

SARE Grant Report

1. FNE 02-431: Grazing Sheep in Organic Lowbush Blueberry Fields to Control Weeds and Increase Yields
2. The main goal of the project was to rotationally graze sheep in organic blueberry fields to control weeds. Weeds are a significant hindrance to harvesting blueberries and are the major reason organic growers do not fertilize this crop. The current method of weed control in organic blueberry fields is hand pulling, which is very labor intensive. A secondary goal of the project was to increase organic blueberry yields as a result of the rotationally grazing sheep.
3. Stoneset Farm is a small (200 +/- acre) diversified farm located on a back road in the town of Brooklin, Maine. We grow 7 acres of certified organic vegetables, 1 acre of certified large fruits, 17 acres of certified blueberries, 40 acres of pasture, and a flock of 70 certified layer chickens. We also conventionally raise 20 turkeys, 1,000 meat chickens, 12 sheep, 8 pigs, 8 hives of bees and other various other farm animals. Our father/daughter operation is in its fourth season. The father farmed part time for 20 years prior to this venture. We have two adjoining farms, the daughter lives on the smaller parcel, and the majority of the farming operation takes place on the larger parcel. The previous farmer and his wife, both 87 years old, still reside on the farm, as they have life tenancy. They farmed the land from 1952 to 1992 using conventional methods.
4. I set forth the original project concept, which was enthusiastically supported by Roland Dupuis, NRCS District Conservationist. He subsequently had conversations with David Yarborough, Blueberry Specialist with Cooperative Extension, University of Maine, who was very interested in assisting on this project. Mr. Dupuis assisted in the expanding the project concept, grant writing and editing, while Mr. Yarborough assisted in the experimental design and the use of University of Maine facilities.
5. In the fall of 2001, the field was spread with saltmeadow hay to serve as a flammable material for the 2002 burn. The blueberry field in which the project was placed, was burned in April 2002. It was a very wet and cold spring which caused us to have a poor burn. Burning blueberry fields is a common practice in blueberry culture. The purpose of the burning is to prune the blueberry plants, which makes them more productive and easier to harvest. It also destroys pests and diseases that may have built up their numbers over the season. In mid May, we purchased the flexinet fencing and a solar powered charger, ground rods and clips. Flexinet fencing was needed for two reasons: first, it is lightweight and easy to move in a rotational grazing system in our experimental plots; second, we have extreme predator pressure, not only from coyotes and bears, but also from domestic dogs. The exterior fence was installed on the blueberry field to encompass a 1.33 acre (240 feet on each side) plot. The plot was then divided by internal fence into 4 equal paddocks in which to rotate the sheep. Five 1 ½ year old ewes, who were recently

separated from their lambs, were used in this project. Because the plot contained sheep – laurel (lambskill), we felt that the newborn lamb's systems would not be able to tolerate ingestion of this species, whereas the mothers being older and fat from a good winter, would be able to tolerate this weed with no ill effects. This was in fact the case.

6. When the sheep were first placed in each paddock, they immediately grazed the grassy weeds, which generally took them a couple of days to consume. Thereafter, they would eat some of the other weeds that came up, but with the grasses gone, they did nothing but walk around and complain. During the first month of the experiment, there was no new blueberry plant emergence because of the wet cool spring. Once blueberry plant emergence began, the sheep stopped eating everything and concentrated on eating the new blueberry growth. At this point, the sheep had to be removed from the plots. Our findings showed that sheep had a feeding preference among the various weed species in the plots. Those categorized as highly preferred feed (voraciously eaten) were the grasses. Those categorized as acceptable feed (occasionally eaten) were grey birch, bracken fern, meadow sweet, red maple, and common cinquefoil. Those categorized as unpalatable plants (sparingly eaten) were bunchberries, and those categorized as unpalatable plants (not eaten) were third year growth blueberry plants.
7. The spring of 2002 was cold and wet, which delayed weed emergence and shortened the normal length of time between weed emergence and blueberry emergence. In a normal year, the grassy weeds would have grown quickly and dominated the site before the blueberries emerged. This rapid grass emergence would have allowed the sheep more grazing opportunities and would have allowed us to rotate the sheep between paddocks without their need to graze new blueberry growth.
8. It would not be economically feasible to purchase sheep solely for grazing organic blueberry fields, as they would only be able to graze the fields for the short time between weed emergence and blueberry emergence. However, if you already owned the sheep, it may be economically feasible to rotationally graze them on organic blueberry fields.
9. This project generated several new ideas about weed control in organic blueberry fields. They are as follows: 1. We found that the sheep would not eat second year growth blueberry plants. These plants were harvested in the prior year. It may prove useful to rotationally graze them on a second year production field to minimize all weed species throughout the field. . some growers do not follow the standard burn in spring, let the plants grow that year, harvest the following year, preferring to harvest two years in a row before burning (pruning) again. in this case, on a conventional field, sheep could be grazed on these fields and would have, i feel, a significant effect on the grassy weeds without having a negative effect on the harvestable blueberry plants. organic farms could not use this

method due to the requirement of needing to have the sheep off the fields 90 days prior to harvest because of the manure issue.

