Optimizing Water Use

By Trevor Hardy

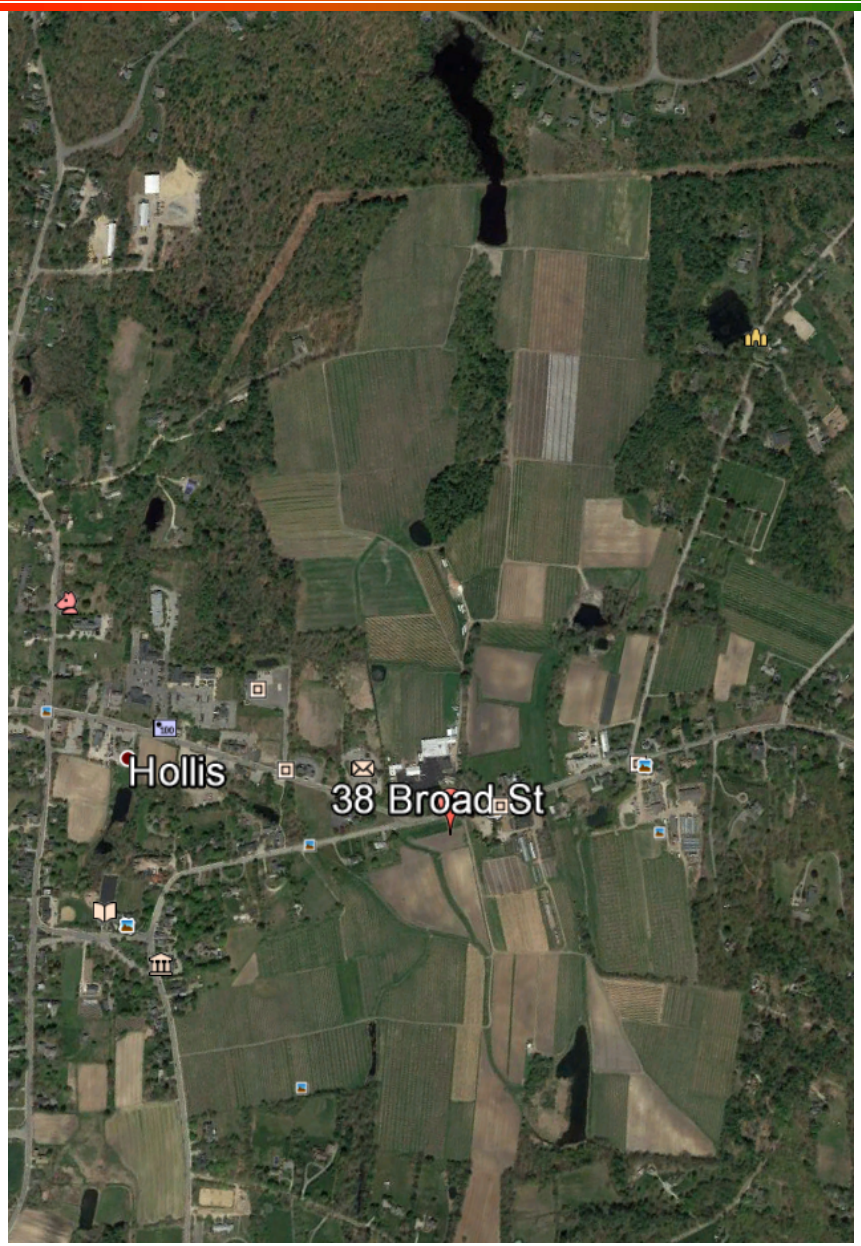
Brookdale Fruit Farm Inc.

Brookdale History

- Brookdale Fruit Farm established in 1847
- Currently Operated by the 5th 6th and 7th generations of the Hardy and Whittemore families
- Farming hundreds of acres
  - Certified Organic 10+ Acres
- 4 major business units
  - Wholesale, Retail, Pick Your Own, Supplies

Brookdale Hollis, NH

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240



Brookdale Farm Supplies

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

NETAFIM™

BIO 360 BIO Plus

BERRY PLASTICS

KIFCO

JAIN Irrigation Inc

AirCrow

Plant Marvel

Overview

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

1. Irrigation Uniformity
2. New Drip Technology
3. New Overhead
4. Moisture Management
5. Soil Health
6. Regional Tips

System Design

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Brookdale Fruit Farm Irrigation and Row Crop Supplies — **Date** 12/27/2016

38 Broad St PO Box 389 Hollis NH 03049 603 465 2240

Customer — **Irrigation Sales Slip** — Prepared by Trevor Hardy

Name
Address
Contact

603 860 1657

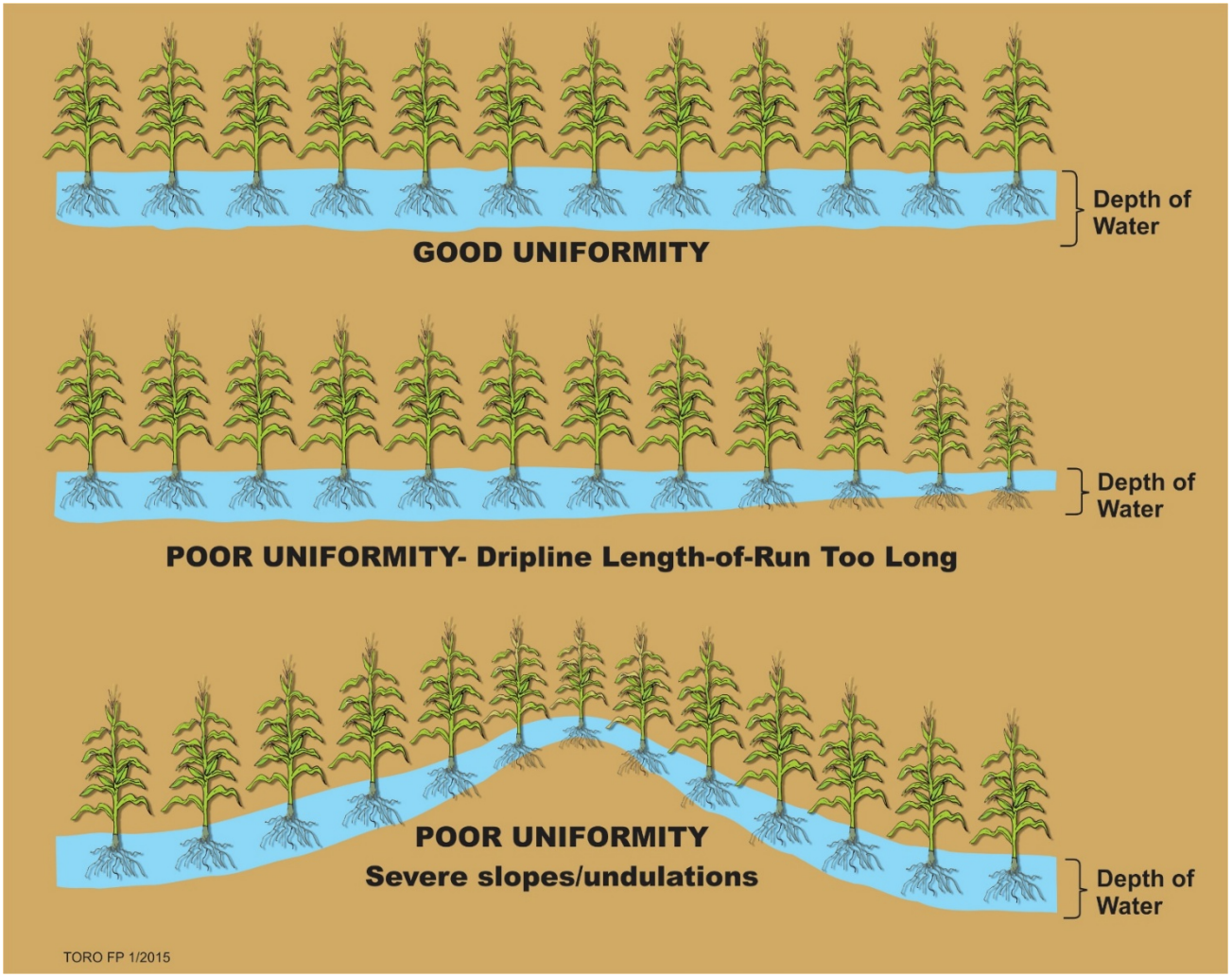
		Quantity	Units	Description	Unit Price	Total
1						$0.00
2		3400	feet	2 inch poly pipe 100 psi	$0.97	$3,298.00
3	filter	1	assembly	2 inch single disc filter built to backflush on cam locks	$490.00	$490.00
4	injector	1	assembly	2 x 3/4 fertilizer injector	$305.00	$305.00
5	fittings	30	feet	2 inch red layflat hose connect filter and injector well	$1.25	$37.50
6		4	each	2 inch cam lock c	$7.50	$30.00
7		5	each	2 inch cam lock e	$4.50	$22.50
8		60	each	2 inch super clamps 56-59	$5.00	$300.00
9		12	each	dravity drain assembly	$38.00	$456.00
10		15	each	2 inch insert caps	$2.25	$33.75
11		20	each	2 inch couplers	$1.55	$31.00
12		10	each	2 inch eblows	$1.85	$18.50
13		5	each	2 inch barbed tee	$4.00	$20.00
14						$0.00
15		39	coils	24 inch o.53 spacing orchard tubing	$155.00	$6,045.00
16		200	each	xpando starter with grommet	$1.60	$320.00
17		200	each	figure 8 end cap	$0.20	$40.00
18		100	each	ram coupler	$0.35	$35.00
19						$0.00
20		3	asssembly	2 way pvc valve tower with pressure gauge and air vent	$175.00	$525.00
21		1	asssembly	3 way pvc valve tower with pressure gauge and air vent	$225.00	$225.00
22		1	asssembly	2 way flow diverter with zone b threaded	$110.00	$110.00
23						$0.00
24						$0.00
25						$0.00
26						$0.00
27						$0.00
28						$0.00
29						$0.00
30						$0.00
31						$0.00
32						$0.00
33						$0.00
34						$0.00
35						$0.00
36						$0.00

Notes:

