

Organic highbush blueberry production basics



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Small Fruits: Options & Opportunities – March 8, 2011

- Organic production systems “...respond to site-specific conditions by integrating cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.” – USDA (2002)
- USDA National Organic Standards (2002)
- Accredited certifiers:
 - NH Department of Agriculture, Markets & Food
 - Vickie Smith, 603-271-3685, vsmith@agr.state.nh.us

In practice, certified organic:

- Synthetic fertilizers & pesticides are generally prohibited
- Fertilizers & pesticides of natural origin are generally allowed**
- Requires:
 - Organic farm plan for managing nutrients and pests
 - Research & record-keeping



Planting & Maintaining Highbush Blueberries

- Site selection
- Adjust pH
- Mulch & Sod
- Irrigation
- Annual Pruning
- Pollination
- Fertilization May-June ←
- Pest Management Apr-Aug ←
- Harvest late July-Sept

- Full production in 8 years



Photo: Bill Lord

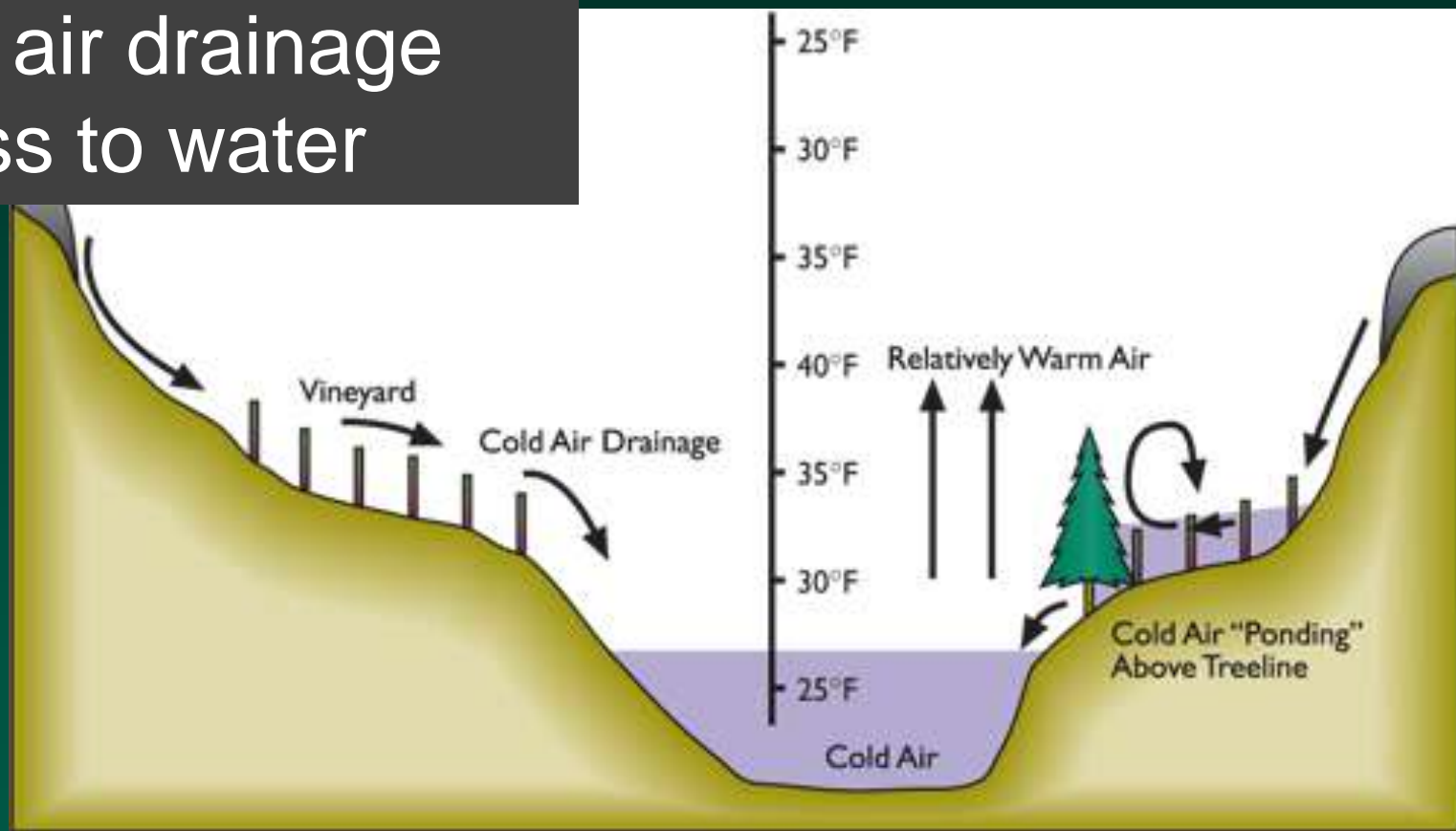
Managing an organic planting

- Site selection
- Varieties
- Nutrition
- Pest management
- Pruning



Choose a site with:

- Good water drainage
- Good air drainage
- Access to water



Virginia Cooperative Extension

One year before planting:

- Adjust pH to 4.5-5.0
 - Finely ground elemental sulfur
- Kill perennial grasses
 - Light barrier (plastic, fabric), or tillage to kill
 - Till and plant cover crop
- Decide on varieties and order plants



Variety selection...

- Plant a few different varieties for cross pollination
- Select varieties based on:
 - Hardiness
 - Maturity date
 - Disease resistances
 - Flavor and berry characteristics
 - Growth habit
- Preferences vary widely!

For example...



July

Aug

Sept

Blueberry Nutrition

pH is the #1 factor in growing healthy plants

- Soil test every 2 years

Incorporate fertilizers based on soil tests just before planting:

- Organic complete fertilizers
- Soy or alfalfa meals, bone char, sulphomag

Annual fertilization

- Nitrogen is usually the only element needed
 - $\frac{1}{4}$ - $1\frac{1}{4}$ lbs actual N per bush
- All other nutrients should be applied based on leaf tissue analysis
 - Leaf tissue test every 3 years