10. We will continue to use these methods although with some of the following modifications: 1. We are going to introduce goats into the system and try to rotationally graze them alongside the sheep to hopefully achieve a total pruning process in lieu of burning. I think doing this, perhaps every third harvest cycle can not only reduce the weed growth in the fields, but by having the animals on the fields for the summer season, would leave enough manure to have a positive impact on the fertility. we found that by using only the methods we originally proposed these methods use was limited in benefits and are most probably not economically feasible.
11. We sent this report to MOFGA. as well as a press release for them to place in their magazine. We also sent this report to MOBGA and the University of Maine Blueberry Experimental Station in Jonesboro. Scheduled a MOFGA twilight grower's meeting at the farm in July to review the project.

#4. What are the effects of grazing on Blueberry plant morphology?

Blueberry plants in grazed areas were slightly stunted and broken, most probably due to the constant travel of the sheep. They also were stunted due to the sheep being left on the field after the Blueberry plants had emerged- if only for a very short time. It is crucial with this method of weed control to remove the sheep as soon as Blueberry plants emerge. It would also be beneficial to increase the amount of sheep, by two fold at least, so that there would be more grazing done in the short amount of time that there is between weed emergence and Blueberry plant emergence.

In the second year of our study, which we needed to do so that we could actually complete the harvesting of the initial plots, we added 2 goats to the herd of sheep and grazed them only on land where there was 3rd year Blueberry growth. We could not harvest a crop from this section due to Organic Certification issues, but made several observations:

Sheep would graze the weedy growths all thru the growing season but would also graze on Blueberry flowers and fruits- if left too long on one area;

The goats did a good job of eating the woody growth plants i.e. any hardwood trees and alder bushes.

Section 5.

1. What are the effects of grazing on weed properties in the blueberry fields?

Note: All plots are 3 feet by 3 feet.

Transect #1

Grazed plots 1,2,3,4
i.e.: T1 GP1, T1 GP2, etc

Control plots 1,2,3,4
i.e.: T1 CP1, T1 CP2, etc

Weed Cover estimates, (percent of):

T1 GP1	20
" GP2	10
" GP3	30
" GP4	20

average _ 20 %

T2 GP1	30
"" GP2	20
"" GP3	40
"" GP4	20

average _ 27%

Transect #2

Grazed plots 1,2,3,4
i.e.: T2 GP1, T2 GP2, etc.

Control plots 1,2,3,4
i.e.: T2 CP1, T2 CP2, etc.

T1 CP1	30
" CP2	20
" CP3	40
" CP4	30

average _ 30%

T2 CP1	50
"" CP2	40
"" CP3	30
"" CP4	40

average _ 40%

Dry Matter Weights -- Weighed on a digital scale at the farm, dried in greenhouse on newspapers for five days in August -- in pounds or percent thereof.

Notes: Due to wet, late spring conditions, there was less grass/weed/berry bushes growth than normal; sheep would not graze on bunchberry plants, a prevalent weed in blueberry fields.

Dry Weights:

T 1 GP1 .08	T1 CP1 .09	T2 GP1 .09	T2 CP1 .14
"" GP2 .10	"" CP2 .12	"" GP2 .08	"" CP2 .11
"" GP3 .11	"" CP3 .10	"" GP3 .13	"" CP3 .09
"" GP4 .06	"" CP4 .07	"" GP4 .07	"" CP4 .10
.35	.38	.37	.44

#2. What are the effects of grazing on Blueberry harvest and cleanliness in the following year?

Note: Weight is in pounds or percent thereof.

T1 GP1 .07	T1 CP1 .06	T2 GP1 .04	T2 CP1 .07
"" GP2 .02	"" CP2 .03	"" GP2 .09	"" CP2 .04
"" GP3 .08	"" CP3 .07	"" GP3 .06	"" CP3 .05
"" GP4 .06	"" CP4 .06	"" GP4 .09	"" CP4 .03
.23	.22	.28	.19

Cleanliness counts were too work intensive as each plot appeared to average over several hundred pieces of blueberry material. Visually there appeared to be no difference between the plots.

#3. What are the effects of grazing on Blueberry insect pests?

Note: See copy of scout report, scout found no major blueberry pests in either of the plots.