Total $12,342.25

3 way valve tower
2 way valve tower
well
main line
sub main
gravity drain

crop	FIELD	# rows	LENGTH	ROW FT	spacing	flow	gpm
apples	A	6	420	2520	2	0.53	11.1
apples	B	11	210	2310	2	0.53	10.2
apples	C1	8	500	4000	2	0.53	17.7
apples	C2	10	300	3000	2	0.53	13.3
apples	D1	10	450	4500	2	0.53	19.9
apples	D2	10	360	3600	2	0.53	15.9
xmas	E	42	100	4200	2	0.53	18.6
xmas	F	40	150	6000	2	0.53	26.5
apples	G	7	250	1700	2	0.53	7.5
xmas	H	42	160	6720	2	0.53	29.7
		186 totals		38550			


Depth of Water
GOOD UNIFORMITY
Depth of Water
POOR UNIFORMITY- Dripline Length-of-Run Too Long
POOR UNIFORMITY
Severe slopes/undulations
Depth of Water
TORO FP 1/2015

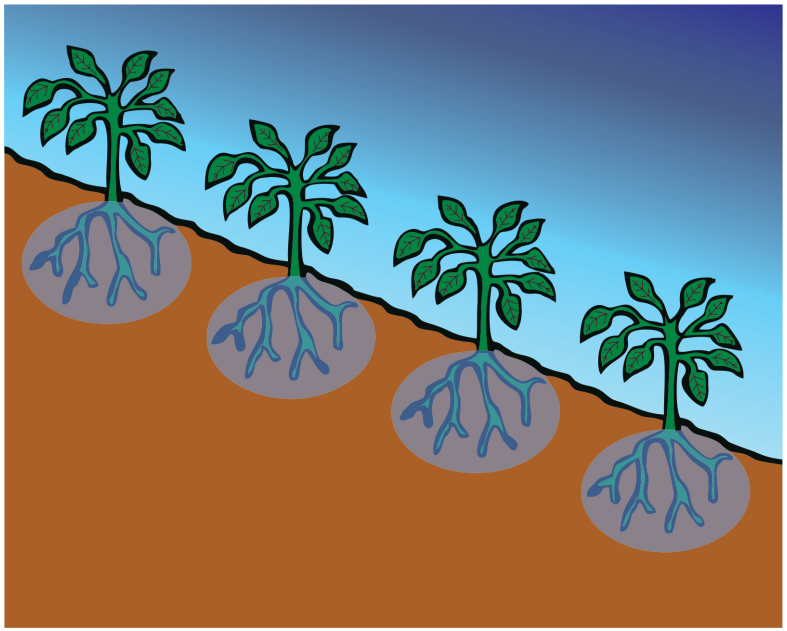
Uniformity

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

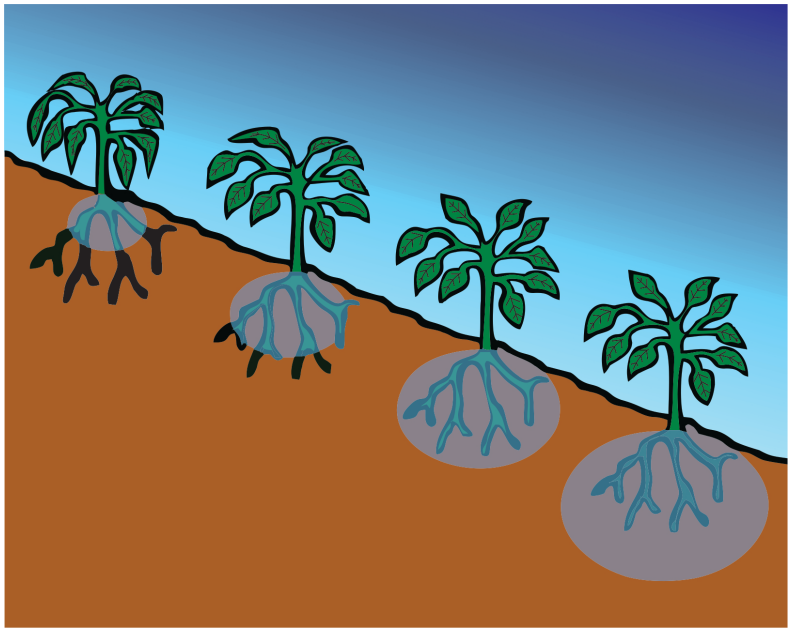
- One acre inch is equal to 27,154 gallons
- That's 18.9 GPM for 24 hours

Dripper Type

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

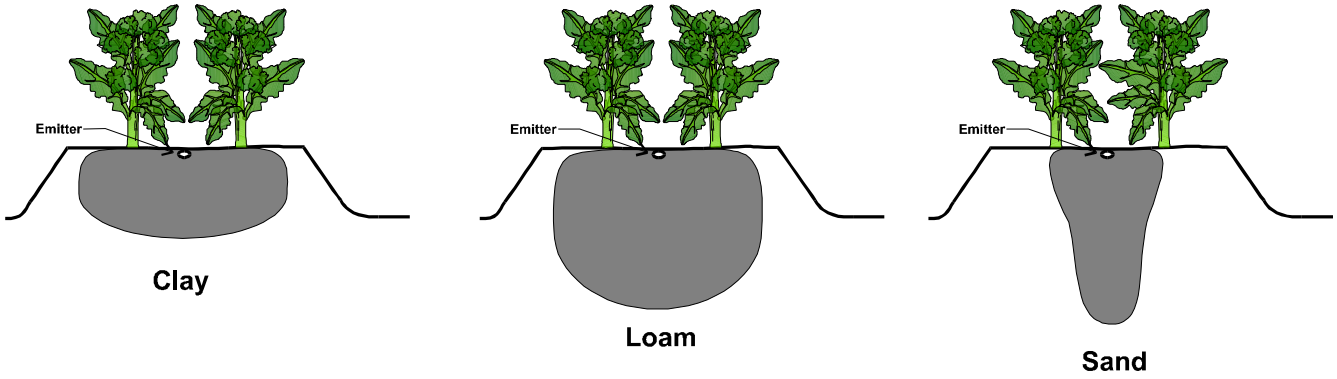


Compensating Emitters (FC)

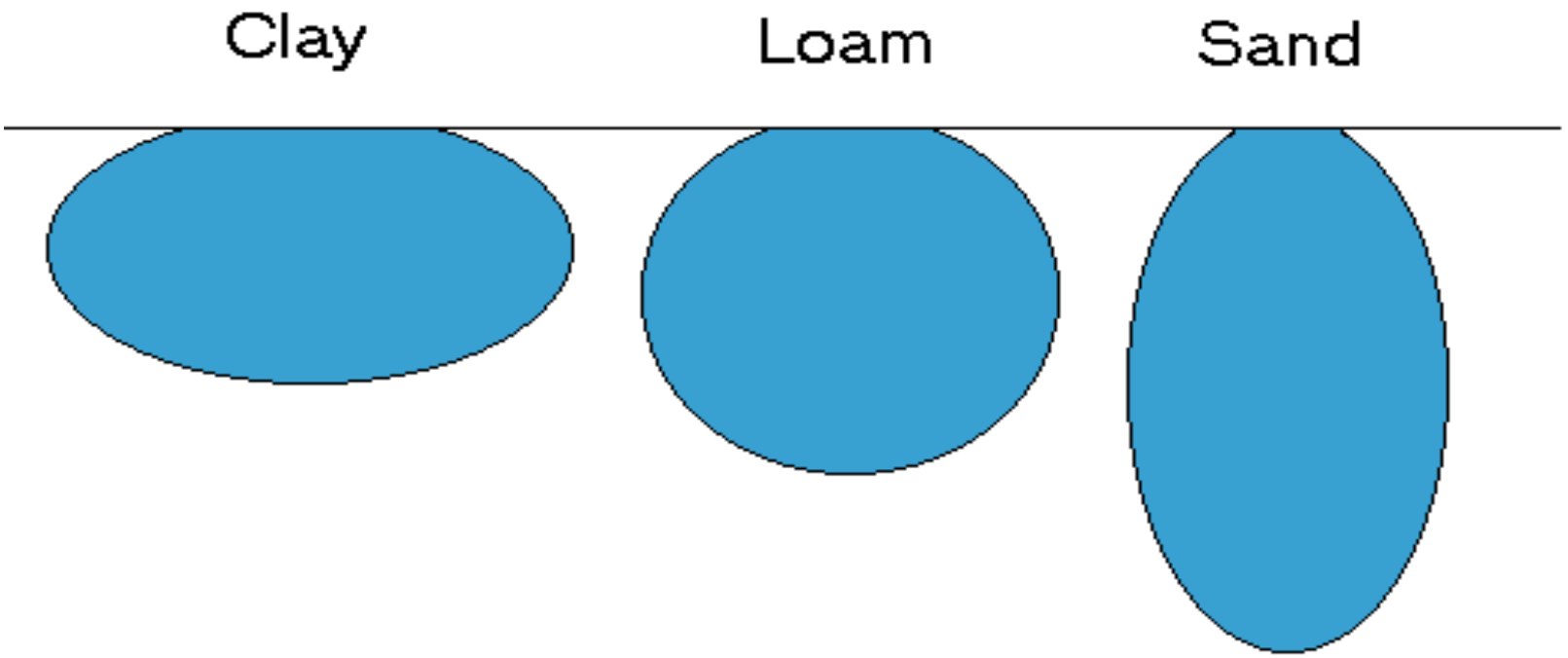


Non-Compensating Emitters

- Water holding capacity varies in different soil types
  - Clay
  - Loam
  - Sand



