LOW SWEET
LOWBUSH BLUEBERRY
(Vaccinium angustifolium)

1 cm

SOUR-TOP
LOWBUSH BLUEBERRY
(Vaccinium myrtilloides)

1 cm
Cultivated Blueberries Grown World-wide
Lowbush production concentrated in Maine, Atlantic Canada and Quebec
Wild blueberry populations have more diversity than cultivated selections.
Size of berries
Figure 1. Yield from Untreated Plots by Initial Weed Cover on Percent from All Years

Weed populations will reduce blueberry yield and quality
WEED MANAGEMENT

How:
Cultural:
Cut herbaceous weeds before go to seed
Woody weed mowing simulation 2007-2008

• Twenty clumps each of white birch and willow spp. were located at Highland Farm in Stockton Springs
• Three cutting regimes in summer 2007 to simulate mowing
  – Cut 21 June
  – Cut 21 June and 23 July
  – Cut 21 June, 23 July and 22 August
• Average height (in) and number of stems were assessed pre-treatment in June and at one month intervals through September 2007
• Average height and number of stems were assessed for recovery in summer 2008
2008 white birch height and abundance following a 2007 mowing simulation
Untreated control

2007

2008
1 cut

2007

2008
3 cuts

2007

2008
2008 willow spp. height and abundance following a 2007 mowing simulation

Average height (in./no. stems)

UTC 1 cut 2 cuts 3 cuts UTC 1 cut 2 cuts 3 cuts

Stems

2007 2008

UTC 1 cut 2 cuts 3 cuts

Average height (in./no. stems)

UTC 1 cut 2 cuts 3 cuts UTC 1 cut 2 cuts 3 cuts

Stems

2007 2008

UTC 1 cut 2 cuts 3 cuts
Untreated control

2007

2008
1 cut

2007

2008
2 cuts

2007

2008
3 cuts
Radial spread of blueberry plants

Land Improvement- mulch promotes spread of plants
Trevett in 1956 ‘Observations on the decline and rehabilitation of Lowbush blueberry fields’

Trevett recommended the use of much to replace the organic matter in the field and increase the rhizome spread
Trevett in 1956 ‘Observations on the decline and rehabilitation of Lowbush blueberry fields’

Burning fields with oil was causing a decline in blueberry cover
Trevett in 1956 ‘Observations on the decline and rehabilitation of Lowbush blueberry fields’

A hard burn that incinerated stems was though necessary
Kender and Eggert in 1966 ‘Several soil management practices influencing the growth and rhizome development of the lowbush blueberry’

Research showed that the addition of much resulted in more water available for blueberry plant that produced more and longer rhizomes
Joyal 1985 ‘Thermal effects of organic mulches on blueberry soils in Maine’

Research showed that without much the temperature was higher.
Smagula in 1989 ‘Effects of several mulches on frost heaving, soil moisture, soil temperature and rhizome development’
Lowbush blueberry fields

Mulch Study Highmoor
Top and Rhizome Growth

Figure 1

Dry Weight/plant (gm)

50
40
30
20
10
0

Bark
Sawdust
Cedar
Chips
Control

Mulch Source

- Tops
- Rhizome

Mulch increased weight of rhizomes and top growth
Smagula in 1989 ‘Effects of several mulches on frost heaving, soil moisture, soil temperature and rhizome development’ Lowbush blueberry fields’

Figure 2

**Mulch Study - Highmoor**

**Rhizome Number and Length**

Mulch increased number of rhizomes and length
Mulch source on spread and erosion Fact Sheet #228

Mulch source influences rhizome spread and erosion
Mulch will improve plant cover, yield and reduce weed competition.
WEED MANAGEMENT

Cultural: Lower pH to 4.0 for acid-loving plants
pH reduction

Granular Sulfur 90% - like Split Pea
Wild blueberries are well adapted to a low pH environment

Reducing the pH in your soil gives the advantage to the wild blueberry over many weeds but will not suppress all weeds