BLUEBERRY ICM - FRUIT FLY MONITORING (Fact Sheet No. 204)

Name Keweenaw Island
 Address _____
 Crop year: _____ Acres _____

ASCS Farm # _____ ASCS Tract # _____
 Field Location Rau Rd
 Field Name/Number _____

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Trap #	1st Visit		2nd Visit			3rd Visit			4th Visit			5th Visit			6th Visit			7th Visit				
	Date	Fly #	Date	Fly #	Total	Date	Fly #	Total	Date	Fly #	Total	Date	Fly #	Total	Date	Fly #	Total	Date	Fly #	Total	Date	
1	7/11	0	7/16	0	0	7/22	5		7/30	5	10	8/5	4		8/7	4	8					
2		0		3	3	"	5			4	9		3			4	7					
3		0		0	0	"	1			1	2		1			2	3					
4		1		1	2	"	0			1	1		1			2	3					
5		2		1	3	"	1			1	2		2			0	2					
6		0		0	0	"	0			0	0		0			2	2					
7		0		1	1	"	2			1	3		2			2	4					

Note:
 (1) Only apply insecticide if threshold is exceeded (6 flies/trap for any one visit or 10 flies/trap overall visits) AND if and only ripe fruit is present in field.
 (2) Replace traps after spray and restart total count.

In May 2002, Stoneset Farm, located on River road in Brooklin Maine, received a grant from the Sustainable Agricultural Research and Education program (SARE), with help from the NRCS Ellsworth office. The main goal of the project was to rotationally graze sheep in organic blueberry fields to control weeds. Weeds are a significant hindrance to harvesting blueberries and are the major reason organic growers do not fertilize this crop. The current method of weed control in organic blueberry fields is hand pulling, which is very labor intensive. A secondary goal of the project was to increase organic blueberry yields as a result of the rotationally grazing sheep reducing weed competition and applying manure to the field.

In the fall of 2001, the field was spread with saltmeadow hay to serve as a flammable material for the 2002 burn. The blueberry field was burned in April 2002, but because of the very wet cold spring, the burn was of poor quality. Burning blueberry fields is a common practice in blueberry culture. The purpose of the burning is to prune the blueberry plants, which makes them more productive and easier to harvest. It also destroys pests and diseases that may have built up their numbers over the season. In mid May, the flexinet fence was installed on the blueberry field to encompass a 1.33 acre (240 feet on each side) plot. The plot was then divided by flexinet fence into 4 equal paddocks in which to rotate the sheep. Five 1 ½ year old ewes, who were recently separated from their lambs, were used in this project. Because the plot contained sheep – laurel (lambskill), we felt that the newborn lamb's systems would not be able to tolerate ingestion of this species, whereas the mothers being older and fat from a good winter, would be able to tolerate this weed with no ill effects. This was in fact the case.

The experiment showed that sheep had a feeding preference among the various weed species in the plots. These preferences were as follows: 1. highly preferred feed (voraciously eaten) were the grasses, 2. acceptable feed (occasionally eaten) were grey birch, young bracken fern and sweet fern, meadow sweet, red maple, and common cinquefoil, 3. unpalatable plants (very sparingly eaten) were bunchberries and other ferns, 4. unpalatable plants (not eaten) were third year growth blueberry plants (blueberry plants that had survived the previous year's burn).

These results appear to potentially benefit conventional blueberry growers who are going to harvest a specific field two years in a row. Because sheep do not eat second year blueberry growth, conventional growers could use sheep to control weeds, without any detriment to the crop. Organic growers however, would need to move the sheep off the field at least 90 days before the crop is harvested, which would be too early in the spring to have any meaningful weed control benefit.

Next year, it is our intent to expand on this weed control concept by including goats with the sheep on a different organic blueberry field that was harvested last year but not burned this spring. The hope is that the combination of goats and sheep will prune the blueberry plants and allow better control of all weed species.

For more information about this experiment can be obtained by visiting the SARE website at www.sare.org or by contacting the farmer, Kevin Poland c/o Stoneset Farm, HC 64 Box 6425, Brooklin, Maine, 04614 Tel. 207-266-0672
e-mail kvpoland@midmaine.com

Pasturing Sheep an Alternative To Burning Blueberry Lands

Tour of Brooklin Farm Part of MOFGA Series

By JAMES STRAUB

BROOKLIN—Blueberry growers looking for alternatives to burning and spraying their fields could find answers in a study being conducted at Stoneset Farm on River Road.

Kevin Poland and his daughter, Clara Poland, were planning a tour of the farm yesterday evening (Wednesday).

The tour was to be preceded by a potluck supper and followed by a discussion of their ongoing study of alternative ways of pruning blueberries.

The event was part of a series of Twilight Organic Farm Meetings hosted by Maine Organic Farmers and Gardeners Association (MOFGA).

The farm tours will be held throughout the state all summer and into September.

The meetings are intended to bring farmers and gardeners together for an opportunity to learn new techniques and share ideas and information.

A MOFGA staff member attends each meeting.

