

Open Hydroponics vs. Conventional Grove Trial Grove "What-If" Analysis

Instructions:

The trial grove "what-if" analysis allows you to compare the costs and returns for planting groves using Advanced Production Systems/Open Hydroponics and conventional microjet systems. The series of worksheets are designed to illustrate the principles of APS/OHS in financial terms.

Getting Started:

Our suggestion is to follow a simple procedure. First, save this file in a place you want to keep it. Then, go to <File> in the upper left corner of the screen and choose <Save As> and save it again with a different file name (that way if it gets messed up you'll still have the original file). We recommend that you first print out all the sheets. After you've printed out the sheets, which already have fairly realistic data, you'll be able to see what's on all of them, and can then start to play with your own numbers.

With all of the sheets, the numbers marked with **colored print** are constants that change the numbers on the sheet. The tree counts are all based on the initial tree spacing you can insert in the "Establishment" worksheet. You can also just type directly into the boxes to change anything.

Tip: Change the size of the type by selecting <View>, then <Zoom> -- you'll be able to see more on the screen. Play around with it until you have a comfortable appearance.

Using the Tool: There are four tabs in this spreadsheet that do the work.

Establishment: The first one looks at grove establishment costs. Due to the higher number of trees in APS/OHS, the establishment costs are higher, but the cost/tree is less since there are more trees over which the indirect costs such as land clearing can be absorbed.

Annual Cost: The second sheet compares annual grove care costs using Ron Muraro's latest figures. The primary differences are due to the increased number of rows with APS/OHS, requiring more equipment trips through the grove. The irrigation and fertilizer costs are generally lower with APS/OHS, while pruning costs will be higher.

Year 3 Scenario: The third sheet takes a snapshot of the first commercial crop that most APS/OHS groves will produce. While some fruit may be produced during the second growing season, the moment of shift from the non-bearing to bearing program is generally at the end of the second growing season, and the third growing season is the first dedicated to setting and producing fruit that will be harvested the following fruit season. This is the first true commercial crop, and there will be more fruit per acre with APS/OHS simply due to the added number of trees. The bearing program will then continue through the commercial life of the grove. Note that the cost figures are linked to the Annual Cost sheet. This sheet can also be used for analysis of any year by adjusting the numbers.

Greening Scenario: The fourth sheet is an analysis of the effects of greening losses. You can substitute different loss rates to see the effect on production over the first 12 years of the grove. You can also change the boxes/tree each year to see how that affects production. One of the cornerstone theories of APS/OHS is that as trees are lost to greening, the neighboring trees will rapidly fill the empty space. As they do so, the boxes per tree produced will increase since the remaining trees can grow larger. The actual progress of this effect will be based on the number of trees that are lost. With low loss rates, you'll need to adjust the boxes per tree downward from the data provided in the basic model since the trees will remain confined. With higher loss rates, the boxes per tree for the remaining trees should be increased faster than what is shown since they will probably grow larger.

Open Hydroponics vs. Conventional Grove
 Trial Grove "What-If" Analysis
 Grove Establishment Costs

Item	Cost/Unit	Unit	Total Cost	Cost/Acre	Cost/Tree
APS/OHS	<i>Tree spacing in row:</i>	6	<i>Row Spacing:</i>	20	363
	<i>Grove Acres:</i>	40			14,520
					<i>trees/acre</i>
					<i>total trees</i>
Land clearing/leveling	\$ 400	acre	16,000	400	1.10
Bedding	\$ 400	acre	16,000	400	1.10
Trees	\$ 8.00	tree	116,160	2,904	8.00
Tree wraps	\$ 0.50	tree	7,260	181.50	0.50
Tree Planting/Establishment	\$ 2.50	tree	36,300	908	2.50
Irrigation System	\$ 1,800	acre	72,000	1,800	4.96
Windbreaks	\$ 80	acre	3,200	80	0.22
Other Cost (Power, etc.)			-	-	-
			\$ Totals	6,673	18.38
Conventional	<i>Tree spacing in row:</i>	12	<i>Row Spacing:</i>	25	145
	<i>Grove Acres</i>	40	<i>Row Ratio</i>	80%	5,808
					<i>trees/acre</i>
					<i>total trees</i>
Land clearing/leveling	400	acre	16,000	400	2.75
Bedding	320	acre	12,800	320	2.20
Trees	8.00	tree	46,464	1,162	8.00
Tree wraps	0.50	tree	2,904	73	0.50
Tree Planting/Establishment	2.50	tree	14,520	363	2.50
Irrigation System	1,620	acre	64,800	1,620	11.16
Windbreaks	80	acre	3,200	80	0.55
Other Cost (Power, etc.)			-	-	-
			Totals	4,017	27.67
			Difference, APS/OHS vs. Conventional	2,656	(9.28)
					Conventional Additional Cost/Tree
					51%

*Tree planting/establishment includes planting, staking, wrap installation, other housekeeping jobs.