Sulfur at approximately 100 lb/acre for a reduction of 0.1 pH unit is less expensive than an herbicide

Change in pH may take several years to be completed

Results take longer to obtain but last longer
Vicon Applicator – more common for fertilizer
Air Assist Applicator – most accurate placement
In general it takes two to three years for the sulfur application to reduce the soil pH and it takes about 100 pounds of sulfur pellets to reduce the soil pH 0.1 **Target pH is 4.0**

Apply sulfur in the spring after pruning but it could be applied other times of the year, except if the ground is frozen, or if the soil is saturated with standing water or if the plant leaves are wet

Apply preemergence in the spring to pruned plants would have the least potential for any blueberry plant injury

With Vicon type spreader
Apply with ½ rate and 50% overlap

Reduced weed competition will increase yield:
N - 1.6%
P - 0.125%
B - 24 ppm
Yield as influenced by DAP application rate and P concentration in leaves
COMPARISON OF FISH HYDROLYSATE AND INORGANIC FERTILIZERS FOR LOWBUSH BLUEBERRY

John M. Smagula and Scott Dunham
University of Maine, Orono
OBJECTIVES

• Compare organic and inorganic fertilizer
• Determine effect of N, NP and NPK on leaf nutrient concentrations
• Evaluate yield response to fertilizers
MATERIAL AND METHODS

- Field with low leaf N and P
- Treatments: 33 or 67 kg N or P /ha
  Control
  N (urea)
  P (phosphoric acid)
  NP (diammonium phosphate)
  NPK (5-10-5)
  NPK (fish hydrolysate, 2-4-2)
LEAF NITROGEN

TREATMENTS

N (%)

CON  N  P  NP  NPK  FH  CON  N  P  NP  NPK  FH

33.6 kg/ha 67.2 kg/ha

Prune year, sign 1 %
LEAF PHOSPHORUS

Prune year

TREATMENTS

33.6 kg/ha

67.2 kg/ha

CON
N
P
NP
NPK
FH
CON
N
P
NP
NPK
FH

P (%)
LEAF POTASSIUM

TREATMENTS

K (%)

CON  N  P  NP  NPK  FH  CON  N  P  NP  NPK  FH

0.3  0.4  0.5  0.6

STD

CON  N  P  NP  NPK  FH

33.6 kg/ha  67.2 kg/ha

Prune year
BLUEBERRY YIELD

High Fertilizer RATE
(67.2 kg/ha)

Stem length (cm)

Yield (kg/ha) (Thousands)

TREATMENTS

CON  N  P  NP  NPK  FH

Stem length
Yield

(Thousands)
**CONCLUSIONS**

- Yield increase correlated well with stem length.
- In fields low in N and P, 67 kg/ha rate of fertilizer containing N and P recommended for improving nutrient status, growth and yield.
Wild Blueberry fields benefits

Open land provides wildlife habitat and increases land values
# Time-Table of Pest Abundance

<table>
<thead>
<tr>
<th></th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bud Swell</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bloom</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fruit Set</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ripening</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Harvest</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Spanworm L.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flea Beetle L.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sawfly L.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rootworm A.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leaf Beetle A.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Leaf Beetle A.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Thrips Curls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blueberry Maggot A.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Blueberry Plant Development*
Cultural Techniques to Reduce Insect Infestation

More information may be found in Wild Blueberry Fact Sheet No. 253, Cultural Management for Insects and Diseases in Wild Blueberries.

