

FNE 96-136

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P R O J E C T R E P O R T

THE EFFICACY OF RED OAK SAWDUST AS A MULCH
TO CONTROL GRASS AND WEEDS IN ORGANIC WILD BLUEBERRIES

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Shade and street tree
management plans,
tree inventories,
and general tree care
for homeowners
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Licensed arborist.

Johnson's Wild Blueberries

Maintenance and harvest
of wild blueberry land.

Project conducted by

Douglas N. Johnson, Project Leader

and Nancy Caudle-Johnson

JOHNSON'S WILD BLUEBERRIES



April 29, 1997

Funded by the
Northeast Region Sustainable Agriculture Research and Education Program
S.A.R.E. Farmer/Grower Grant
1996

PROJECT NUMBER: FNE 96-136

PROJECT TITLE: The Efficacy of Red Oak Sawdust as a Mulch
to Control Grass and Weeds in Organic
Wild Blueberries

PROJECT LEADER: Douglas N. Johnson
and Nancy Caudle-Johnson
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COLLABORATORS: Dr. Eric Sideman, Director Technical Services
Maine Organic Farmers 7 Gardeners (MOFGA)

Marjorie Hundhammer, Extension Educator
Hancock County Cooperative Extension

PROJECT LOCATION: Saccharum Acres
Happytown Road
Ellsworth, Maine (Hancock County)

PROJECT GOALS

The project involved testing a theory, which offered a potential solution to grass and/or herbaceous weed problems in wild blueberry fields.

Conventional blueberry growers address the weed problem by applying herbicides, Velpar being the current herbicide of choice. Velpar traces in ground water are an increasing public health concern for communities whose drinking water is affected by runoff.

Organic growers do not have an effective method for dealing with grass and weeds - they use time consuming brush cutting and hand pulling. They can't apply nitrogen because it simply stimulates weed and grass growth. Organic blueberry production is largely unprofitable because of the grass/weed problem and the labor intensive methods required eradicate them. In addition, the organic industry must pay higher prices for rakers because it is time-consuming for rakers to pick through the weeds for the berries.

Douglas Johnson, in his twelve years as a wild blueberry grower, had observed in several blueberry fields that field edges bordered by red oak trees had heavier wild blueberry vine cover with fewer weeds and grasses.

A possible explanation for this curious phenomenon could be the coumarins and other phenolics (tannins) exuded by red oaks which inhibit the growth of herbs and grasses.

He believed a project involving field trials of organic wild blueberries mulched with red oak sawdust was a worthwhile undertaking.

The goal of the project was to conduct field trials, applying red oak sawdust to organically managed wild blueberry plots, and evaluating the effectiveness of red oak sawdust as a biological herbicide.

FARMING UPDATE

As reported in the SARE Grant application, we also manage and harvest ICM wild blueberry acreage. Since the date we received the grant, Johnson's Wild Blueberries has been involved in restoring approximately 24 additional acres of wild blueberries to ICM production.

PROJECT COOPERATORS

Douglas N. Johnson was the project leader. He was directly involved in managing the project and in spreading sawdust, etc. He and

Nancy Caudle-Johnson own Saccharum Acres in Ellsworth where the field trial was carried out.

Nancy Caudle-Johnson was the project recordkeeper, organized the field day, wrote and distributed the news release, took project photographs, and assisted Douglas Johnson with writing the project grant and report.

Dr. Eric Sideman, Director of Technical Services for Maine Organic Farmers & Gardeners (MOFGA), was the project's technical advisor. He examined the field trial on three occasions, did sampling and provided information, and recommended that the trial be extended through August 1997 to provide yield comparisons from the test plots.

Marjorie Hundhammer, Extension Educator with the Hancock County Cooperative Extension, examined the field trial on several occasions and helped to organize the field day.