Soil vs. Tissue Tests

pH 5.6

Phosphorus VH

Potassium VL

Magnesium 0

Calcium 0

Manganese

Iron

Copper

Boron

Aluminum

Zinc

Nitrogen 0

Phosphorus 0

Potassium 0

Magnesium 0

Calcium 0

Manganese 0

Iron L

Copper 0

Boron 0

Aluminum 0

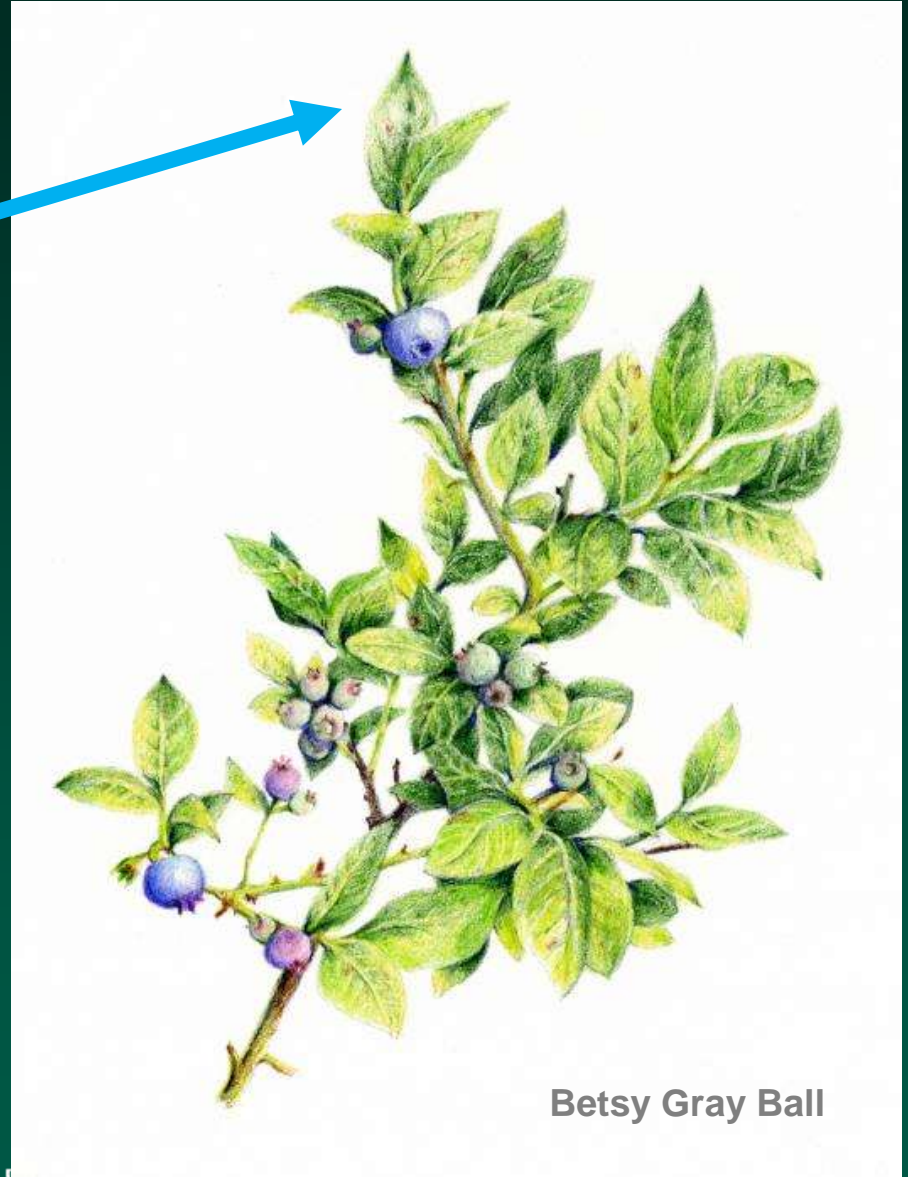
Zinc L



Taking Leaf Tissue Tests

- When first fruits ripen
- 40 healthy leaves
- From 10-20 plants

- Plants should be *representative*



Betsy Gray Ball

With soluble fertilizers,

Apply $\frac{1}{2}$ at **BLOOM**, $\frac{1}{2}$ **SIX WEEKS LATER**