<table>
<thead>
<tr>
<th>Insects</th>
<th>Method</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blueberry Maggot</td>
<td>Harvesting</td>
<td>Harvesting techniques that reduce fruit loss can minimize the number of infected fruit left on the plants and on the ground.</td>
</tr>
<tr>
<td></td>
<td>Management</td>
<td>Keep isolated fields in same cycle.</td>
</tr>
<tr>
<td></td>
<td>Winnower cleanup</td>
<td>Compost, burn or dispose of winnower refuse.</td>
</tr>
<tr>
<td>Flea Beetle, Sawfly, Spanworm</td>
<td>Fire pruning Insecticides</td>
<td><em>BT</em> (<em>Bacillus thuringiensis</em>) <em>Botani</em>ard (<em>Beauveria bassiana</em>) <em>Entrust</em> (<em>spinosad</em>) Blueberry litter must be ignited.</td>
</tr>
<tr>
<td>Thrips</td>
<td>Fire pruning</td>
<td>Burn curled stems as soon as extensive curling occurs in early spring, but not later than June 1 in a nonbearing crop or reduction in next year's fruit buds will occur.</td>
</tr>
</tbody>
</table>
**Beauveria bassiana**

- BotaniGard / Mycotrol
- Naturally occurring fungal pathogen

*Control of Blueberry Flea Beetle Larvae - 2004*

![Graph showing survival rates of Blueberry Flea Beetle Larvae after application of different products over 15 days.](image)
Percent Survival of Blueberry Flea Beetle

- Untreated check
- Mycotrol ES + Entrust 70 WP

Days after collection:
- 0
- 3
- 5
- 8
- 11
- 13

Percent survival:
- 0
- 20
- 40
- 60
- 80
- 100

Bar chart showing the percentage survival of blueberry flea beetles over different days after collection.
## Severity Rating of Monilinia Infection Periods

<table>
<thead>
<tr>
<th>Wetness Duration (Hours)</th>
<th>Mean Temperature (°F) during Infection Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36°</td>
</tr>
<tr>
<td>2</td>
<td>NONE</td>
</tr>
<tr>
<td>4</td>
<td>NONE</td>
</tr>
<tr>
<td>6</td>
<td>NONE</td>
</tr>
<tr>
<td>8</td>
<td>NONE</td>
</tr>
<tr>
<td>10</td>
<td>MOD</td>
</tr>
<tr>
<td>15</td>
<td>MOD</td>
</tr>
<tr>
<td>24</td>
<td>HIGH</td>
</tr>
</tbody>
</table>

Serenade approved for organic use but results variable
Data from Paul Hildebrand and Rick Delbridge, Agriculture and Agri-Food Canada, Nova Scotia.
Tests of organic treatments for control of mummy berry blight

Son. = Sonata (*Bacillus pumilus*)
Ser. = Serenade (*Bacillus subtilis*)
CT = Compost Tea
G = Garlic adjuvant alone

Water = Water
Mulch = Peat Mulch
Neem = Neem Oil
Control = No treatment
Honeybee Hives vs Yield

Yield lbs/a x 1000

Honey Bee Hives/a

Blueberries need insects for pollination

Yield = 1264.2 + 881.4 * hives

Pr > F = 0.0004
Average flies/trap vs. Distance from field edge (ft)

Distance from field edge (ft)

Threshold
If both fields are in the same cycle flies will not have Berries to lay eggs and populations will drop
Small growers use backpack or ATV sprayers to apply Naturalyte Fruit Fly Bait (spinosad)
Control of Blueberry Maggot Fly with GF-120 NF Fruit Fly Bait

2003

Avg Number of BMF/trap

0 2 4 6 8 10

GF-120 Check

2004

Avg. number pupae/5 qts

0 5 10 15 20 25

GF-120 Check

GF-120 Check

1st application 12 July

2nd application 20 July

3rd application 26 July

Avg. BMF/trap

0 5 10 15 20 25

GF-120 NF Check

6-Jul 11-Jul 16-Jul 21-Jul 26-Jul 31-Jul
<table>
<thead>
<tr>
<th>Organic Cultural Management for Insect Pests</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Blueberry Maggot</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Flea beetle</strong></td>
</tr>
<tr>
<td><strong>Spanworm</strong></td>
</tr>
<tr>
<td><strong>Sawfly</strong></td>
</tr>
<tr>
<td><strong>Red striped fireworm</strong></td>
</tr>
<tr>
<td><strong>Thrips</strong></td>
</tr>
</tbody>
</table>

