-Parsley	Nas
Aly	Beet-Onion-Carrot-Parsley	Cat	Radish-Lettuce-Radish	Mar	Tomato-Pole Beans-Cucumbers	Nas	Corn- Bush Bean- Pumpkin	Cal	Sunflower-Melons-Carrots -Beets	Cos

corn-soy
corn - 3 plants - 15” apart
corn
10’ bed soy - 3 plants - 15” apart 15” btw rows
soy
corn
corn
soy
soy

beet-onion-carrot-parsley
carrots - 16 plants - 3” apart
10 ft bed carrots 4” btw rows of carrots
carrots 6” btw parsley & carrots
parsley - 6 plants - 8” apart 12” btw rows of parsley
parsley 6” btw parsley & beets
beets - 12 plants - 4” apart 4” btw rows of beets
beets
beets 4” btw beets and onions
bunching onions 3” btw rows of onions
bunching onions
carrots - 16 plants - 3” apart 4” btw carrots and onions
carrots
carrots *** rotate this plot with
parsley - 6 plants - 8” apart radish-lettuce-radish
parsley throughout season
beets - 12 plants - 4” apart
beets
beets
bunching onions
bunching onions

radish-leaf lettuce-radish
radish -24 plants - 2”apart
radish 2” btw rows of radishes
10 ft bed radish 4” btw radish and lettuce
lettuce - 12 plants - 4”apart 4” btw rows of lettuce
lettuce
lettuce **lettuce is cut and come again

lettuce
lettuce *** rotate this plot with
lettuce carrot-pars-beet-onion
lettuce throughout season
lettuce
radish -24 plants - 2”apart
radish
radish
lettuce - 12 plants - 4”apart
lettuce
lettuce
lettuce
lettuce
lettuce
lettuce
lettuce
radish -24 plants - 2”apart
radish
radish
lettuce - 12 plants - 4”apart
lettuce
lettuce

eggplant-bushbean-head lettuce
bean - 8 plants - 6” apart plant bean 6” from edge of bed
eggplant - 4 plants - 4”apart 12” btw beans and eggplant
10’ bed eggplant 18” btw rows of eggplant
bean - 8 plants - 6” apart 6” btw lettuce and beans
lettuce - 4 plants - 12” apart 12” btw rows of lettuce
lettuce
bean - 8 plants - 6” apart
eggplant - 4 plants - 4”apart
eggplant
bean - 8 plants - 6” apart

Determinate Tomato-basil-lettuce
Basil - 8 plants - 6” apart plant basil at edge of bed
lettuce - 5 plants - 12” apart 12” btw all rows
12’ bed tomato - 2 plants - 24” apart
lettuce

basil
lettuce
tomato
lettuce
Basil
lettuce
tomato
lettuce
Basil

pole pea-cucumber-parsnip
parsnip - 12 plants - 4” apart
parsnip 4” btw rows of parsnips
10’ bed parsnip 4” btw peas & parsnips
pea - 12 plants - 4” apart peas in double row
pea 4” btw pea (1&2), (3&4)
pea share trellis
pea 12” btw pea 2&3
cucumber - 3 plants - 12” apart leave peas after harvest
pea trellis cucumber on pea
pea trellis as it grows
pea
pea 3’ btw first parsnip and cucumber
pea 4’ btw cucumber and cucumber
pea
cucumber
pea
pea
pea
pea
parsnip
parsnip
parsnip

Broccoli-parsley-dill-cilantro-cabbage
broccoli - 4 plants - 10” apart 12” btw rows of broccoli
parsley - 6 plants - 8” apart 6” btw parsley & dill
10’ bed dill - 24 plants - 2” apart 4” btw dill & cilantro
cilantro - 8 plants - 6” apart 4” btw rows of cilantro

cilantro 4” btw cilantro and cabbage
cabbage - 4 plants - 10” apart 12” btw rows of cabbage
cabbage plant broccoli at edge of bed
parsley 24” btw broccoli and cabbage
dill
cilantro
cilantro
broccoli
broccoli
parsley
dill
cilantro
cilantro
cabbage
cabbage
parsley
dill
cilantro
cilantro
broccoli

bush peas-potatoes-late head lettuce
potato - 5-6 plants - 9” apart 18” from potato to potato
pea - 16 plants - 3” apart 8” btw pea and potato
10.5’ bed pea 3” btw rows of peas
potato pull out peas once harvested
pea plant 1 row head lettuce
pea btw rows of potatoes
potato lettuce 5 plants/row
pea 10” apart
pea
potato
pea
pea
potato

Chard-Kohlrabi-chard
Chard - 8 plants - 6” apart
Kohlrabi - 12 plants - 4” apart 12” from Chard to Chard

