



Can humic acids improve production in mature organic northern highbush blueberry?

Amanda Davis and Dr. Scott Lukas

Collaborators: Dr. Bernadine Strik and Dr. David Bryla



Oregon State
University

Objective

Can adding OMRI-approved humic acids to a standard fertigation program in a mature organic blueberry production system...

- Improve yield or fruit quality
- Change leaf/fruit nutrient concentration
- Change soil characteristics



Study details

• Treatments

- Cultivars: 'Duke' and 'Liberty'
- With or without humic acid (HA)
 - BioGro Premium 6 (0-0-1)
 - 3.5% humic acid (983 g/year), 1.2% fulvic acid (329 g/year)
 - 1 gal/acre, every 2 weeks, mid-April through early July
- Fertilizer: 80 lb N/acre
 - Grower's Secret 14-0-0





Harvest details

- **Duke**

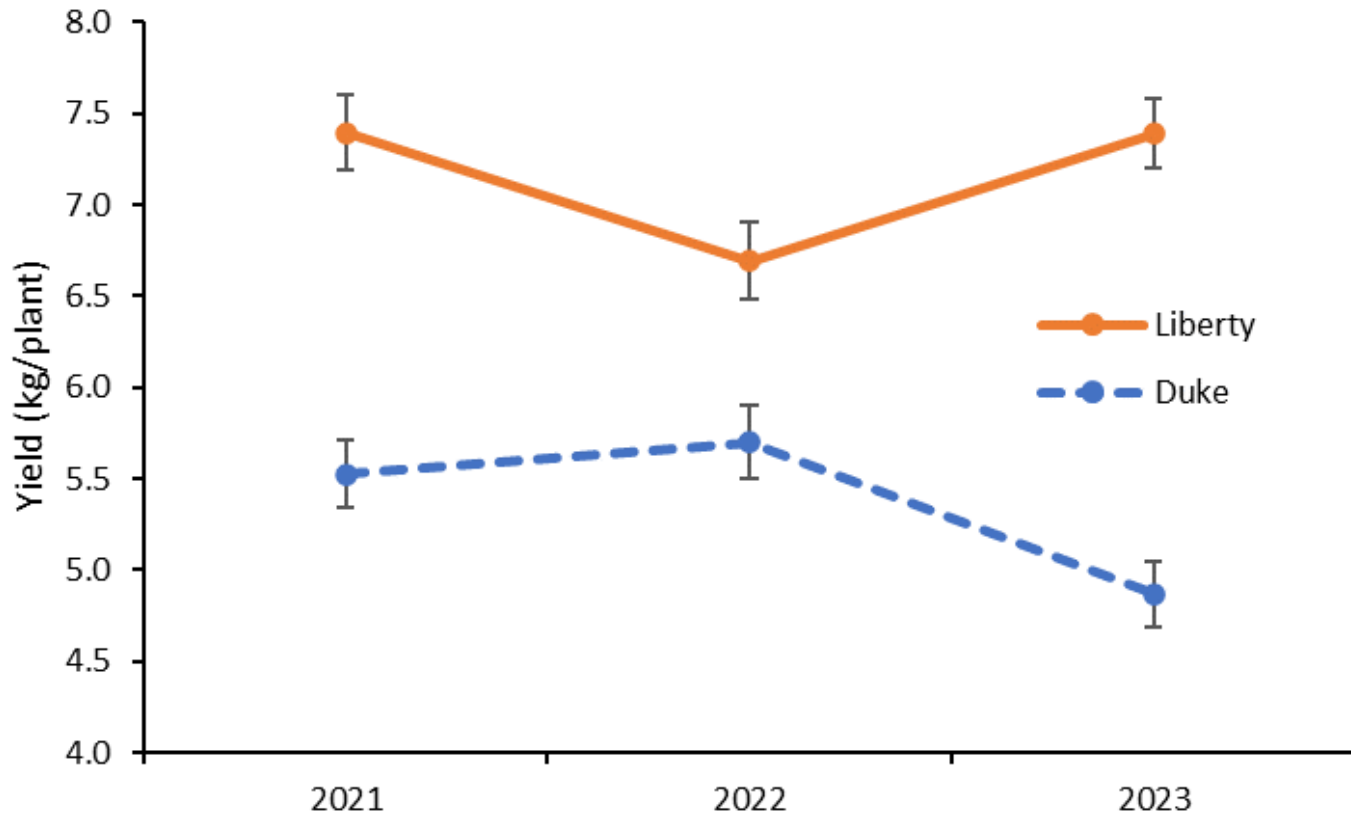
- 2021-2022: Hand picked over 2 harvests
- 2023: Machine picked on 1 harvest