Wednesday's discussion at Stoneset Farm focused on pasturing sheep on blueberry land as an alternative to burning.

The Polands are in the second year of a study sponsored by Sustainable Agriculture Research and Education, a competitive grants program of the U.S. Department of Agriculture. The program is dedicated to research and education to help build the future viability of agriculture in the United States.

Clara Poland said she became interested in the research project when she was looking for different ways to control weeds on the 17 acres of blueberries at the farm.

She also wanted to control the amount of fertilizer used on the land because fertilizer

also makes the weeds grow.

She had heard of the possibility of placing sheep on blueberry land to reduce weeds, but she was unable to find anyone trying the concept.

Next, she turned to Roland Dupuis, a district conservationist with the Natural Resource Conservation District in Ellsworth.

Dupuis helped Poland receive the federal grant to study the feasibility of using sheep to control weeds, rather than burning or spraying blueberry land.

The Polands started their study last year on one acre of blueberry land by placing four sheep on the plot.

The sheep ate some weeds but ignored others, such as bunchberry.

"It was fine until the young blueberry growth came," Kevin Poland said. "When the blueberries came, there was nothing else they'd eat. We moved them quickly."

Continuing the experiment in another section of land, the Polands discovered that sheep would not eat second-year blueberry bushes, those that were not burned and grew over two seasons.

The Polands also observed a noticeable difference in the amount of weeds, especially grasses, in the portion of the field in which the sheep had grazed.

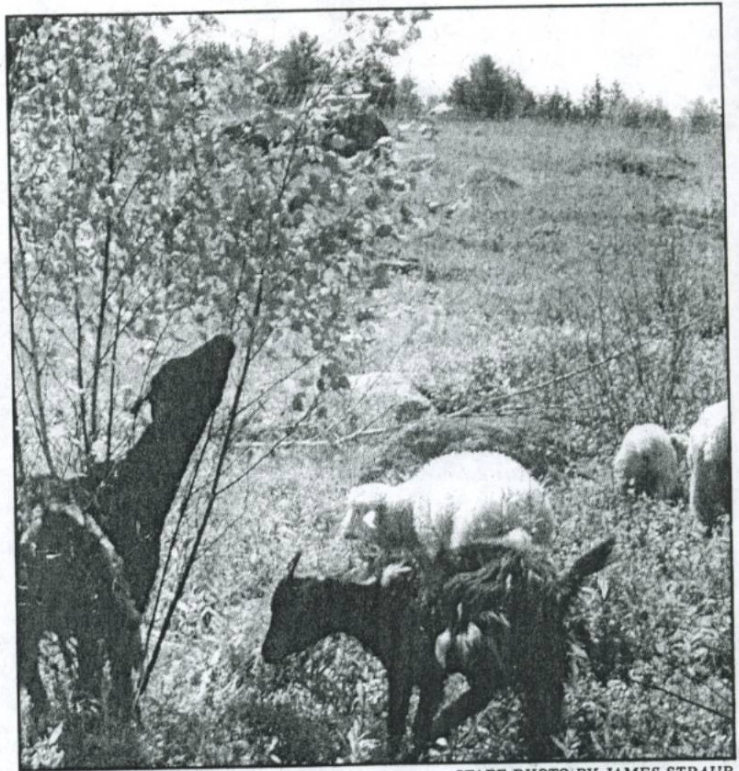
The encouragement led them to extend the study into a second year.

This spring they placed sheep and two goats in an area containing a second-year crop.

"We want to see if the sheep are mowers too," Clara Poland said.

She explained that some blueberry growers will mow fields every other year, rather than burning them.

Mowing, however, puts organic matter back into the soil



STAFF PHOTO BY JAMES STRAUB

This goat's appetite for woody plants pleases Kevin and Clara Poland. The Brooklin farmers are conducting a study on the feasibility of pasturing sheep and goats on blueberry land as an alternative to burning.

and nourishes unwanted weeds. imal manure on a harvest area within 90 days of harvest.

If the sheep or goats prune the second-year blueberries and consume unwanted grasses and weeds, it will have the same effect as mowing. However, they plan to keep the sheep and goats on the second-year growth all season.

While the farmers would lose the organic cover resulting from mowing fields, they gain the organic nutrients in sheep manure. "If there are fewer weeds to be dealt with, then all the better," Kevin Poland said.

"We want as much organic matter as possible," Clara Poland said, "as long as it's not weeds." With 14 sheep involved in this year's experiment, Clara Poland sees other possibilities, such as selling wool.

"We try to make the best use of our time and make the best use of the animals that are here, while still raising them humanely," she said.

They will be unable to harvest the section involved with this year's experimentation because of federal standards that prohibit the introduction of animal manure on a harvest area within 90 days of harvest. For information about Stoneset Farm or the sheep experiment, call 339-5513. jstraub@ellsworthamerican.com