- Water holding capacity helps determine drip tape emitter spacing



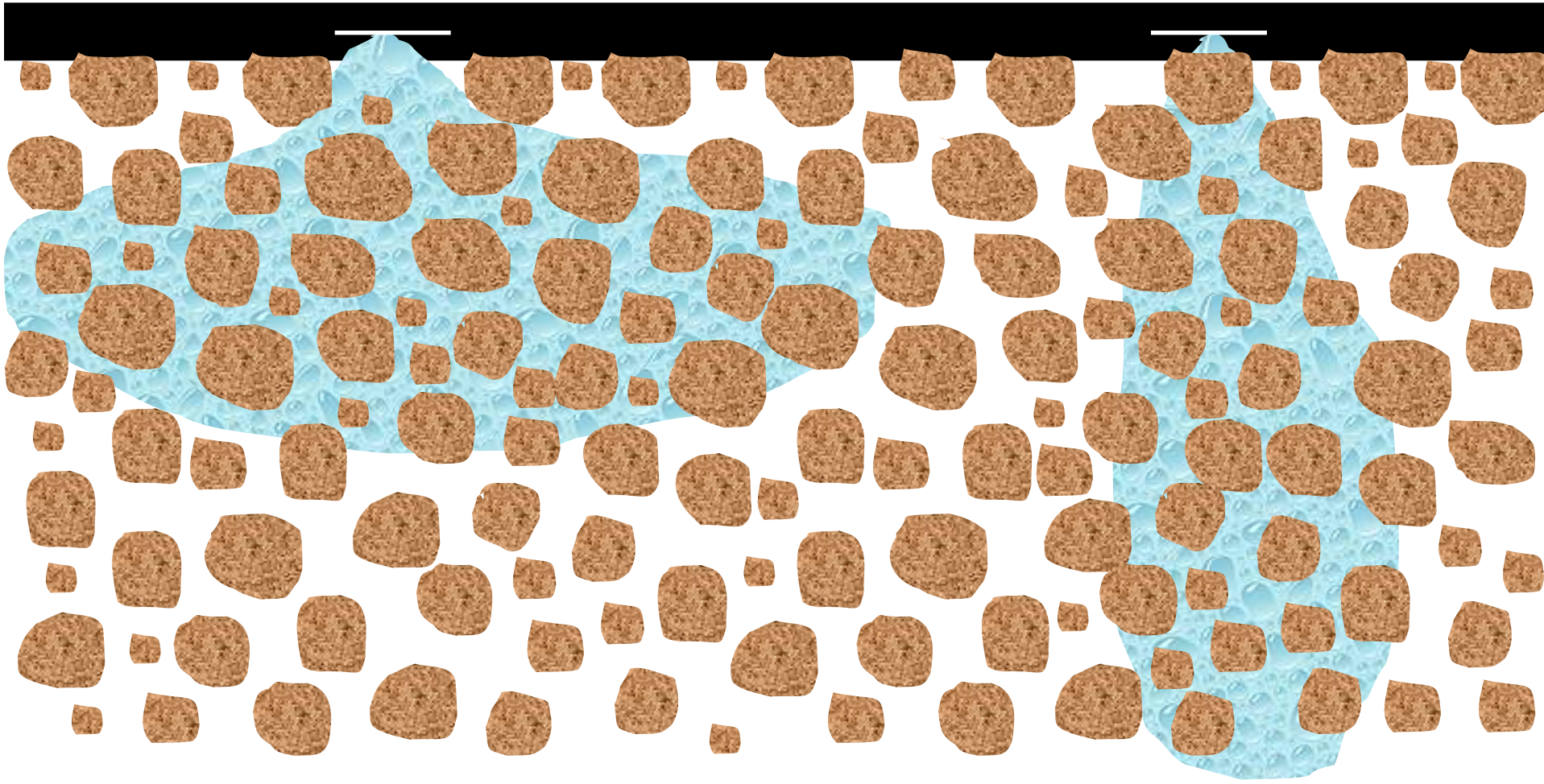
Approximate Lateral Movement

- Coarse Sand 0.5 - 1.5 feet
- Fine Sand 1.0 - 3.0 feet
- Loam 3.0 - 4.5 feet
- Heavy Clay 4.0 - 6.0 feet

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Pulsed Irrigation

Continuous Irrigation



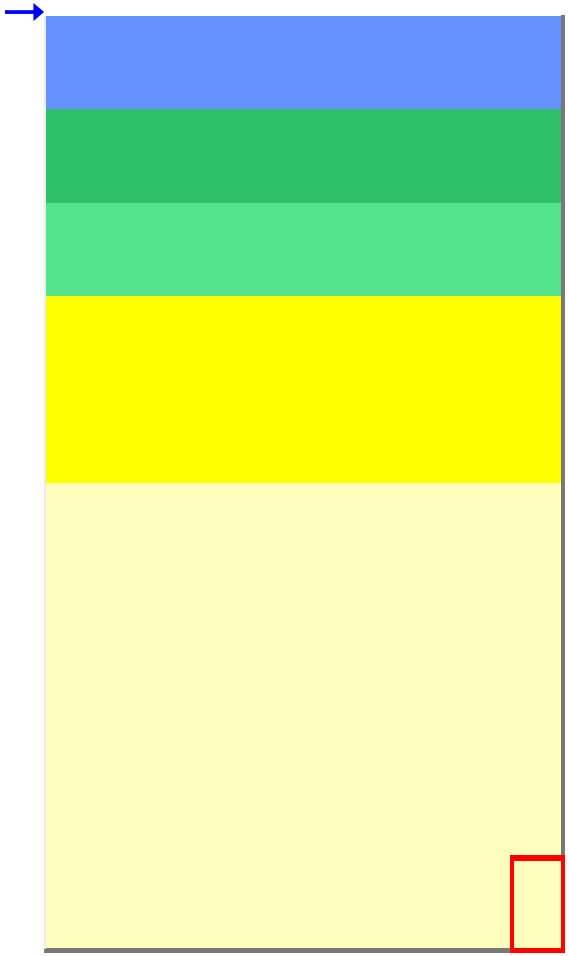
Does Irrigation Pay?

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

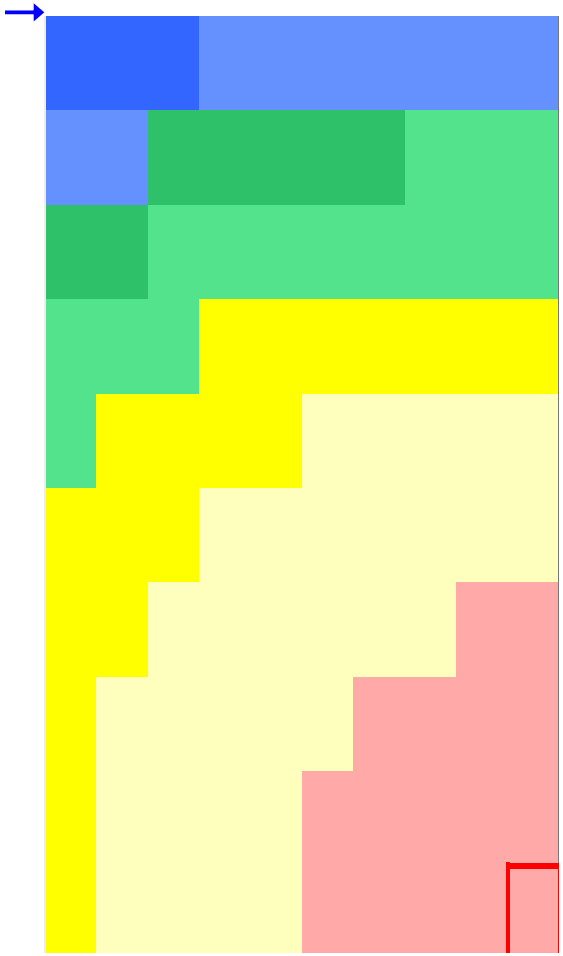
Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Water conserving tools in design

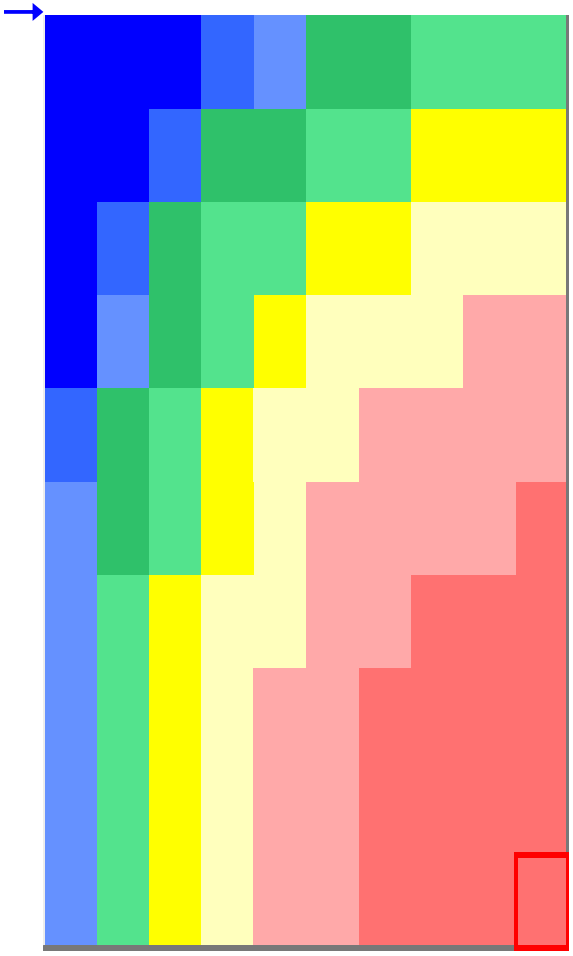
6” Layflat



4” Layflat



3” Layflat



Flow Control Drip Tape

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

ADVANTAGE **1** **MORE UNIFORM OUTPUT FOR ANY TERRAIN**

STANDARD TAPE

Standard tapes stress plants and reduce yield and efficiency by over- or under-watering as pressure changes throughout the run.

RESULT: Wasted water and fertilizer, stressed plants and reduced yields.

AQUA-TRAXX® FC

Toro Aqua-Traxx FC gives you uniform output regardless of elevation changes. So now you can adjust the amount of water you give your plants on hilly terrain, and they'll all receive the same amount through our uniform delivery system.

RESULT: More uniform plants and higher yields even in hilly terrain that might otherwise be impractical to farm.