- **Liberty**

- 3 harvests each year
- 2021-2022: hand and machine picked
- 2023: all machine picked

Results: Yield

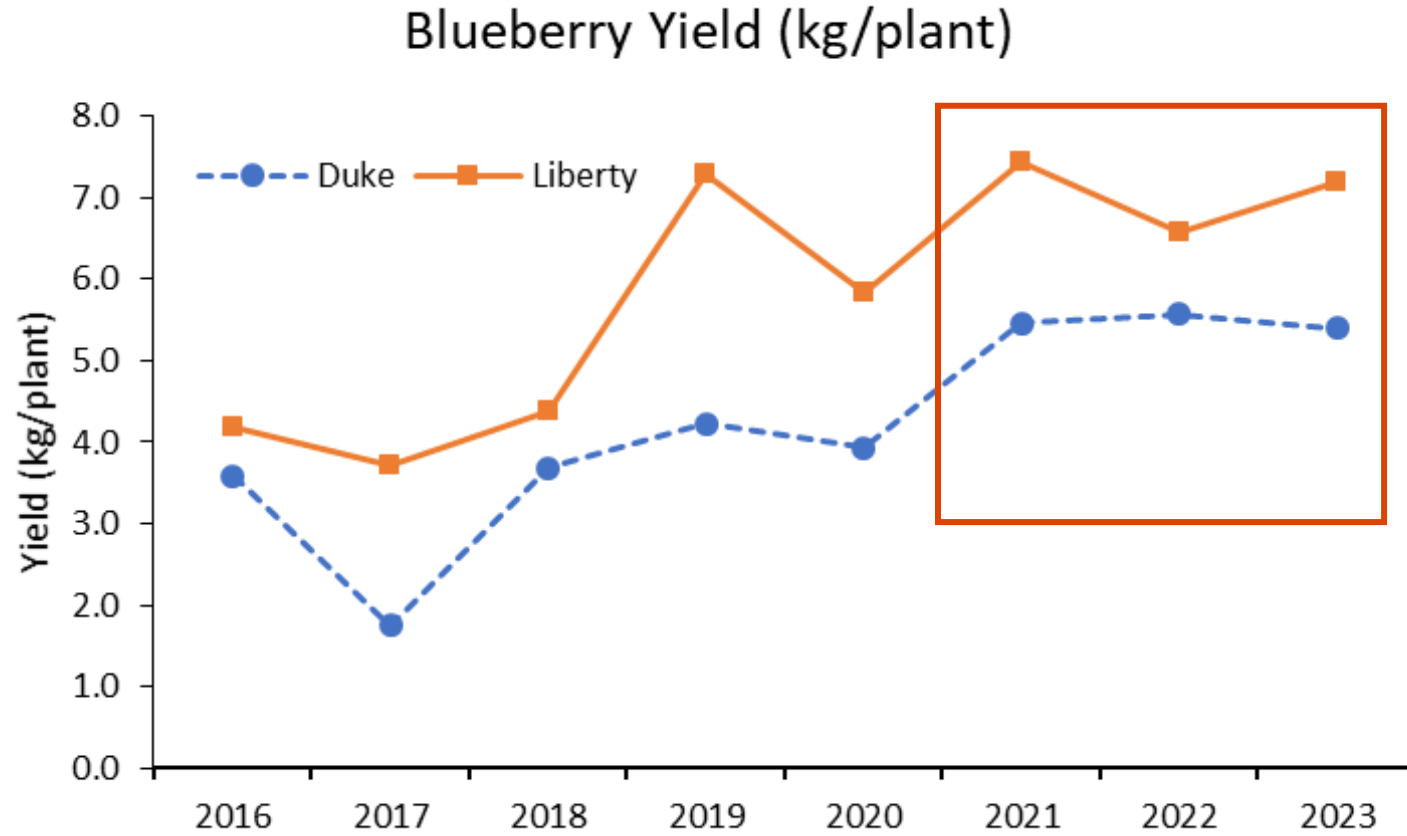
- HA had no effect on either cultivar or in any year
- Ripening rate not affected



**Liberty: 13.7
tons/acre**

**Duke: 10.3
tons/acre**

Results: Yield



Fruit quality (2023)

- Berry weight larger in Duke w/o HA
- Brix and firmness only differed by cultivar