* doesn’t work consistently  
∞ expensive and difficult to maintain in windy areas  
† flea beetles also overwinter outside of field as adults (small proportion)  
Δ appears not to have a dramatic effect on natural enemies – timing
# Organic Insecticides for Insect Pests

<table>
<thead>
<tr>
<th>Pest Type</th>
<th>Insecticide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blueberry maggot</td>
<td>GF-120 NF Naturalyte®</td>
</tr>
<tr>
<td></td>
<td>Fruit Fly Bait</td>
</tr>
<tr>
<td>Blueberry spanworm</td>
<td>Entrust® 80 W</td>
</tr>
<tr>
<td></td>
<td><em>Bacillus thuringiensis</em> (various formulations)</td>
</tr>
<tr>
<td>Blueberry flea beetle</td>
<td>Entrust® 80 W</td>
</tr>
<tr>
<td></td>
<td>Botanigard® ES (Beauvaria bassiana)*</td>
</tr>
<tr>
<td>Strawberry rootworm</td>
<td>Entrust® 80 W</td>
</tr>
</tbody>
</table>

*Botanigard is also very effective on grasshoppers, but not often a problem*
## Organic Controls That Did NOT Work !!

<table>
<thead>
<tr>
<th>Pest</th>
<th>Control Measures</th>
</tr>
</thead>
</table>
| Blueberry maggot              | Surround® - can’t get the coverage  
                                    Entrust®  
                                    Botanigard® - *B. bassiana*  
                                    Pyrethrum  
                                    Neem / azadirachtin w/wo molasses bait for push-pull strategy |
| Blueberry spanworm            | Hot Pepper Spray  
                                    Steam sanitization ?  
                                    *Trichogramma* wasp release  
                                    Bollworm virus |
| Blueberry flea beetle         | *Bacillus thuringiensis (tenebrionus)*  
                                    Steam sanitization ?  
                                    Diatomaceous earth  
                                    Insecticidal soap |
| Strawberry rootworm           | Botanigard® - *B. bassiana*  
                                    Semaspore® – *Nosema locustae* |
| Grasshoppers                  |                                                                                   |
Exclusion of Blueberry Maggot Fly from fields with Hopperfinder® Barrier Tape
Exclusion of Blueberry Maggot Fly from fields with Hopperfinder® Barrier Tape

Mean number of pupae per quart of berries

2008*, $P < 0.05$

2009, $P > 0.05$
HOW DO FLIES MOVE INTO BEARING FIELDS?

• APPROACH FROM HIGH ALTITUDE AND DROP RANDOMLY INTO FIELD.

• APPROACH BY A SERIES OF SHORT HOPS AND CONTACT FIELD EDGE FIRST.
FLIES / TRAP

TRAP HEIGHT (m)
SMALL ENCLOSURES (3 REPS, 225 SQ FT)
DEBLOIS, ME 1999

LARGE ENCLOSURES (3 REPS, 70 X 150 X 70 FT)
WASHNIGNTON CO, ME 2001

FLIES / TRAP or MAGGOTS / QT

TREATMENT

OPEN ENCLOSURE FENCE

OPEN ENCLOSURE FENCE
Five years (1998-2002) of testing: NOT able to reduce maggot infestation: best results 2002
ENGINEERED BY NATURE™

WILD MAINE BLUEBERRIES

Thank you for supporting the Family Farm

Net Wt. 5 lbs
Wild Maine Blueberries

Ocquitt Farm
Pesticide Free
Wild Blueberries
Product of USA

1 U.S. Dry Pint 551ml

Until you've tried these, you haven't tasted blueberries.
Nature's #1 Antioxidant Fruit*

Wild Blueberry

Total Antioxidant Capacity
Per USDA Serving Size

Health Benefits of Wild Blueberries

- Blueberries have highest antioxidant capacity of 40 tested fruits and vegetables
- Tufts USDA animal study shows improved memory and motor skill with blueberry diet
- University of Illinois shows wild blueberries cancer-fighting promise
- Anthocyanin (blue-pigment) linked to reduce eyestrain and improved eyesight
- Blueberries as effective as cranberries to prevent and treat urinary tract infections
Organic Research Plot Treatments – Weed Plot evaluations