Aqua Traxx.
EA5150834-400
Dia - 15 Mil – 8 Inch
0.34 Q100 @ 8 PSI
.13 GPH / EMITTER
4000 FEET PER ROLL
BLUE STRIPES UP
Aqua Traxx.
Flow Control
EAFC5xx1234
10 PSI
5/8 Dia. 12 in. Spacing
0.34 Q100 @ 8 PSI
0.20 GPH / EMITTER
BLUE STRIPES UP
Aqua Traxx.
EA5xx1234
10 PSI
5/8 Dia 12 in. Spacing
0.34 Q100 @ 8 PSI
0.20 GPH / EMITTER
BLUE STRIPES UP
Aqua Traxx.
Flow Control
EAFC5xx1222
10 PSI
5/8 Dia, 12 in. Spacing
0.22 Q100 @ 8 PSI
.13 GPH / EMITTER
BLUE STRIPES UP

Pressure Moderating

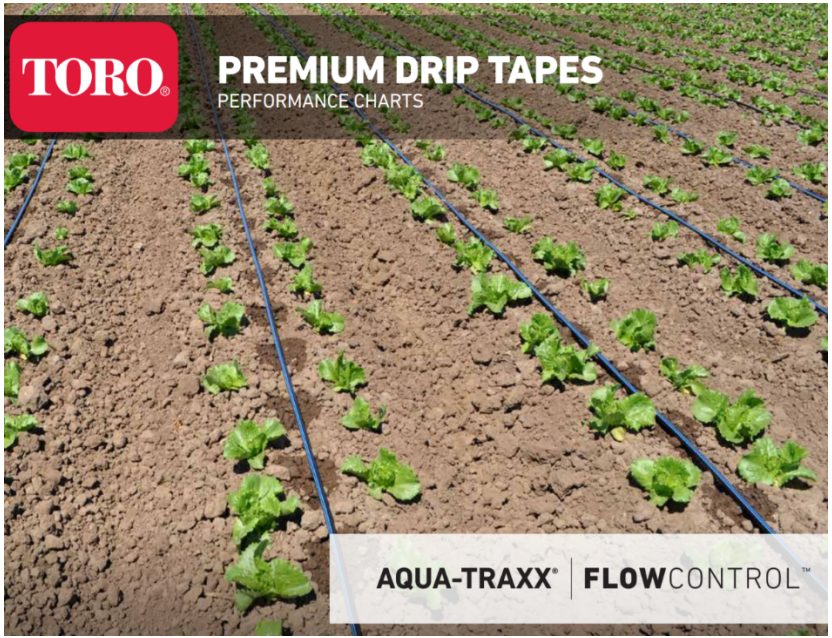
⅝" DIAMETER
Length of Run (ft) @ 10 psi for 90% EU

	Slopes				
Q-100	-2%	-1%	0%	+1%	+2%
0.09	240	456	1441	1874	318
0.11	259	481	1298	1719	368
0.13	237	442	1148	1523	337
0.14	256	462	1074	1424	1249
0.17	255	454	999	1324	1216
0.22	249	424	835	1095	1074
0.25	246	411	762	987	996
0.28	243	397	699	910	924
0.29	243	392	687	885	907
0.30	243	387	674	874	896
0.34	240	381	645	824	849
0.38	236	362	586	737	774
0.42	231	347	544	683	772
0.44	231	343	537	674	712
0.45	230	341	524	650	695
0.50	224	324	487	608	649
0.56	218	311	449	555	597
0.66	212	291	410	499	537
0.67	212	293	412	505	544
0.84	196	261	349	418	449
0.88	193	256	341	406	437
0.90	193	255	337	399	431
1.00	187	240	312	372	399
1.12	180	228	291	341	368
1.33	169	211	262	305	330
1.34	168	209	259	299	324
1.68	155	186	224	256	277
2.65	128	145	168	187	202

⅝" DIAMETER
Length of Run (ft) @ 10 psi for 90% EU

	Slopes				
Q-100	-2%	-1%	0%	+1%	+2%
0.11	386	691	1568	2072	1970
0.17	374	629	1191	1547	1572
0.22	367	586	1008	1290	1338
0.25	360	555	921	1166	1222
0.30	349	524	820	1024	1085
0.34	343	504	762	949	1012
0.45	322	448	633	770	824
0.50	312	424	591	712	769
0.67	290	374	493	583	629
0.90	261	324	406	472	506

508-12-45



Orchard Tubing

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Ram Tubing

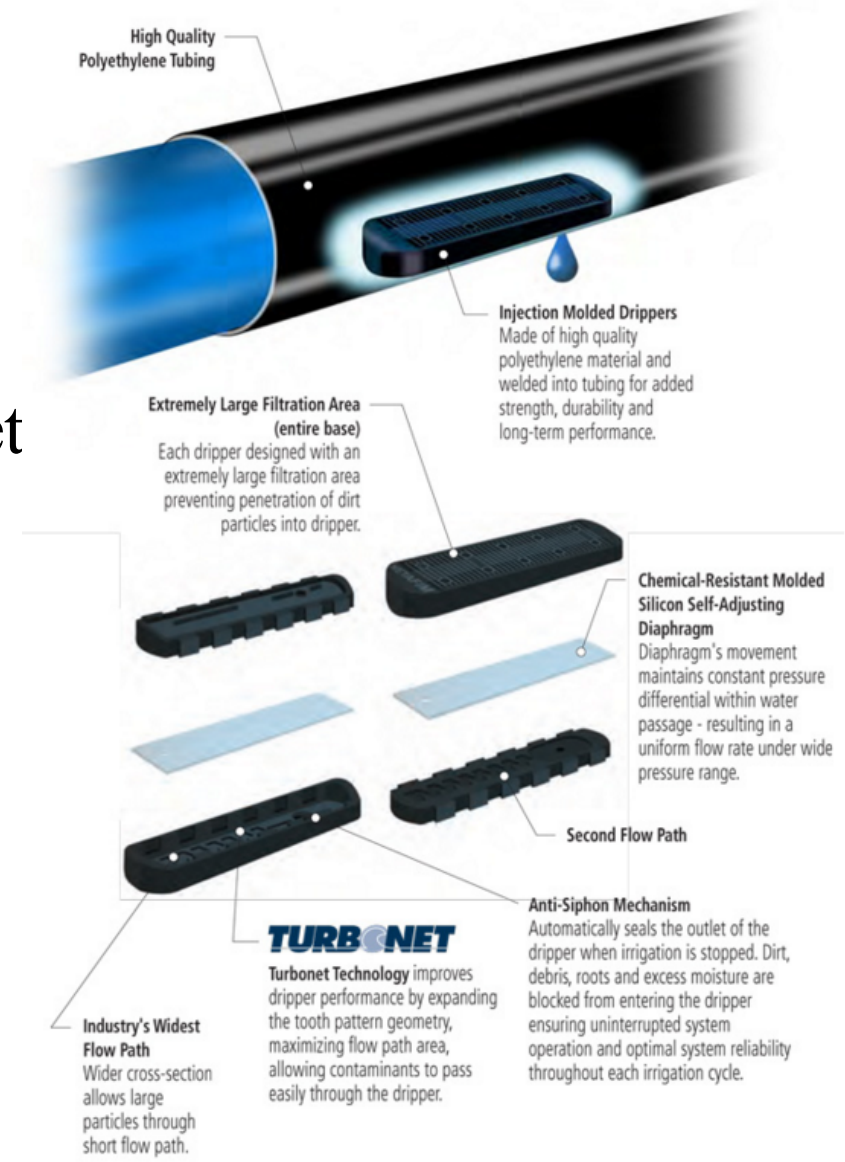
Permanent System

Spacing available at

40, 36, 24 and 12 inch spacing

Flow Rate 0.6 gpm per 100 feet

48 mil thick wall



MEGANET Sprinklers

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Frost protection apples, blueberry, strawberry
Seed germination Carrots, radish, lettuce
General Overhead Irrigation

Precise application of overhead water at 90%+ uniformity conserves water by having shorter run time

MegaNet Sprinkler

MEGANET

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

MEGANET SPRINKLER UNIFORMITY - HIGH TRAJECTORY - 24°

UPRIGHT POSITION, 3.3' HEIGHT, 33 psi

NOZZLE COLOR	NOMINAL FLOW	DISTANCE BETWEEN SPRINKLERS	SPACING BETWEEN ROWS 10' SQ	10' PR	16' SQ	16' PR	22' SQ	22' PR	28' SQ	28' PR	34' SQ	34' PR	40' SQ	40' PR
YELLOW	0.88 GPM	10'	95%	0.89	95%	0.54	96%	0.40	85%	0.31	67%	0.26	52%	0.22
		16'	93%	0.54	93%	0.33	91%	0.24	82%	0.19	67%	0.16	52%	0.13
		22'	96%	0.40	91%	0.24	90%	0.18	85%	0.14	66%	0.11	50%	0.10
		28'	85%	0.31	82%	0.19	85%	0.14	79%	0.11	66%	0.09	52%	0.08
		34'	67%	0.26	67%	0.16	66%	0.11	66%	0.09	62%	0.07	47%	0.06
		40'	52%	0.22	52%	0.13	50%	0.10	52%	0.08	47%	0.06	33%	0.06
PURPLE	1.10 GPM	10'	96%	1.09	95%	0.67	94%	0.48	93%	0.38	76%	0.31	61%	0.27
		16'	95%	0.67	94%	0.41	93%	0.30	89%	0.24	76%	0.19	61%	0.17
		22'	94%	0.48	93%	0.30	90%	0.22	91%	0.17	75%	0.06	59%	0.15
		28'	93%	0.38	89%	0.24	91%	0.17	89%	0.13	75%	0.11	60%	0.09
		34'	76%	0.31	76%	0.19	75%	0.14	75%	0.11	71%	0.09	58%	0.08
		40'	61%	0.27	61%	0.17	59%	0.15	60%	0.09	58%	0.08	46%	0.07
GREEN	1.54 GPM	10'	99%	1.42	95%	0.89	97%	0.65	94%	0.51	92%	0.42	79%	0.35
		16'	95%	0.89	93%	0.56	93%	0.40	92%	0.32	90%	0.26	78%	0.22
		22'	97%	0.65	93%	0.40	93%	0.29	89%	0.23	88%	0.19	79%	0.16
		28'	94%	0.51	92%	0.32	89%	0.23	91%	0.18	89%	0.15	76%	0.13
		34'	92%	0.42	90%	0.26	88%	0.19	89%	0.15	84%	0.12	75%	0.10
		40'	79%	0.35	78%	0.22	79%	0.16	76%	0.13	75%	0.10	73%	0.09
BLUE	1.98 GPM	10'	99%	2.03	98%	1.27	94%	0.92	93%	0.73	91%	0.60	91%	0.51
		16'	98%	1.27	98%	0.79	94%	0.58	91%	0.45	91%	0.37	91%	0.32
		22'	94%	0.92	94%	0.58	91%	0.42	90%	0.33	85%	0.27	84%	0.23
		28'	93%	0.73	91%	0.45	90%	0.33	85%	0.26	87%	0.21	88%	0.18
		34'	91%	0.60	91%	0.37	85%	0.27	87%	0.21	90%	0.17	85%	0.15
		40'	91%	0.51	91%	0.32	84%	0.23	88%	0.18	85%	0.15	79%	0.13
BROWN	2.42 GPM	10'	99%	2.53	99%	1.58	95%	1.15	91%	0.90	88%	0.74	92%	0.63
		16'	99%	1.58	98%	0.99	95%	0.72	91%	0.56	88%	0.46	92%	0.40
		22'	95%	1.15	95%	0.72	92%	0.52	90%	0.41	85%	0.34	87%	0.29
		28'	91%	0.90	91%	0.56	90%	0.41	85%	0.32	85%	0.27	90%	0.23
		34'	88%	0.74	88%	0.46	85%	0.34	85%	0.27	86%	0.22	84%	0.19
		40'	92%	0.63	92%	0.40	87%	0.29	90%	0.23	84%	0.19	80%	0.16
ORANGE	2.86 GPM	10'	99%	2.68	98%	1.67	95%	1.22	90%	0.96	86%	0.79	91%	0.67
		16'	98%	1.67	98%	1.05	95%	0.76	90%	0.60	86%	0.49	91%	0.42
		22'	95%	1.22	95%	0.76	92%	0.56	89%	0.44	84%	0.36	86%	0.31
		28'	90%	0.96	90%	0.60	89%	0.44	84%	0.34	83%	0.28	89%	0.24
		34'	86%	0.79	86%	0.49	84%	0.36	83%	0.28	84%	0.23	82%	0.20
		40'	91%	0.67	91%	0.42	86%	0.31	89%	0.24	82%	0.20	78%	0.17
RED	3.30 GPM	10'	99%	2.80	98%	1.75	96%	1.27	91%	1.00	89%	0.83	94%	0.70
		16'	98%	1.75	98%	1.10	96%	0.79	91%	0.63	89%	0.52	93%	0.44
		22'	96%	1.27	96%	0.79	95%	0.58	90%	0.46	87%	0.37	90%	0.32
		28'	91%	1.00	91%	0.63	90%	0.46	86%	0.36	86%	0.29	90%	0.25
		34'	89%	0.83	89%	0.52	87%	0.37	86%	0.29	86%	0.24	85%	0.21
		40'	94%	0.70	93%	0.44	90%	0.32	90%	0.25	85%	0.21	82%	0.17