With organic fertilizers, apply **ALL AT BLOOM**



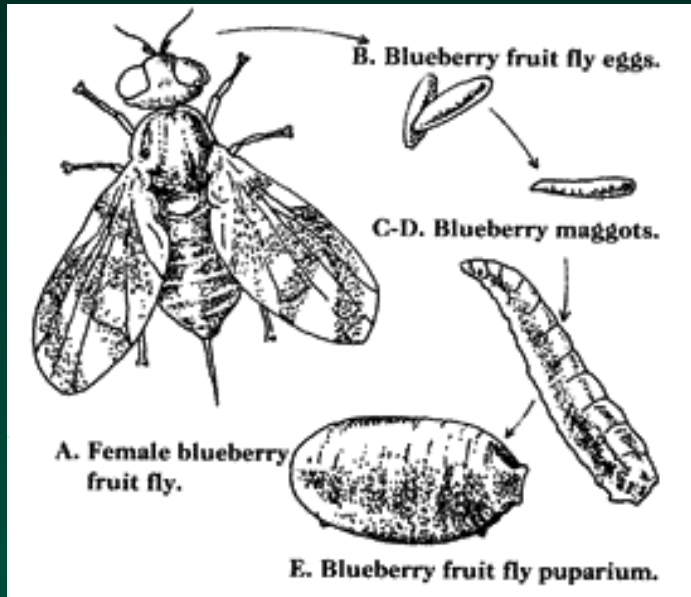
Photo: Bill Lord

Winter injury caused by late nitrogen application

Managing Insects & Diseases

- Blueberry maggot/ blueberry fruit fly
- Mummyberry
- Other fruit diseases
- Cane diseases

Blueberry Maggot or *Blueberry Fruit Fly*



Univ. of Maine

- adults emerge late June-Aug
- females lay eggs in ripe fruit
- larvae hatch in 3-10 days
- larvae feed for 17-22 days
- fruit drops to ground, larvae pupates in soil



Michigan State University

Do you have a problem?