**Open Hydroponics vs. Conventional Grove
Trial Grove "What-If" Analysis
Annual Grove Care Costs**

-- Ron Muraro Costs for Conventional
-- Same Canopy Volume/Acre Assumed

Grove Size OHS Conventional
14,520 5,808
trees/acre total trees

Item	Conventional Cost/Acre	OHS Cost/Acre	Conventional Total Cost	OHS Total Cost	Conventional Cost/Tree	OHS Cost/Tree
<u>Weed Management/Control:</u>						
Mow Middles	32.76	40.95	1,310.40	1,638.00	0.23	0.11
Chem Mow Middles	25.53	31.91	1,021.20	1,276.50	0.18	0.09
General Grove Work	30.88	30.88	1,235.20	1,235.20	0.21	0.09
Herbicide (1/2 tree acre treated):						
Application (3 residual applications)	42.28	52.85	1,691.20	2,114.00	0.29	0.15
Material	90.37	112.96	3,614.80	4,518.50	0.62	0.31
Total Herbicide	132.65	165.81	5,306.00	6,632.50	0.91	0.46
Total Weed Management	221.82	269.56	8,872.80	10,782.20	1.53	0.74
<u>Spray/Pest Management:</u>						
Temik (33 lbs): Application	14.93	18.66	597.20	746.50	0.10	0.05
Temik Material	108.54	108.54	4,341.60	4,341.60	0.75	0.30
Total Temik Program	123.47	154.34	4,938.80	6,173.50	0.85	0.43
Winter-Spring #1: Application (125 GPA) (February) Material	29.20	36.50	1,168.00	1,460.00	0.20	0.10
Winter Spring #2: Application (125 GPA) (Nutritional) Material	34.09	34.09	1,363.60	1,363.60	0.23	0.09
Winter Spring #3: Application (125 GPA) @ 3 Times Material	29.20	36.50	1,168.00	1,460.00	0.20	0.10
	38.41	38.41	1,536.40	1,536.40	0.26	0.11
Late Spring #4: Application (125 GPA) (Nutritional) Material	87.60	109.50	3,504.00	4,380.00	0.60	0.30
	47.52	47.52	1,900.80	1,900.80	0.33	0.13
Summer Oil #1: Application (125 GPA) Material	29.20	36.50	1,168.00	1,460.00	0.20	0.10
	49.51	49.51	1,980.40	1,980.40	0.34	0.14
Annual Cost	29.20	36.50	1,168.00	1,460.00	0.20	0.10
	80.85	80.85	3,234.00	3,234.00	0.56	0.22

Row Ratio of Conventional vs. APS/OHS

Item	Conventional Cost/Acre	OHS Cost/Acre	Conventional Total Cost	OHS Total Cost	Conventional Cost/Tree	OHS Cost/Tree
Summer Oil #2: Application (125 GPA) Material	29.20 55.59	36.50 55.59	1,168.00 2,223.60	1,460.00 2,223.60	0.20 0.38	0.10 0.15
Fall Insecticide: Application (125 GPA) Material	29.20 50.61	36.50 50.61	1,168.00 2,024.40	1,460.00 2,024.40	0.20 0.35	0.10 0.14
Total Spray Program	619.38	774.23	24,775.20	30,969.00	4.27	2.13
Field Inspections for Citrus Greening (4 inspections @ \$22.73) Clean Blocks Before Certification and Harvesting Inspections Before "Canker Free" Certification (2 inspections @ \$22.73) Mandatory Citrus Canker Decontamination Costs	90.92 31.08 45.46 29.35	113.65 38.85 56.83 29.35	3,636.80 1,243.20 1,818.40 1,174.00	4,546.00 1,554.00 2,273.00 1,174.00	0.63 0.21 0.31 0.20	0.31 0.11 0.16 0.08
Total Pest Control Program	939.66	1,167.24	37,586.40	46,689.50	6.47	3.22
Fertilizer:4 Bulk Applications Conv, \$50/A OHS Material (12-2-12-2.4MgO @ 120 lbs N Conv, 30% Less OHS)	37.44 129.88	50.00 90.92	1,497.60 5,195.20	2,000.00 3,636.64	0.26 0.89	0.14 0.25
Dolomite (one ton applied every 3 yrs) – Material/Application	14.76	14.76	590.40	590.40	0.10	0.04
Total Nutrition Program	182.08	155.68	7,283.20	6,227.04	1.25	0.43
Pruning: Topping (\$28.92/A ÷ 2.5 yrs Conv, Hand Prune OHS) Hedging (\$27.33/A ÷ 2 yrs Conv, Annual OHS) Chop/Mow Brush after Hedging (\$11.99/A ÷ 2 yrs) Raise Skirts of Trees (\$15.75/A ÷ 2 yrs)	11.97 13.67 6.00 7.88	150.00 27.33 7.50 9.85	478.80 546.80 240.00 315.20	6,000.00 1,093.20 300.00 394.00	0.08 0.09 0.04 0.05	0.41 0.08 0.02 0.03
Irrigation: Microsprinkler Conv, 40 % Less w/Drip OHS Clean Ditches (Weed Control) Ditch and Canal Maintenance Water Control (Pump water in/out of Ditches and Canals)	186.70 18.56 17.48 16.72	140.03 18.56 17.48 16.72	7,468.00 742.40 699.20 668.80	5,601.00 742.40 699.20 668.80	1.29 0.13 0.12 0.12	0.39 0.05 0.05 0.05
Total Cost	1,622.54	1,979.93	64,901.60	79,197.34	11.17	5.45
Comparison of APS/OHS vs. Conventional	Per Acre	357.39	Grove Total	14,295.74	Per Tree	(5.72)
						Added Cost/Tree for Conventional 105%