22 to 28 foot spacing

90+% uniformity

Install into drip tape header pipe

Cheaper than aluminum pipe

Better coverage

Built in strainer prevent clogging

90 GPM to acre for frost

48 sprinklers per square acre

6 laterals per square acre

Is Soil Wet? #1

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- How to check moisture level
  - Moisture meter
  - Feel method
- Trees measure at 20” and 40”
- Blues Raspberry at 12” and 24”
- Strawberry at 6” and 12”

Taking Data is only good if you act on it

25 to 50 percent available 1.6 to 0.8 inches per foot depleted

Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away.

50 to 75 percent available 1.1 to 0.4 inches per foot depleted

Moist, forms a ball, very light staining on fingers, darkened color, pliable, forms a weak ribbon between the thumb and forefinger.

75 to 100 percent available 0.5 to 0.0 inches per foot depleted

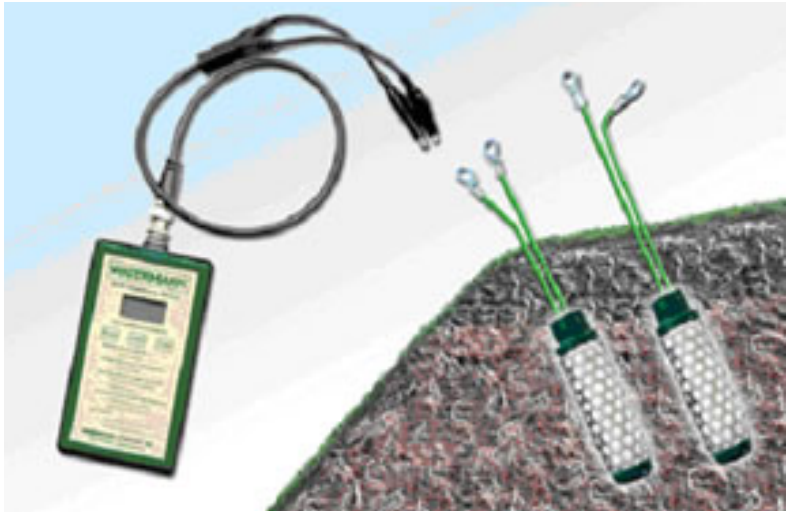
Wet, forms a ball with well-defined finger marks, light to heavy soil/water coating on fingers, ribbons between thumb and forefinger.

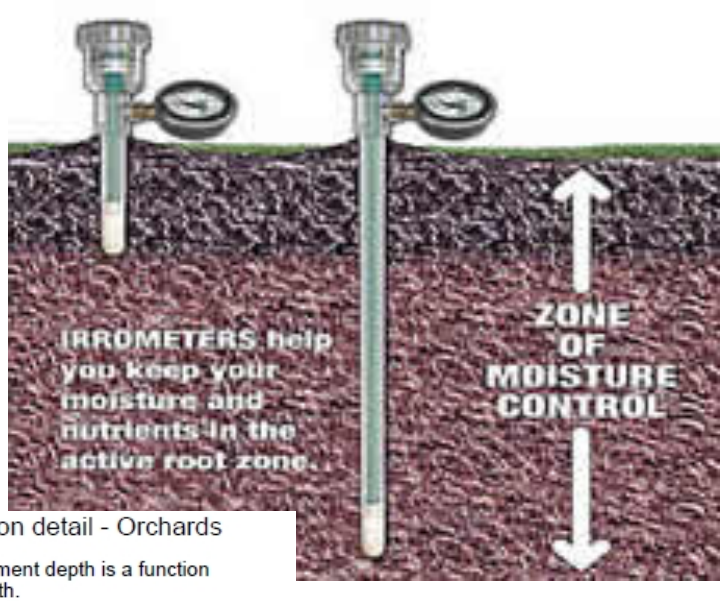
Available Soil Moisture Percent	Coarse Texture	Moderately Coarse Texture	Medium Texture	Fine Texture
Soil Texture	Fine Sand and Loamy Fine Sand	Sandy Loam and Fine Sandy Loam	Sandy Clay Loam, Loam, and Silt Loam	Clay, Clay Loam, or Silty Clay Loam
Available Soil Moisture Percent	Available Water Capacity 0.6 to 1.2 inches per foot	Available Water Capacity 1.3 to 1.7 inches per foot	Available Water Capacity 1.5 to 2.1 inches per foot	Available Water Capacity 1.6 to 2.4 inches per foot
0 to 25	Dry, loose, will hold together if not disturbed, loose sand grains on fingers with applied pressure. SMD 1.2 to 0.5	Dry, forms a very weak ball, aggregated soil grains break away easily from ball. SMD 1.7 -1.0	Dry. Soil aggregations break away easily. no moisture staining on fingers, clods crumble with applied pressure. SMD 2.1-1.1	Dry, soil aggregations easily separate, clods are hard to crumble with applied pressure SMD 2.4-1.2
25 to 50	Slightly moist, forms a very weak ball with well-defined finger marks, light coating of loose and aggregated sand grains remain on fingers. SMD O.9-0.3	Slightly moist, forms a weak ball with defined finger marks, darkened color, no water staining on fingers, grains break away. SMD 1.3-0.7	Slightly moist, forms a weak ball with rough surfaces, no water staining on fingers, few aggregated soil grains break away. SMD1.6-0.8	Slightly moist, forms a weak ball, very few soil aggregations break away, no water stains, clods flatten with applied pressure SMD 1.8-0.8
50 to 75	Moist, forms a weak ball with loose and aggregated sand grains on fingers, darkened color, moderate water staining on fingers, will not ribbon. SMD O.6-0.2	Moist, forms a ball with defined finger marks. very light soil/water staining on fingers. darkened color, will not slick. SMD O.9-0.3	Moist, forms a ball, very light water staining on fingers, darkened color, pliable, forms a weak ribbon between thumb and forefinger. SMD 1.1- 0.4	Moist. forms a smooth ball with defined finger marks, light soil/water staining on fingers, ribbons between thumb and forefinger. SMD l.2-0.4
75 to 100	Wet, forms a weak ball, loose and aggregated sand grains remain on fingers, darkened color, heavy water staining on fingers, will not ribbon. SMD O.3-0.0	Wet, forms a ball with wet outline left on hand, light to medium water staining on fingers, makes a weak ribbon between thumb and forefinger. SMD O.4-0.0	Wet, forms a ball with well defined finger marks, light to heavy soil/water coating on fingers, ribbons between , thumb and forefinger. SMD O.5 -0.0	Wet, forms a ball, uneven medium to heavy soil/water coating on fingers, ribbons easily between thumb and forefinger. SMD O.6-0.0
Field Capacity (100 percent)	Wet, forms a weak ball, moderate to heavy soil/water coating on fingers, wet outline of soft ball remains on hand. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking,medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears briefly on soil surface after squeezing or shaking, medium to heavy soil/water coating on fingers. SMD 0.0	Wet, forms a soft ball, free water appears on soil surface after squeezing or shaking, thick soil/water coating on fingers, slick and sticky. SMD 0.0

https://www.nrcs.usda.gov/wps/portal/nrcs/detail/mt/technical/ecoscience/agronomy/?cid=nrcs144p2_056491