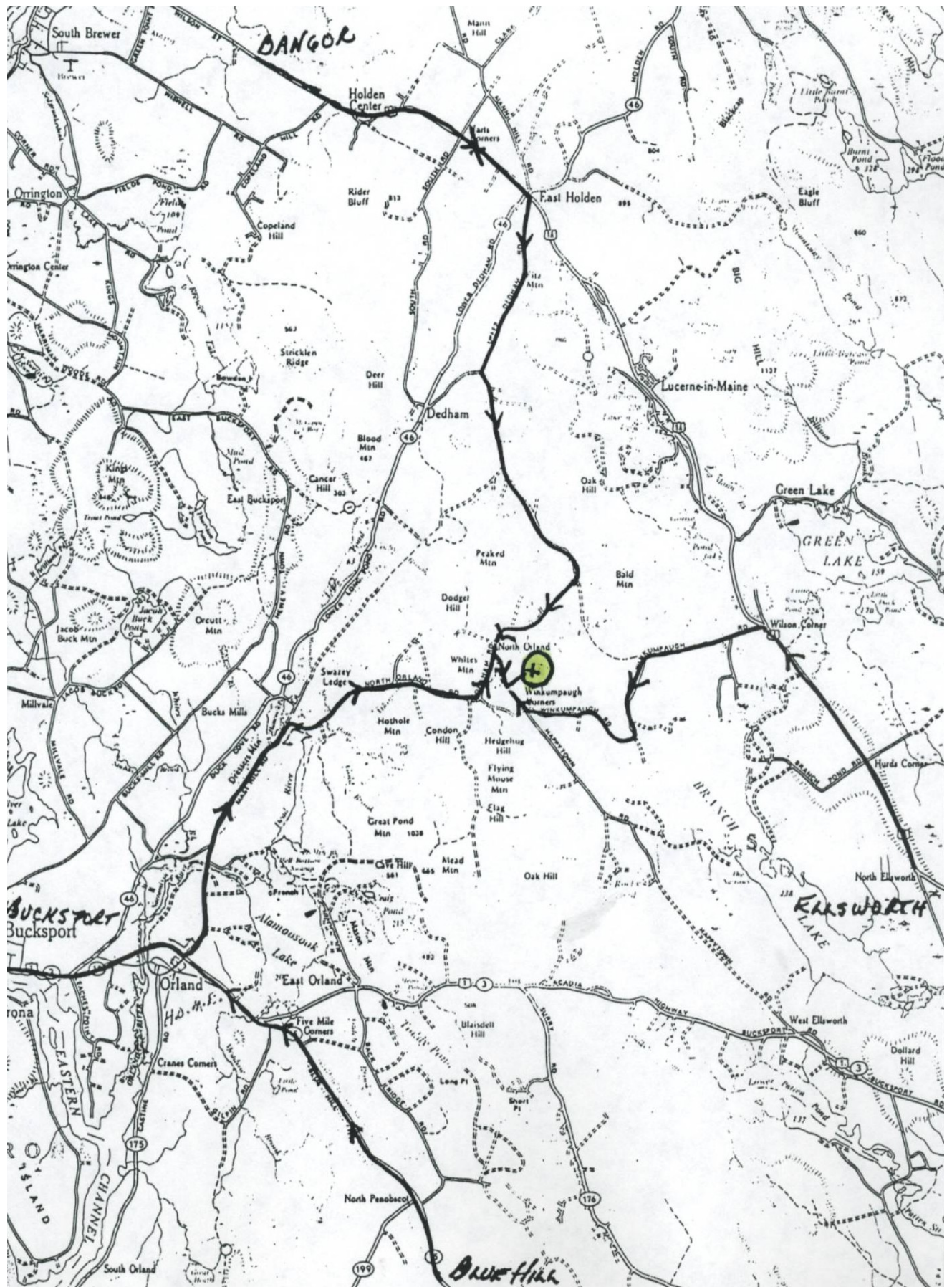
PROJECT METHODOLOGY

The location of the field trial was on our land in the town of Ellsworth, Maine (Hancock County). Eight of the twenty acres is a field in transition to blueberry vine. The vine is plentiful enough to be managed for production. The field is relatively rock-free and flat enough to mow.

In April 1996, the proposed plot area was mowed to within $\frac{1}{4}$ " of ground level. After mowing, four test plots, each 25' by 50' were staked. One test area (A) was comprised of two side-by-side plots (A-1 and A-2) in an area of the field that is heavily vined, with grass competition. The other test area (B) was comprised of two side-by-side plots (B-1 and B-2) in an area of the field that is heavily vined with grass and herbaceous/woody weed competition.

A source of pure red oak sawdust was found at a sawmill in Belfast, Maine. On April 26, 1996, red oak sawdust was applied to a depth of $1\frac{1}{2}$ ", spread evenly over test plots A-1 and B-1. The two remaining test plots (A-2 and B-2) did not receive red oak sawdust mulch. Although we had originally planned to top-dress plots A-1 and B-1 with red oak chips to prevent erosion of sawdust from wind and rain, this proved not to be necessary. The sawdust adhered to the plots well and was not displaced during the course of the experiment.

The plots were checked each month. From the beginning, there appeared to be some effect from the sawdust though it was at first so slight as to be elusive.



By mid-July 1996 and into August, differences in the percent cover of grasses and herbaceous/woody weeds became more discernible. By the time that the field day was held on October 17, 1996, differences were more obvious - enough so that the organic growers attending the field day expressed some optimism that the sawdust was having the desired effect.