**Open Hydroponics vs. Conventional Grove
 Trial Grove "What-If" Analysis
 Year 3 Scenario**

The Year 3 Scenario assumes that the first commercial crop will be harvested at the end of the 3rd growing season.

-- Ron Muraro Costs for Conventional
 -- Same Canopy Volume/Acre Assumed

Grove Size 40 acres

OHS	
363	Conventional
14,520	145
Total Trees	
5,808	

Item	Conventional		OHS		Conventional		OHS		Conventional	
	Cost/Acre	Cost/Acre	Total Cost	Total Cost	Cost/Tree	Cost/Tree	Total Cost	Total Cost	Cost/Tree	Cost/Tree
80% Row Ratio of Conventional vs. APS/OHS										
<u>Weed Management/Control:</u>										
Mow Middles	32.76	40.95	1,310	1,638	0.23	0.23	1,638	1,638	0.11	0.11
Chem Mow Middles	25.53	31.91	1,021	1,277	0.18	0.18	1,277	1,277	0.09	0.09
General Grove Work	30.88	30.88	1,235	1,235	0.21	0.21	1,235	1,235	0.09	0.09
Herbicide (1/2 tree acre treated):										
Application (3 residual applications)	42.28	52.85	1,691	2,114	0.29	0.29	2,114	2,114	0.15	0.15
Material	90.37	112.96	3,615	4,519	0.62	0.62	4,519	4,519	0.31	0.31
Total Herbicide	132.65	165.81	5,306	6,633	0.91	0.91	6,633	6,633	0.46	0.46
Total Weed Management	221.82	269.56	8,873	10,782	1.53	1.53	10,782	10,782	0.74	0.74
<u>Spray/Pest Management:</u>										
Temik (33 lbs): Application	14.93	18.66	597	747	0.10	0.10	747	747	0.05	0.05
Temik Material	108.54	108.54	4,342	4,342	0.75	0.75	4,342	4,342	0.30	0.30
Total Temik Program	123.47	154.34	4,939	6,174	0.85	0.85	6,174	6,174	0.43	0.43
Winter-Spring #1: Application (125 GPA) (February) Material	29.20	36.50	1,168	1,460	0.20	0.20	1,460	1,460	0.10	0.10
Material	34.09	34.09	1,364	1,364	0.23	0.23	1,364	1,364	0.09	0.09
Winter Spring #2: Application (125 GPA) (Nutritional) Material	29.20	36.50	1,168	1,460	0.20	0.20	1,460	1,460	0.10	0.10
Material	38.41	38.41	1,536	1,536	0.26	0.26	1,536	1,536	0.11	0.11
Winter-Spring #3: Application (125 GPA) @ 3 Times	87.60	109.50	3,504	4,380	0.60	0.60	4,380	4,380	0.30	0.30
Material	47.52	47.52	1,901	1,901	0.33	0.33	1,901	1,901	0.13	0.13
Late Spring #4: Application (125 GPA) (Nutritional) Material	29.20	36.50	1,168	1,460	0.20	0.20	1,460	1,460	0.10	0.10
Material	49.51	49.51	1,980	1,980	0.34	0.34	1,980	1,980	0.14	0.14
Summer Oil #1: Application (125 GPA) Material	29.20	36.50	1,168	1,460	0.20	0.20	1,460	1,460	0.10	0.10
Material	80.85	80.85	3,234	3,234	0.56	0.56	3,234	3,234	0.22	0.22
Summer Oil #2: Application (125 GPA) Material	29.20	36.50	1,168	1,460	0.20	0.20	1,460	1,460	0.10	0.10
Material	55.59	55.59	2,224	2,224	0.38	0.38	2,224	2,224	0.15	0.15
Fall Insecticide: Application (125 GPA) Material	29.20	36.50	1,168	1,460	0.20	0.20	1,460	1,460	0.10	0.10
Material	50.61	50.61	2,024	2,024	0.35	0.35	2,024	2,024	0.14	0.14
Total Spray Program	619.38	774.23	24,775	30,969	4.27	4.27	30,969	30,969	2.13	2.13