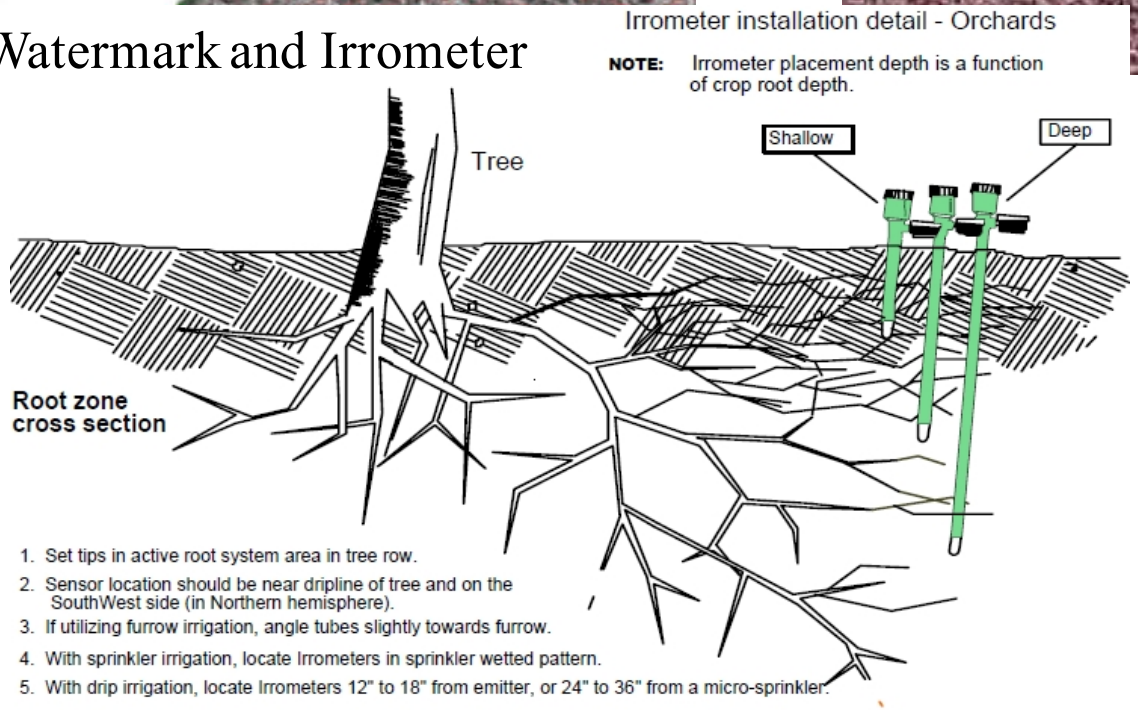
Moisture Meters

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240





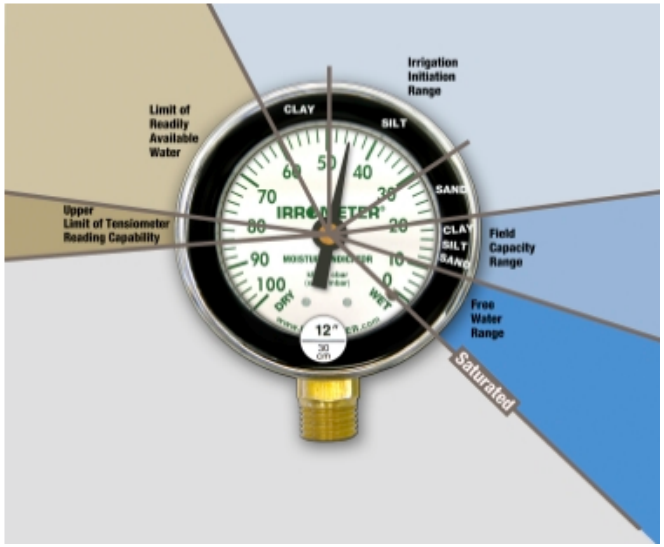
Watermark and Irrometer



Watermark and Irrometer
Scale 0 to 100
0 is wet 100 is dry
Above 40 turn water on
Shut off when hit 20

Sensor Information

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240



- **0-10 Centibars** = Saturated soil
- **10-30 Centibars** = Soil is adequately wet (except coarse sands, which are beginning to lose water)
- **30-60 Centibars** = Usual range for irrigation (most soils)
- **60-100 Centibars** = Usual range for irrigation in heavy clay

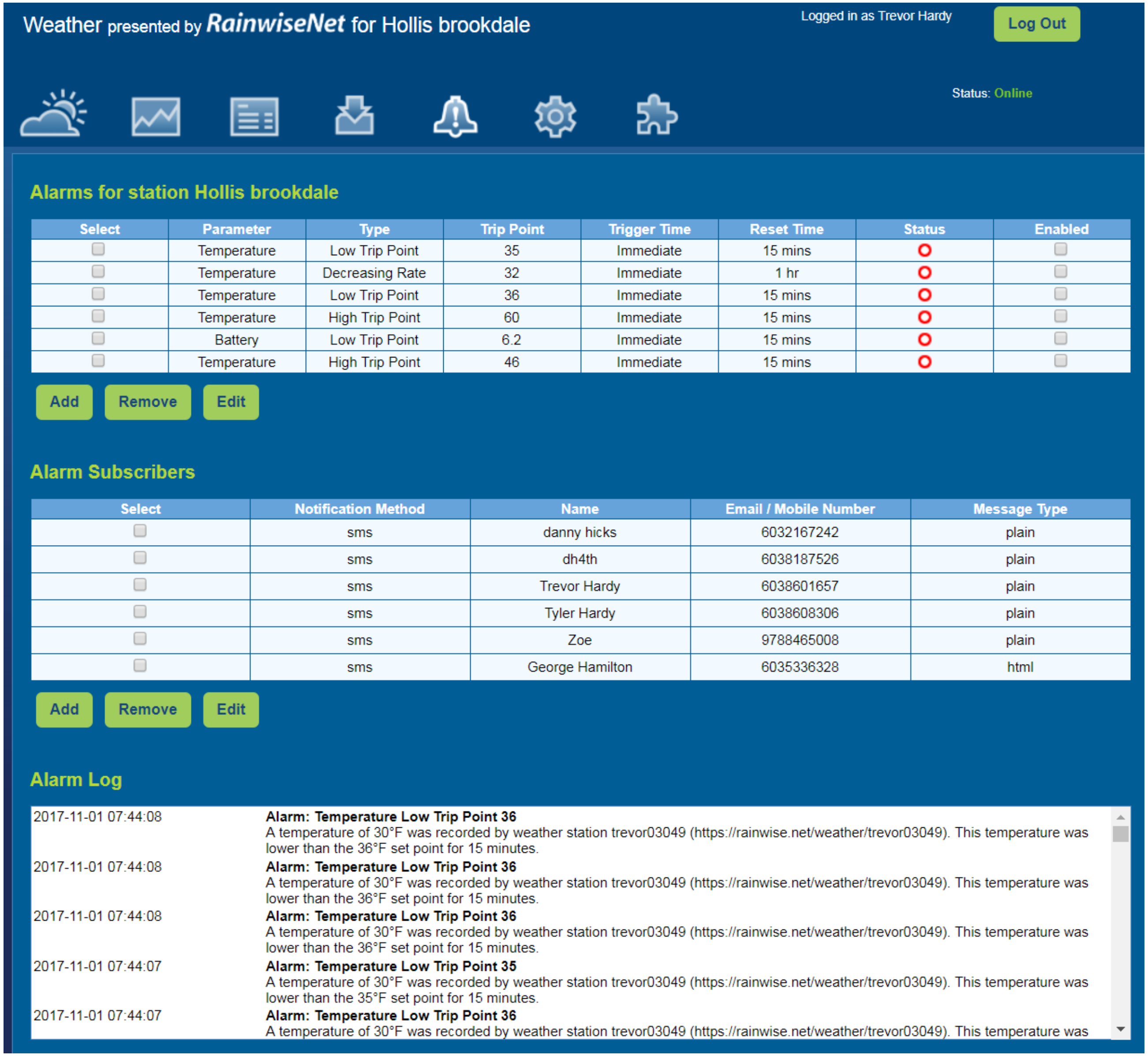
CROP	SHALLOW INSTRUMENT (INCHES)	DEEP INSTRUMENT (INCHES)	FOR EXTRA DEPTH, SET AT (INCHES)
ALFALFA	18-24	36-48	60-70
ALMONDS	24	48	72
APPLES	20	40	60
APRICOTS	24	48	72
ARTICHOKES	18	36	
ASPARAGUS	18-24	36-48	
AVOCADOS	12	24	36
BANANAS	12	24	
BARLEY	18	36	
BEANS (bush)	10		18
BEANS (Lima)	18	36	
BEANS (Pole)	18	36	
BEETS (sugar)	18	36	
BEETS (table)	12-18	24-36	
BLUEBERRIES	12	24	
BROCCOLI	12	20	
CABBAGE	12	20	
CANAIGRE	18	36	48
CANTALOUPE	18	36	
CARNATIONS	4-6		
CARROTS	12	24	
	12	24	
	10	20	
	12	24	
	24	48	
	12	24	
	18	36	
	18-24	36-48	
	12	30	
CORN (field)	18	36	
COTTON	18	36	48
CRANBERRIES	18	36	
CUCUMBERS	18	36	
DATE PALM	24	48	60
EGGPLANT	12	24	
FIGS	18	36	
GARLIC	12	24	
GRAIN and FLAX	18	36	
GRAPES	24	48	60
HOPS	24	48	60
JOJOBA	18	36	
KIWI	18	36	48
LADINO CLOVER	10	20	
LETTUCE	12		
MACADAMIAS	12	24	36
MAIZE	18	36	

CROP	SHALLOW INSTRUMENT (INCHES)	DEEP INSTRUMENT (INCHES)	FOR EXTRA DEPTH, SET AT (INCHES)
MELONS	18	36	
MILO	24	48	
MINT	12	24	
MONTEREY PINES, FIRS	12	24	
MUMS	4-6		
MUSTARD	18	36	
NECTARINES	18	36	
OATS	18	36	
OKRA	18	36	
OLIVES	24	48	60
ONIONS	12		
PAPAYA	12	24	
PARSNIPS	18	36	
PEACHES	18	36	60
PEANUTS	12	24	
PEARS	18	36	48
PEAS	18	36	
PECANS	18	36	48
PEPPERS	15	30	
PERMANENT PASTURES	8-15		24-30
PERSIMMONS	18	36	
PINEAPPLE	15	30	
PISTACHIO NUTS	24	48	60
POMEGRANATES	18	36	
POTATOES (Irish)	8-10	18	
POTATOES (sweet)	18	36	
PLUMS	24	48	72
PRUNES	24	48	72
PUMPKIN	18	36	48
RADISHES	12		
RASPBERRIES	18	36	
SORGHUM	18	36	
SOY BEANS	18	36	60
SPINACH	12	24	
SQUASH (Summer)	15	30	
STRAWBERRIES	6	12	
SUDAN GRASS	18-24	36-48	
SUGAR CANE	18	36	
SUNFLOWERS	24	48	60
TEA	12	24	
TOBACCO	8-15	30	
TOMATOES	18	36	
TURNIPS	18	36	
WALNUTS	24	48	72
WATERMELON	18	36	48
WHEAT, HAY	18	36	

Weather Data

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- NEWA
- RAINWISE
- Message
- Temp Value



Weather presented by RainwiseNet for Hollis brookdale

Logged in as Trevor Hardy — Log Out

Status: Online

Alarms for station Hollis brookdale

Select	Parameter	Type	Trip Point	Trigger Time	Reset Time	Status	Enabled
☐	Temperature	Low Trip Point	35	Immediate	15 mins	○	☐
☐	Temperature	Decreasing Rate	32	Immediate	1 hr	○	☐
☐	Temperature	Low Trip Point	36	Immediate	15 mins	○	☐
☐	Temperature	High Trip Point	60	Immediate	15 mins	○	☐
☐	Battery	Low Trip Point	6.2	Immediate	15 mins	○	☐
☐	Temperature	High Trip Point	46	Immediate	15 mins	○	☐