Monitor for flies:

- Before first fruits ripen
- Use **unbaited sticky** red spheres
OR
baited yellow trece traps

Sources of traps:

Great Lakes IPM

www.greatlakesipm.com

Gempler's

www.gemplers.com



Photos: Michigan State University

Insecticide Options

- Surround (kaolin clay)
- Pyganic (pyrethrum)
- AzaDirect, AgroNeem (azadiractin)
- GF120 Naturalyte Fruit Fly Bait
- Entrust
(spinosad)



Efficacy of organically-approved insecticides

Table 2. Mortality of adult blueberry maggots after residual exposure to organic insecticides

Treatment	(AI) / ha	Mortality (%)	
		24 h	48 h
Aza-Direct	13.8 g	7.5 ± 3.1cd	32.5 ± 5.9c
	27.6 g	8.7 ± 3.9cd	23.7 ± 4.6c
Entrust	56.1 g	38.7 ± 7.6b	93.7 ± 3.2ab
	112.2 g	36.2 ± 8.0b	85.0 ± 5.9b
PyGanic 1.4 EC	16.4 ml	10.0 ± 2.6c	25.0 ± 5.6c
	32.8 ml	13.7 ± 3.7cd	37.5 ± 7.0c
Imidan 70-W ^a	1.05 kg	96.2 ± 1.8a	98.7 ± 1.2a
Water (control)		3.7 ± 2.6d	21.2 ± 5.8c

Means in the same column having the same letter are not significantly different (arcsine square-root transformed data, Fisher's LSD, $P = 0.05$).

^a Organophosphate insecticide (included to allow comparison with organic insecticides).



Barry et al 2005. Journal of Economic Entomology

Where the rubber meets the road...

“% boiled blueberries w/maggots”

Table 4. Larval blueberry maggot presence estimated from boiling blueberry fruit samples collected in an organic insecticide trial

Treatment	Rate (oz/acre)	% boiled blueberries with maggots ^a		
		24 July	31 July	12 Aug.
Entrust	112.2 g	0.57 ± 0.20bc	1.00 ± 0.46bc	0.67 ± 0.34bc
GF-120	0.29 ml	0.47 ± 0.17bc	0.53 ± 0.03c	0.53 ± 0.22bc
Agroneem	7.02 ml	2.27 ± 1.48b	2.30 ± 1.08b	1.90 ± 1.25b
PyGanic 1.4 EC	32.8 ml	1.03 ± 0.34bc	0.70 ± 0.23c	0.50 ± 0.06bc
Provado 1.6F ^b	84.2 g	0.3 ± 0.06c	0.23 ± 0.08c	0.03 ± 0.03c
Untreated		13.70 ± 3.04a	14.10 ± 4.50a	9.7 ± 2.25a
<i>F</i>		19.49	25.29	13.55
<i>P</i>		<0.0001	<0.0001	<0.0001

Means in the same column having the same letter are not significantly different (arcsine square-root transformed data, Fisher's LSD, $P = 0.05$).

^a $df = 5, 66$.

^b Neonicotinoid insecticide (included to allow comparison with organic insecticides).

Barry et al 2005. *Journal of Economic Entomology*

For organic blueberry fruit fly control:

Spinosad materials highly effective

GF-120 bait uses much less AI, but requires special application equipment

Azadiractin materials less effective

Pyrethrum intermediate

- Monitor – know when flies are present
- Apply materials as SOON as flies are identified – BEFORE egg-laying starts
- Re-apply according to label instructions

Mummyberry

Monilinia vacinii-corymbosi



Photo: Southern Region Small Fruit Consortium



Photo: Mark Longstroth



Photo: Michigan State University



Control Measures

- Varieties
- Fall mulching
- Scout for apothecia (use a “mummy garden”)
 - rake
 - lime sulfur
- Apply fungicides: budbreak through bloom
 - Serenade (*B. subtilis*)



Photo: Michigan State University



Photo: Mark Longstroth

Mulching

- ❖ Weed control
- ❖ Disease control
- ❖ Water management

- 3-4" deep
- Wood chips ideal
 - Some use sawdust, leaves, needles, etc
 - Consider water penetration, habitat for voles
- Increase fertilizer rates if mulching



Photo: Bill Lord

Other fruit diseases

Botrytis blight



and Anthracnose

Control:

- decrease humidity at bloom
- pick fruit cleanly

Cane Diseases

Fusicoccum canker



Photo: MSU

and

Phomopsis blight

Control:

- pruning
- sanitation
- dormant lime sulfur

Basic Principles of Pruning

- Remove non-productive canes
 - Old and diseased wood
- Increase light and air flow
- Balance the fruit load

3-5 year old canes are most productive

- aim for 2-3 new canes per year
- remove old canes

When to prune?

- Start light pruning in year 3
- Late in winter is best (after Feb 1)
- Avoid spells right before or after cold snaps
- *Can* start if bushes are FULLY DORMANT
- OK to remove diseased canes anytime



Questions?