- Study initiated in 2004, results of second cycle
- Sulfur 0 or 1000 lb/a in 2004
- Mow vs Burn in 2004 and 2005
- Fertilizer (Pro-Holly 4-6-4) Interaction on weeds in 2006
- Cut – with string trimmer above blueberry, end of June, July, August 2006 on all plots and evaluate cover
- Harvest Plots for yield with Emerson Harvester Aug 2007
Plot layout
Calhoun/Amherst site

Eight replications of each block

* Pro-Holly (4-6-4)
Burn vs Mow on Weeds

- **Grass - Mow**
- **Grass - Burn**
- **Broadleaf-Mow**
- **Broadleaf-Burn**

<table>
<thead>
<tr>
<th></th>
<th>June</th>
<th>July</th>
<th>August</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>a</td>
<td>b</td>
<td>a</td>
<td>a</td>
</tr>
</tbody>
</table>

**Average Cover (%)**

June: A
July: B
August: A

**Legend**

- Grass - Mow
- Grass - Burn
- Broadleaf-Mow
- Broadleaf-Burn
Sulfur Treatment on weeds

- Grass - 0 lb/a
- Grass - 1000 lb/a
- Broadleaf - 0 lb/a
- Broadleaf - 1000 lb/a

Average Cover (%)

June: A, B, a, b
July: A, B, a, b
August: A, B, a, b
Effect of Sulfur on Soil pH

Soil samples 7.6 cm deep taken July of each year. Within each year, values having the same letter are not significantly different at the 5% level.
Effect of Sulfur on Soil pH

Figure 1
Effect of Treatments on Soil Characteristics

Prune Method

Soil concentration (ppm)

Nutrient Elements

<table>
<thead>
<tr>
<th>Nutrient Elements</th>
<th>Mow</th>
<th>Burn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ca</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>K</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fe</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Effect of Treatments on Soil Characteristics

Sulfur

Nutrients that decreased

Soil concentration (ppm)

Nutrient Elements

No sulfur  Sulfur
Effect of Treatments on Soil Characteristics

Sulfur

Nutrients that increased

Soil concentration (ppm)

Nutrient Elements

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>No sulfur</th>
<th>Sulfur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al</td>
<td>b</td>
<td>a</td>
</tr>
<tr>
<td>Fe</td>
<td>b</td>
<td>a</td>
</tr>
<tr>
<td>Cu</td>
<td>b</td>
<td>a</td>
</tr>
<tr>
<td>Mn</td>
<td>b</td>
<td>a</td>
</tr>
<tr>
<td>S</td>
<td>b</td>
<td>a</td>
</tr>
</tbody>
</table>
Nutrient Availability

- Fungi
- Bacteria and Actinomycetes
- N
- Ca & Mg
- P
- K
- S
- Fe, Mn, Zn, Cu, Co
- Mo
- B
Harvest 2 foot strip down center of each plot and convert to pounds per acre
Organic study blueberry yield vs. prune method, pH reduction, and fertilizer rate - 2007
Organic Study Yield
Effects of Treatments on 2007 Yield

Yield (lbs/acre)

Lbs N/acre

0 20 40 No Sulfur 20 Sulfur 40

Mow

Burn
Blueberry field in transition to organic production - Amherst

Mummyberry disease incidence (%)

Year:
- 2005
- 2007

Nitrogen application levels:
- 0 kg N / h
- 20 lb N / h
- 40 lb N / h

Legend:
- 0 kg N / h
- 20 lb N / h
- 40 lb N / h

Note: The differences in disease incidence are statistically significant across different nitrogen application levels and years.
Organic Study: blueberry yield vs. prune method and pH reduction interaction 2007

Yield (lb/a)

- Mow - sulfur 0 lb/a
- Mow - sulfur 1000 lb/a
- Burn - sulfur 0 lb/a
- Burn - sulfur 1000 lb/a
Organic Research Plot Treatments – Results