Add Remove Edit

Alarm Subscribers

Select	Notification Method	Name	Email / Mobile Number	Message Type
☐	sms	danny hicks	6032167242	plain
☐	sms	dh4th	6038187526	plain
☐	sms	Trevor Hardy	6038601657	plain
☐	sms	Tyler Hardy	6038608306	plain
☐	sms	Zoe	9788465008	plain
☐	sms	George Hamilton	6035336328	html

Add Remove Edit

Alarm Log

2017-11-01 07:44:08	**Alarm: Temperature Low Trip Point 36** A temperature of 30°F was recorded by weather station trevor03049 (https://rainwise.net/weather/trevor03049). This temperature was lower than the 36°F set point for 15 minutes.
2017-11-01 07:44:08	**Alarm: Temperature Low Trip Point 36** A temperature of 30°F was recorded by weather station trevor03049 (https://rainwise.net/weather/trevor03049). This temperature was lower than the 36°F set point for 15 minutes.
2017-11-01 07:44:08	**Alarm: Temperature Low Trip Point 36** A temperature of 30°F was recorded by weather station trevor03049 (https://rainwise.net/weather/trevor03049). This temperature was lower than the 36°F set point for 15 minutes.
2017-11-01 07:44:07	**Alarm: Temperature Low Trip Point 35** A temperature of 30°F was recorded by weather station trevor03049 (https://rainwise.net/weather/trevor03049). This temperature was lower than the 35°F set point for 15 minutes.
2017-11-01 07:44:07	**Alarm: Temperature Low Trip Point 36** A temperature of 30°F was recorded by weather station trevor03049 (https://rainwise.net/weather/trevor03049). This temperature was

NEWA Apple Irrigation

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- Based on Grass ET
- Adapted for fruit by Cornell
- Change planting densities
- Based on station ino
- Useful as tool

Cornell Apple ET Model

State: Connecticut

Weather station: Southington (Sunnymount)

Select Date: 09/14/2017

Continue

Map | Results | More info

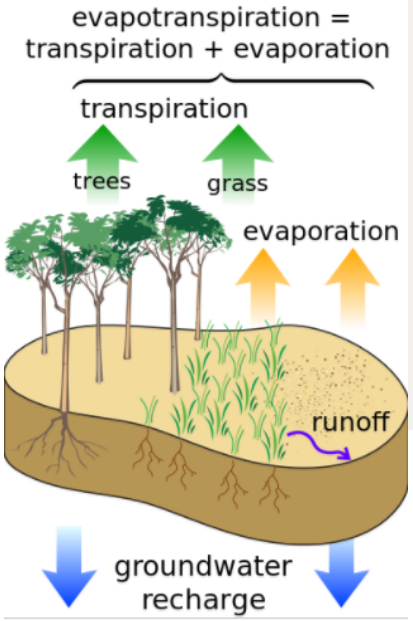
Apple ET Model for Southington (Sunnymount)

Change green tip date or tree density and click "Calculate" to recalculate results. Changing "Age of Orchard" will automatically recalculate table.

Green tip date	In row spacing	Between row spacing	Trees per acre	Age of orchard	Water balance
3/2/2017	4 feet	12 feet	908	Mature	

Apple Evapotranspiration Model Results

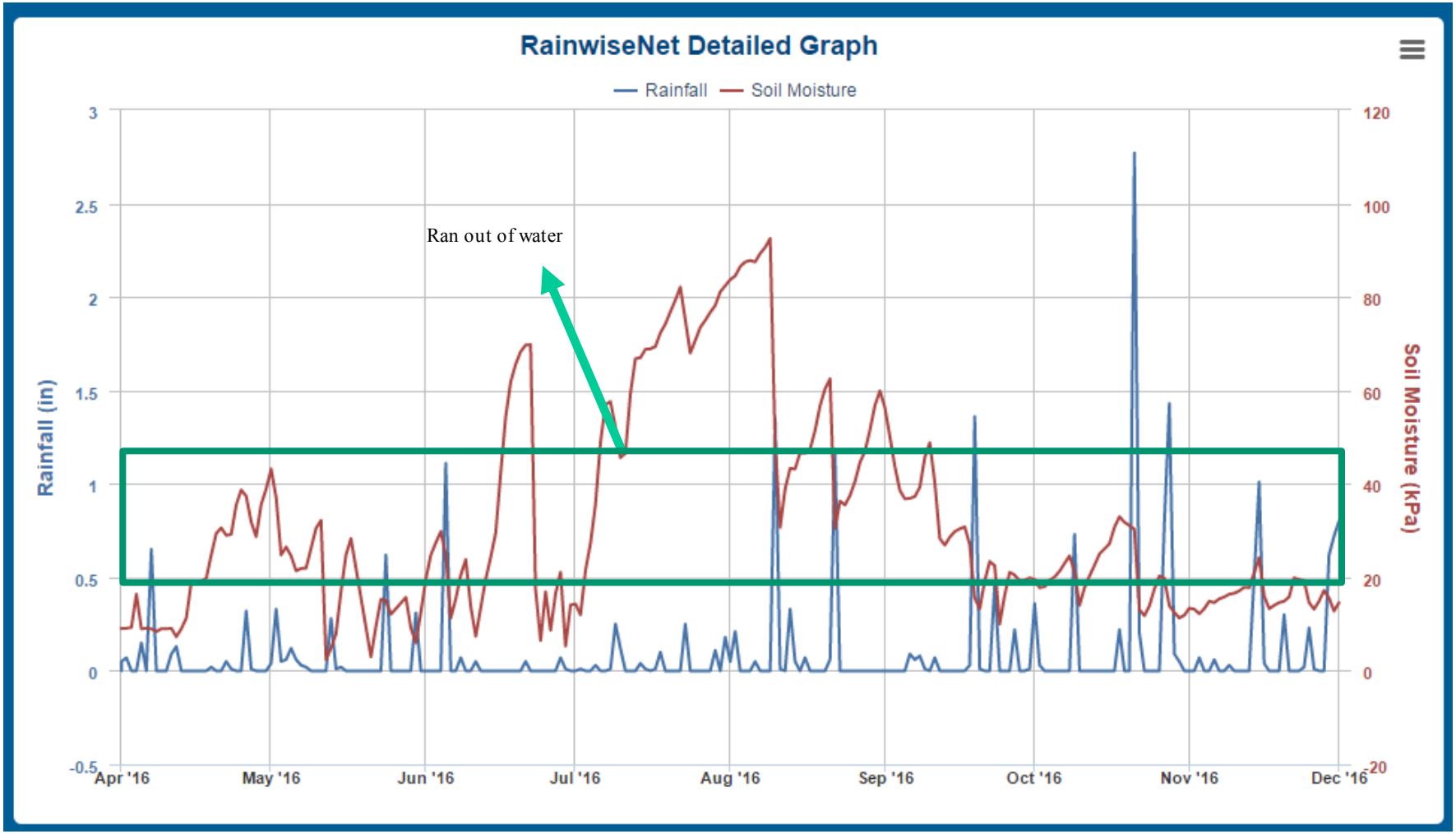
Date	Orchard ET (gallons)		Rainfall		Irrigation	Water Balance (gallons/acre)	
	per tree	per acre	inches	gallons/acre	gallons/acre	Daily	Cumulative
Sep 7	2.1	1872	0.25	4752	0	2880	0
Sep 8	2.6	2330	0.00	0	0	-2330	-2330
Sep 9	2.2	2025	0.00	0	0	-2025	-4356
Sep 10	2.5	2314	0.00	0	0	-2314	-6670
Sep 11	3.3	2980	0.00	0	0	-2980	-9650
Sep 12	3.3	2979	0.00	0	0	-2979	-12629
Sep 13	3.3	2963	0.00	0	0	-2963	-15592
Sep 14	1.3	1178	0.01	190	0	-988	-16580
Sep 15	2.5	2231	0.01	190	0	-2040	-18620
Sep 16	2.0	1812	0.00	0	0	-1812	-20432
Sep 17	2.3	2114	0.00	0	0	-2114	-22546