8’ bed Kohlrabi 4” btw Chard & Kohlrabi
Chard 4” btw rows of Kohlrabi
Kohlrabi
Kohlrabi
Chard
Kohlrabi
Kohlrabi
Chard
Kohlrabi
Kohlrabi
Chard
Kohlrabi
Kohlrabi
Chard
Kohlrabi
Kohlrabi
Chard
Kohlrabi
Kohlrabi
Chard

Indeterminate tomato-dry pole bean
10’ bed Tomato - Beans - Tomato 36” btw tomato in row
Tomato - Beans - Tomato 2 plants/row
Tomato - Beans - Tomato 6 beans btw tomato
Tomato - Beans - Tomato 6” apart
Tomato - Beans - Tomato 24” btw tomato in NS direction
heavy stake for each tomato
twine btw stakes for beans

corn-bush bean- pumpkin
bean - 8 plants - 6” apart 6” btw bean & corn
corn - 3 plants - 12” apart 18” btw rows of corn
10’ bed pumpkin - 2 plants - eq. dist btw corn pumpkin in middle
corn of 2 corn rows
bean
corn

pumpkin
corn
bean
corn
pumpkin
corn
bean
corn
pumpkin
corn
bean

broccoli-beets-radishes-cucumbers
broccoli - 5 plants - 9” apart 24” btw broccoli and cucumber
radish - 24 plants - 2” apart
radish 2” btw rows of radishes
10’ bed beets - 12 plants - 4” apart 4’ btw rows of beets
beets
beets
beets
radish
radish
cucumbers - 2 plants 24” apart
radish
radish
beets
beets
beets
beets
radish
radish
broccoli
radish
radish
beets
beets
beets
beets
radish
radish

cucumbers
radish
radish
beets
beets
beets
beets
radish
radish
broccoli
radish
radish
beets
beets
beets
beets
beets
radish
radish
cucumbers
radish
radish
beets
beets
beets
beets
radish
radish
broccoli

pole beans-spinach-carrots
10’ bed 2 alternating rows of tripods on West 2’ of plot
3 beans per tripod - 48 plants total

East 2’ of plot is planted with list
below repeated for 10 ft
carrot - 8 plants - 3” apart 4” btw rows of carrots
carrot 6” btw rows of spinach
carrot
carrot
spinach - 4 plants 6” apart

spinach

Kale- green pepper- herbs
10' bed West 1' of plot is a single row of Kale
8 plants - 15" apart

East 3' of plot is patern below repeated
for 10 ft
pepper - 3 plants - 12" apart 12" btw rows of peppers
pepper 6" btw herb & pepper
herb - see below
pepper
pepper
herb

cilantro - 8 plants - 6" apart
green onion - 24 plants- 2" apart
parsley - 6 plants - 8" apart

Sunflower-winter squash-parsley-chives-dill
squash - 2 plants - 24" apart first squash 1' from edge of bed
10' bed sunflower - 3 plants - 9" apart 2' btw rows of squash
squash sunflower 1' from squash rows
sunflower herbs on edge of bed and intermixed
squash
sunflower
squash
sunflower
squash

Sunflower - melon - carrots -beets
Melon - 2 plants - 24" apart first melon 1' from edge of bed
10' bed sunflower - 3 plants - 9" apart 2' btw rows of melon
melon sunflower 1' from melon
sunflower plant 2 rows of beets or carrots
melon btw rows of melon and sunflower
sunflower carrots 3" apart
melon beets 4" apart
sunflower

melon

Corn-pole bean-summer squash
Corn - 3 plants - 18” apart 15” btw all rows
10’ bed Corn
squash - 2 plants - 24” apart
squash
corn
corn
squash
squash
Beans planted 2” from corn - 2-3 seeds/corn plant

SUPPLIES

This Section Contains: Page

Jordan seeds – local supplier of farmers market products

Contributor: Michelle Grabowski
Date Submitted: April 27, 2005
Revision Date: April 27, 2005

Keywords: bags, crates, rubber bands, supplies

Abstract:
Jordan seeds is a local supplier of fruit and vegetable seeds as well as grower supplies.

Jordan seeds is located at 6400 Upper Afton Rd. Woodbury, MN. Their web pages is www.jordanseeds.com and their phone number is651-731-7690.

In addition to a variety of fruit and vegetable seeds, Jordan seeds carries grower supplies including, baskets, plastic bags for produce, produce grade rubber bands of varying sizes, floating row covers, plastic mulches, tools, drip irrigation, harvest crates and baskets.

References:
Jordan seeds (2005) Retrieved April 27, 2005 from www.jordanseeds.com