Item	Conventional Cost/Acre	OHS Cost/Acre	Conventional Total Cost	OHS Total Cost	Conventional Cost/Tree	OHS Cost/Tree
Field Inspections for Citrus Greening (4 inspections @ \$22.73)	90.92	113.65	3,637	4,546	0.63	0.31
Clean Blocks Before Certification and Harvesting Inspections Before "Canker Free" Certification (2 inspections @ \$22.73)	31.08	38.85	1,243	1,554	0.21	0.11
Mandatory Citrus Canker Decontamination Costs	45.46	56.83	1,818	2,273	0.31	0.16
	29.35	29.35	1,174	1,174	0.20	0.08
Total Pest Control Program	939.66	1,167.24	37,586	46,690	6.47	3.22
Fertilizer: 4 Bulk Applications Conv, \$50/A OHS Material (12-2-12-2.4MgO @ 120 lbs N Conv, 30% Less OHS)	37.44	50.00	1,498	2,000	0.26	0.14
	129.88	90.92	5,195	3,637	0.89	0.25
Dolomite (one ton applied every 3 yrs) – Material/Application	14.76	14.76	590	590	0.10	0.04
Total Nutrition Program	182.08	155.68	7,283	6,227	1.25	0.43
Pruning: Topping (\$28.92/A ÷ 2.5 yrs Conv, Hand Prune OHS) Hedging (\$27.33/A ÷ 2 yrs Conv, Annual OHS) Chop/Mow Brush after Hedging (\$11.99/A ÷ 2 yrs) Raise Skirts of Trees (\$15.75/A ÷ 2 yrs)	-	-	-	-	-	-
	-	-	-	-	-	-
	-	-	-	-	-	-
	7.88	9.85	315	394	0.05	0.03
Irrigation: Microsprinkler Conv, Drip OHS	186.70	140.03	7,468	5,601	1.29	0.39
Clean Ditches (Weed Control)	18.56	18.56	742	742	0.13	0.05
Ditch and Canal Maintenance	17.48	17.48	699	699	0.12	0.05
Water Control (Pump water in/out of Ditches and Canals)	16.72	16.72	669	669	0.12	0.05
Total Cost	1,590.90	1,795.10	63,636	71,804	10.96	4.95

Year 3 Cost and Return Scenario

	Conventional	OHS	Conventional	OHS	Conventional	OHS
Yield (Box/tree):	1.00	1.00	Boxes/Acre	145	363	
Revenue (\$/Box)			Conventional Income/Tree	Conventional Income/Tree	OHS Income/Tree	
\$6.00	871	2,178	34,848	87,120	6.00	6.00
Net Revenue (income less costs)	(720)	383	(28,788)	15,316	(4.96)	1.05
Net Revenue APS/OHS vs. Conventional		1,103	44,104		6.01	

Conventional Net Income per Tree vs. APS/OHS -53%

**Open Hydroponics vs. Conventional Grove
Greening Loss Projections
Trial Grove "What-If" Analysis**

Boxes/tree in APS increases as trees are lost to Greening, allowing more space

Greening Loss Rates After Year 3
Acres In Grove
Trees/Acre Conventional
Trees/Acre APS/OHS

10%
40
145
363

Year	# Trees Conventional	# Trees APS/OHS	Conventional Boxes/Tree	APS/OHS Boxes/Tree	Conventional Boxes/Acre	APS/OHS Boxes/Acre
1	145	363	-	-	-	-
2	145	363	0.3	0.3	36	91
3	145	363	1.0	1.0	145	363
4	130.7	326.7	1.5	1.5	196	490
5	117.6	294.0	2.0	2.0	235	588
6	105.9	264.6	2.5	2.3	265	595
7	95.3	238.2	3.0	2.5	286	595
8	85.7	214.3	3.5	2.5	300	536
9	77.2	192.9	3.5	2.6	270	502
10	69.4	173.6	3.5	2.8	243	486
11	62.5	156.3	3.5	3.0	219	469
12	56.3	140.6	3.5	3.2	197	450