	Berry weight (g)	Brix (%)	Firmness (g/mm)
Humic	1.9	13.6	155
No Humic	1.9	13.7	153
Duke	1.8	13.2	143
Liberty	2.0	14.1	165
<i>Humic</i>	<i>NS</i>	<i>NS</i>	<i>NS</i>
<i>Cultivar</i>	<i><0.0001</i>	<i><0.0001</i>	<i><0.0001</i>
<i>Humic x Cultivar</i>	<i>0.0434</i>	<i>NS</i>	<i>NS</i>





Leaf nutrients

- All nutrients were within sufficiency standards
- HA had few effects, years and cultivars differed
 - Leaf P, Mg higher with HA in some cases
 - Leaf Cu lower with HA
 - All differences very small



Fruit nutrients

- Year and cultivar effects dominant
- Few differences due to HA were very small
 - %K and S lower with HA (0.01 to 0.001% difference)
 - Higher Fe and Zn (ppm) in 'Liberty' with HA, not different in 'Duke'

Soil properties

- Only 'Duke' plots sampled
- Soil P and Ca increased with HA, pH only in 2021:

	Soil organic		Soil nutrient concentration (ppm)											
	Soil ph	matter (%)	NO ₃	NH ₄	P (Bray I)	K	Ca	Mg	Fe	B	Cu	Mn	Zn	Al
<i>Year</i>														
2021	5.7	3.8	3.6	1.9	154	146	1337	333	385	0.3	1.0	29	1.9	1344
2022	5.8	3.9	4.7	3.7	164	136	1250	300	367	0.4	0.9	21	1.8	1261
2023	5.9	3.7	2.8	1.8	164	134	1257	289	313	0.3	1.3	22	1.9	1192
<i>Humic acid (H)</i>														
Humic	5.9	3.8	3.2	2.3	167	139	1324	311	357	0.3	1.1	25	2.0	1266
NoHumic	5.8	3.7	4.2	2.7	155	138	1239	304	352	0.3	1.0	23	1.8	1266
<i>Significance</i>														
<i>Year</i>	NS	NS	NS	0.0046	NS	NS	NS	NS	<0.0001	NS	0.0006	0.0175	NS	0.0009
<i>H</i>	0.0181	NS	NS	0.0246	0.0177	NS	0.0078	NS	NS	NS	NS	NS	NS	NS
<i>Year x H</i>	0.0067	NS	NS	0.0306	NS	NS	NS	NS	NS	0.0082	NS	0.0412	NS	NS

Humic acid analysis

- pH of 4.6-5.1 (SDS)
- Nutrient analysis varied between years (B, Cu, Mn)
 - Ca: over 1% in 2021-22, none in 2023
 - Very low/undetectable P
 - Also contained K (~1% every year, no differences in soil)

	Soil organic		Soil nutrient concentration (ppm)											
	Soil ph	matter (%)	NO ₃	NH ₄	P (Bray I)	K	Ca	Mg	Fe	B	Cu	Mn	Zn	Al
<i>Year</i>														
2021	5.7	3.8	3.6	1.9	154	146	1337	333	385	0.3	1.0	29	1.9	1344
2022	5.8	3.9	4.7	3.7	164	136	1250	300	367	0.4	0.9	21	1.8	1261
2023	5.9	3.7	2.8	1.8	164	134	1257	289	313	0.3	1.3	22	1.9	1192
<i>Humic acid (H)</i>														
Humic	5.9	3.8	3.2	2.3	167	139	1324	311	357	0.3	1.1	25	2.0	1266
NoHumic	5.8	3.7	4.2	2.7	155	138	1239	304	352	0.3	1.0	23	1.8	1266
<i>Significance</i>														
<i>Year</i>	NS	NS	NS	0.0046	NS	NS	NS	NS	<0.0001	NS	0.0006	0.0175	NS	0.0009
<i>H</i>	0.0181	NS	NS	0.0246	0.0177	NS	0.0078	NS	NS	NS	NS	NS	NS	NS
<i>Year x H</i>	0.0067	NS	NS	0.0306	NS	NS	NS	NS	NS	0.0082	NS	0.0412	NS	NS

Summary

- Productivity and plant health in this research planting remain strong
- No benefit of humic acid application
 - smaller berries in some cases
- Cost savings of \$40-50/acre based on product and rate



Thank you!

BioGro, Grower's Secret, BirdGard, Bird Control Group, Oxbo, Littau Harvester