- Sulfur at 1000 lb/a reduced weeds and increased yield
- Burning increased yields over mowing
- Combining burn and sulfur Interaction 3X increased yield
- Fertilizer increased weeds and but with sulfur and burning also showed a trend to increased yield
- Yield still much lower than conventional fields
Quality in wild blueberries has long been a concern of growers

Use of sulfur to reduce soil pH in wild blueberry production for weed control is an effective cultural practice

Concerns were raised by some organic growers in Maine that the addition of sulfur could impart an “off-flavor” to the blueberry fruit

No previous research had been done to investigate this possibility we used fruit from an organic transition research site to test for the effect of sulfur application on fruit quality

Looked both at the chemical characteristics and mineral composition of the fruit

Used a trained taste-test panel to evaluate the flavor attributes of the fruit
Organic Research Plots – Methods

Berry yield was obtained by mechanically harvesting a 0.6 m wide strip down each treatment plot.

Two one-liter fruit sub-samples were taken from two treatments in each of the eight blocks:

1) the mowed, unfertilized control plots with no sulfur
2) mowed, unfertilized control plots that received the sulfur treatment

Elemental Analysis - N, Ca, K, Mg ( %) and Al, B, Cu, Fe, Mn, Zn (ppm)

Fresh fruit were analyzed for pH, percent soluble solids, titratable acidity and Hunter values (a measure of berry color).
Plot layout
Calhoun/Amherst site

Burn
- cont
- 20 lb* N/a
- 40 lb N/a

Mow

Sulfur | 66 ft | No Sulfur
---|---|---
6 | 6 | 6
5 | 10 | 6
6 | 6 | 6

* Pro-Holly (4-6-4)

Eight replications of each block
Berries were rinsed with tap water and then refrigerated. Defective berries, such as splits, wrinkled berries, and mushy berries were removed, as were any remaining stems and leaves.

Eighteen persons received two samples of S and one of NS; the other eighteen also received two samples of NS and one of S.

After all three samples were tasted, the panelists were asked to identify the one sample that tasted differently from the other two samples.

Panelists were also asked why they thought that the sample tasted different.

SIMS 2000 sensory software program was used to generate a balanced randomized sample presentation order.
No difference in any of the fruit chemical characteristics or color from the sulfur
No increase in sulfur in the fruit, slight increase in K and decrease in Ca, Mg
Organic Research Plots – Fruit Quality Results

Large increase in Mn in the fruit with the sulfur treatment
Organic Research Plots – Fruit Quality Results

Table 1. Panelist comments*.

<table>
<thead>
<tr>
<th>Sample</th>
<th>Comment</th>
<th>Number of comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>less flavor</td>
<td>3</td>
</tr>
<tr>
<td>S</td>
<td>less sweet</td>
<td>1</td>
</tr>
<tr>
<td>S</td>
<td>sweeter/livelier flavor</td>
<td>2</td>
</tr>
<tr>
<td>NS</td>
<td>less sweet</td>
<td>2</td>
</tr>
<tr>
<td>NS</td>
<td>less flavor</td>
<td>2</td>
</tr>
<tr>
<td>NS</td>
<td>more tart/sharper taste</td>
<td>5</td>
</tr>
<tr>
<td>NS</td>
<td>sweeter and stronger flavor</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>can’t tell</td>
<td>1</td>
</tr>
</tbody>
</table>

*Total is greater than 18 because some persons made more than one comment.

Panelists were able to distinguish between the samples
Organic Research Plots – Fruit quality results

Results of this study indicate that there should be no concern that the addition of sulfur added to wild blueberry fields for weed control.

Panelists who evaluated the fruit indicated the non-sulfur treatment resulted in blueberries that were more tart but otherwise, flavor preferences were equivalent.

Increase in the accumulation of manganese with the sulfur application is viewed as a positive one as the manganese in blueberries aids in maintenance of strong bones.