Dr. Eric Sideman, our technical advisor, visited the field trial site on August 29, and again on October 31, when he took samples. His sampling results are reported in the enclosed Memo entitled: "Estimated Percent Cover of Weeds and Blueberries," Sampling date October 31, 1996 (February 5, 1997).

He recommended that "sampling be done again in early summer [1997] when everything has a lot more cover." He also recommended that a "comparison of yield" be carried out in August 1997 at the time of the blueberry harvest.

Although this additional facet of the field trial is beyond the scope of the project as outlined in the grant, we have agreed to do it, because we see that such data will be important to us and other organic blueberry growers and, presumably, to the SARE program.

Due to these further trials, we have added further tests to assess results. They are:

- 1) Random percent sampling of flower buds for each of four plots in late May 1997.
- 2) Resampling of buds and weed cover in early July 1997.
- 3) Yield comparison in August 1997.

FINDINGS AND ACCOMPLISHMENTS

We found that there appeared to be a difference in the plots with the sawdust having an effect upon weed suppression and blueberry growth, though the results were not conclusive.

Organic blueberry growers who attended the field day were very interested in the observable differences in the plots since even the slightest reduction in weeds translates to a more economically viable crop (because organic production is so highly labor intensive).

An unexpected finding is that although the red oak sawdust may not have a dramatic biological herbicide effect on weeds, it may be beneficial as mulch. This potential use has excited the project team - enough so to warrant the further tests culminating in the August 1997 yield comparison (see enclosed "Effects of Sawdust Mulch on Yields of

Maine Organic Farmers and Gardeners Association

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Date: February 5, 1997
To: Doug and Nancy
From: Eric Sideman

ESTIMATED PERCENT COVER OF WEEDS AND BLUEBERRIES

Sampling date - October 31, 1996

	with mulch		without mulch
blueberry	16.8		15.6
Bicolor silver rod	3.7	} 57.1%	9.9
meadow sweet	1.2		5.6
grass	16.8		28.1
potentilla	8.7		4.3
moss	11.8		10.6
unknown broadleaf (to be identified when <i>it flowers</i>)	14.9		13.1

These numbers are not very sophisticated, but interestingly enough they show just what our eyes did...there is not much difference between plots.

I think the sampling should be done again in the early summer when everything has a lot more cover. Also, I think a comparison of yield should be done.

Looking forward to a visit in warm weather,
Eric

Select Clones of Lowbush Blueberry," reporting on research conducted on Prince Edward Island by the Charlottetown Research Station of Agriculture Canada, January 1993).

A successful field day was held on October 17, 1997, with several of the major organic growers in Maine attending. They were interested not only in our experiment results, but our experiment spurred their interest in doing sustainable agricultural research.

We completed all of the goals outlined in our grant application, and, in addition, as outlined above will be extending the trials on our own in order to more thoroughly test our thesis.

SITE SPECIFIC INFORMATION

Two of our four test plots were on a slope, subject to strong winds. We were concerned that the sawdust might erode and render our carefully depth-gauged sawdust application uneven. However, the sawdust remained intact, and of equal depth throughout the year. Additionally, there was no need to apply red oak chips to hold the sawdust.

ECONOMIC FINDINGS

If, after the August yield comparisons, the sawdust is found to have affected the yield, then there will be some economic benefits.

Of course, another consideration is the cost of the red oak sawdust, and this can be obtained very inexpensively from a sawmill, where they are usually pleased to see someone cart it away.

NEW IDEAS

New ideas were generated to the extent that we decided to continue the project through August 1997. (Since blueberries are a biennial crop, we will most likely continue the project through another cycle to gauge further results.)

Several organic growers who attended the field day were intrigued and spoke about trying the experiment or variations on their own blueberry land. Another organic grower who could not make the field day phoned to offer her observations about blueberries growing near oaks.

CONTINUATION OF PRACTICE

As stated above, we will continue to use the practice if our yield com-



AGRI-INFO

HORTICULTURE

JANUARY 1993

FACTSHEET: 93-9

AGDEX: 235.24

EFFECT OF SAWDUST MULCH ON YIELDS OF SELECT CLONES OF LOWBUSH BLUEBERRY

Fruit of the lowbush blueberry is normally harvested from managed native stands. In Prince Edward Island, these stands have generally been developed from abandoned farmland in areas of the province with poorer soil types. Native lowbush blueberries can produce 2-4 t ha⁻¹ of marketable fruit in this region. Select clone breeding and research, mainly at Kentville Research Station, have resulted in a number of high yielding selections. Previous lowbush blueberry adaptability trials have shown select clones will establish and produce well under local conditions. A study was conducted to determine the effect of depth of application of sawdust mulch on the yield of select clones of lowbush blueberries.

The treatments were sawdust mulch applied at 0, 5, and 10 cm and plant source of cuttings or seedlings. The cuttings were from the three clones Chignecto, Blomidon and 70-62. The seedlings were produced from the open pollination of Chignecto, Blomidon and Augusta. The plant material was grown in glasshouses in 1979 and field planted at Peakes, Prince Edward Island in May 1980. The experimental design was a split plot with a factorial combination of mulch and plant sources in the main plots. The subplot was a single row of 6 plants with in-row spacing of 0.5 m and between-row spacing of 1.0 m with four replications. A single application of sawdust (primarily white spruce) was applied as a mulch 10 days after planting.

Plots were spring pruned by burning assisted with straw in 1984 and by flail-mowing in 1986 and 1988. Weed control was provided by hand cultivation until 1983 and thereafter by Hexazinone applied immediately following each pruning. Plots were not fertilized or irrigated. The crop was harvested by hand raking when fruit was 95-100% mature.

The marketable yield of select clones of lowbush blueberries could be improved by applying a sawdust mulch. However, applying too deep a mulch can be no better than applying no mulch. Effective mulch of 5 cm increased the yield by 34% over the 3 harvest years. Plant stand was not affected by the 5 cm application of sawdust mulch but was significantly reduced by the 10 cm mulch (Table 1). The yield from seedlings was significantly higher from cuttings in 1987 (LSD 0.05 = 0.79 t ha) (Table 2).

These results presented encompassing the yields at one location over 3 harvest cycles indicate that the yield of select clones of lowbush blueberries planted in Prince Edward Island was increased by 31% by the application of 5 cm of softwood sawdust mulch. Sawdust was equally suitable for the establishment of both cuttings and seedlings of select clone lowbush blueberries.

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Table 1. Effect of sawdust mulch on yield and plant stand of select clone lowbush blueberries.

Depth of Sawdust Mulch (cm)	Marketable Yield			3-Year Total	Plant Stand** 1985
	Year				
	1985	1987	1989	(t ha ⁻¹)	
0	2.66	3.90	2.04	8.60	94
5	2.92	5.66	2.69	11.27	97
10	1.78	4.37	2.02	8.17	71
LSD§	0.93	.096	ns	1.98	9

§Significantly different at P = 0.05

**Plant stand recorded as a percent of number planted.

Table 2. Marketable yield and plant stand of blueberries as influenced by plant type and clone averaged over 3 mulch treatments.

Plant Type	Select Clone†	Marketable Yield			3-Year Total	Plant Stand** 1985
		Year				
		1985	1987	1989	(t ha ⁻¹)	
Cutting	Blomidon	2.11	5.23	3.61	10.95	100
	Chignecto	2.62	3.12	1.92	7.66	92
	70-62	2.11	4.36	1.81	8.28	79
	Mean	2.28	4.24	2.45	8.96	90
Seedling	Blomidon open	3.11	6.01	2.57	11.69	88
	Chignecto open	2.99	4.79	1.76	9.54	90
	Augusta open	1.78	4.35	1.83	7.96	75
	Mean	2.63	5.05	2.05	9.73	84

†Selections from Lowbush Blueberry Breeding Program, Kentville Research Station, Kentville, Nova Scotia.

**Plant stand recorded as a percent of number planted.

parisons indicate increased yields in the mulched plots.

In addition, we will maintain the integrity of the experimental plots through another blueberry harvest cycle, so we can judge the long-term effect.

INFORMATION CONVEYED TO OTHER PRODUCERS

We tell other producers that with sustainable projects like ours, results are usually seen over time. Dramatic "quick fixes" and instant results are usually unattainable, and are not necessarily desirable because of the effects upon other flora and fauna. We believe that gradual changes are the natural, sustainable way.

We encourage other producers to experiment with their ideas - it's the best way to learn.

OUTREACH PROGRAM

We followed our outreach plan, writing a news release that was disseminated to organic and commercial blueberry growers in Maine through Maine Organic Farmers & Gardeners, Maine Lowbush Blueberry Office of the Cooperative Extension, and other newsletters.

We held a successful field day in October. In addition to the organic and commercial blueberry growers, the field day was attended by David Bell, executive director of the Maine Blueberry Commission, and Dave Yarborough, blueberry specialist with the Cooperative Extension.

Both of our consultants recommended delaying an article on the project's findings until after August 1997 when the results will be more conclusive. We intend to issue a news release in September 1997, reporting the project's findings. This will be issued to Maine Organic Farmer & Gardener, the blueberry and sustainable agriculture organizations, and local newspapers.