Negative have to apply water Positive have too much

Rainfall vs Soil Moisture

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

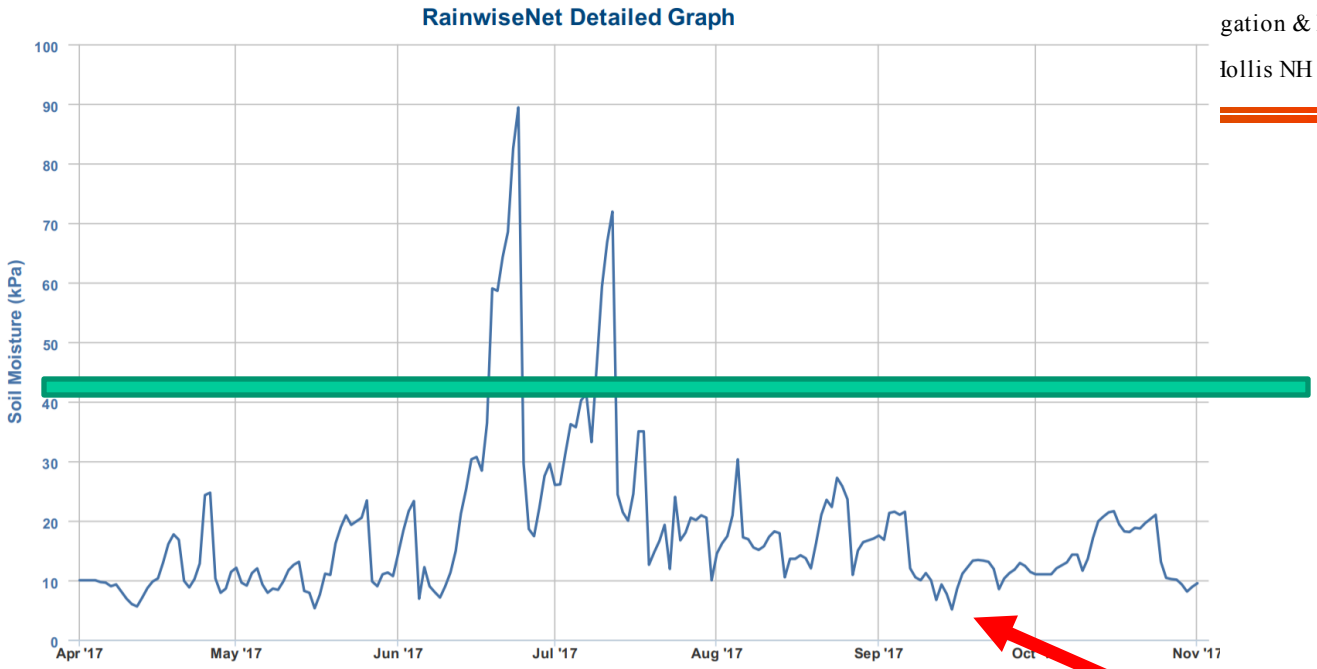


Brookdale Fruit Farm
gation & Row Crop Supply
Iollis NH (603) 465 2240

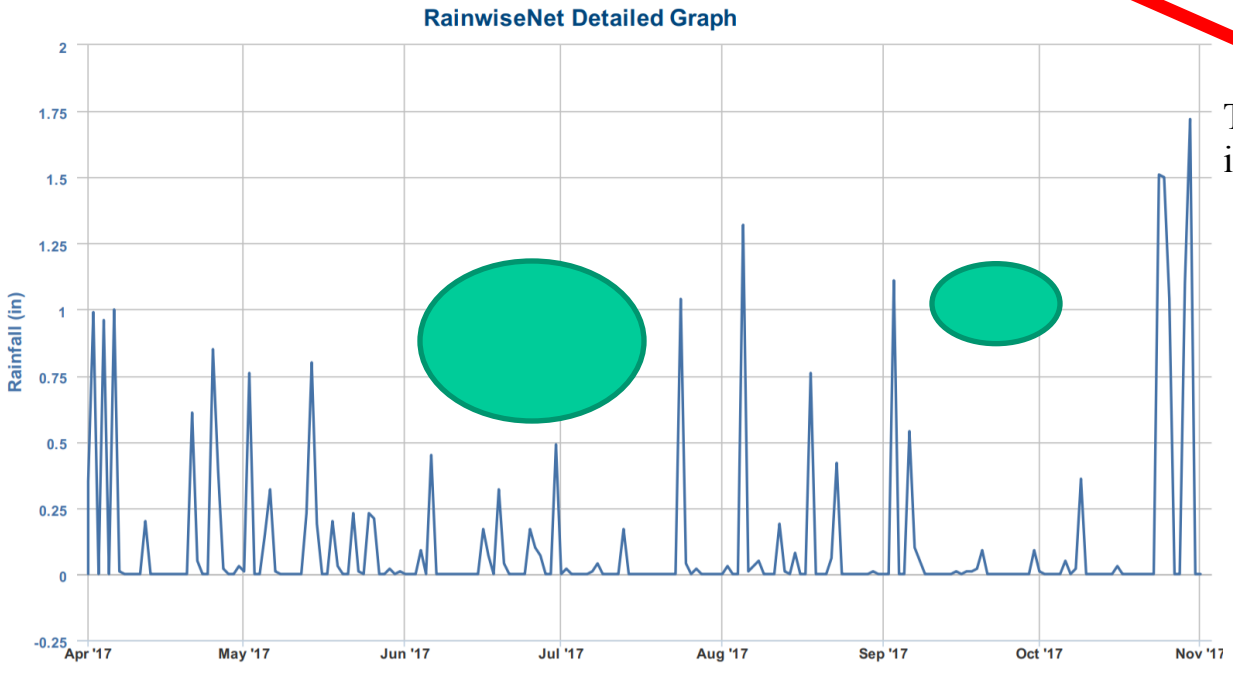
2017

Dry

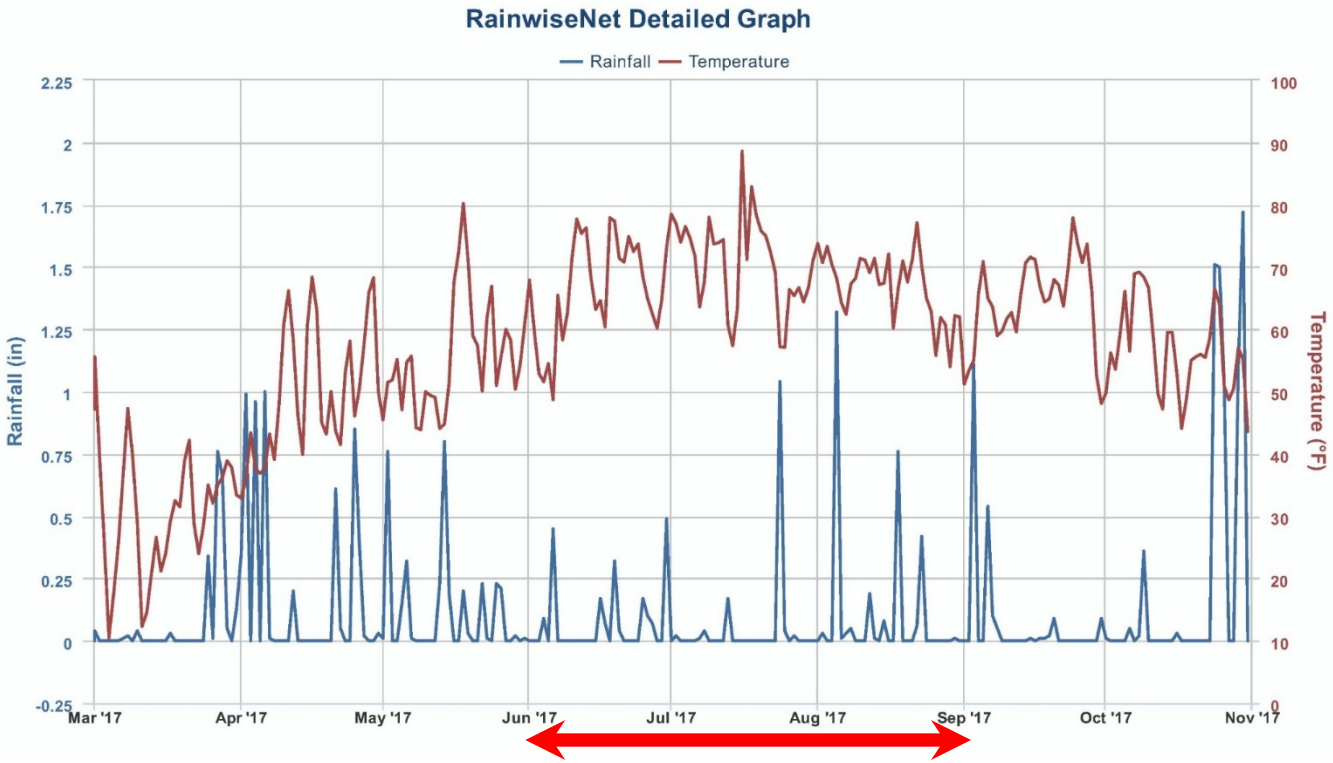
Wet



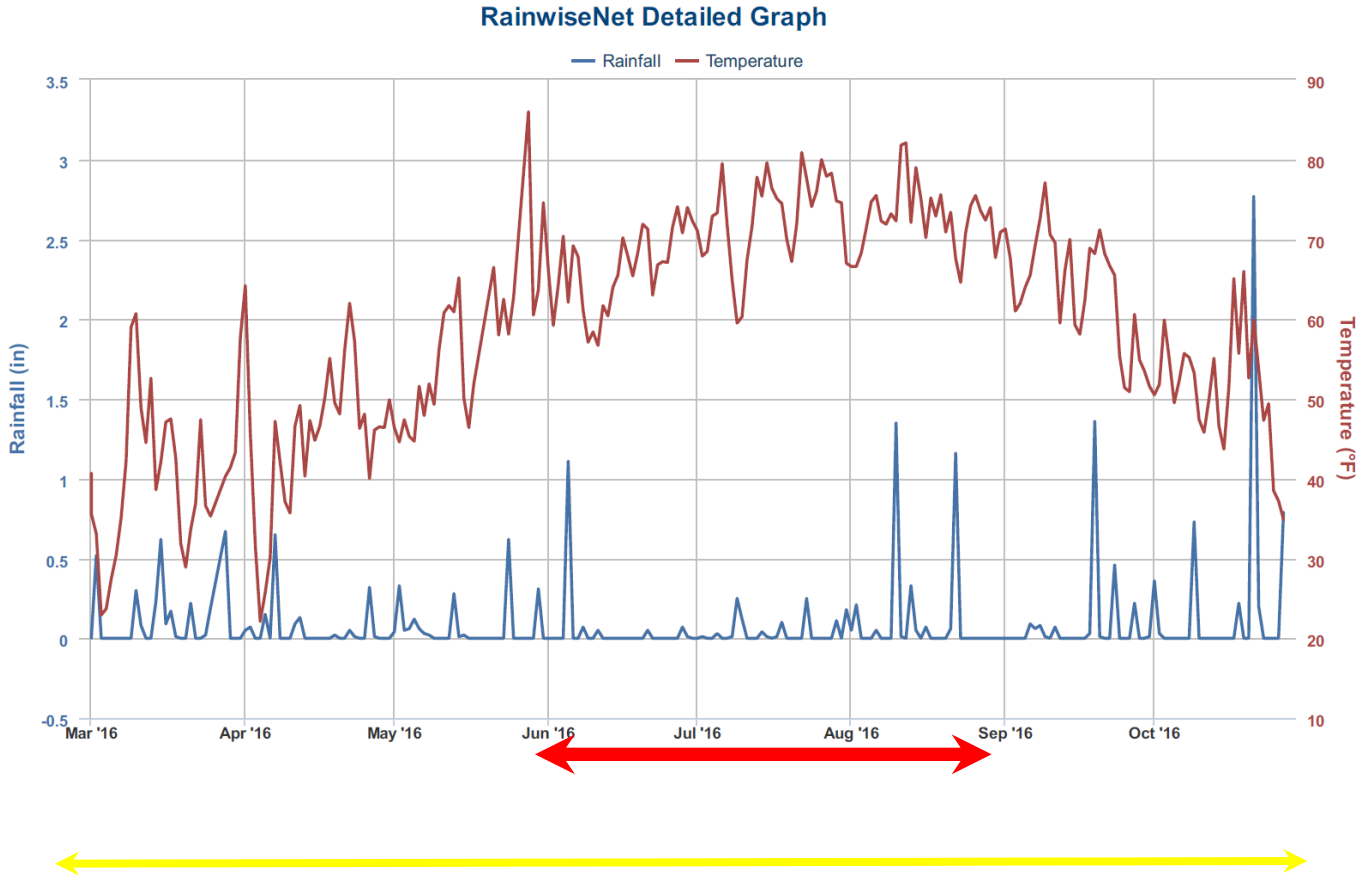
2017 had 2 mini droughts with wet spring



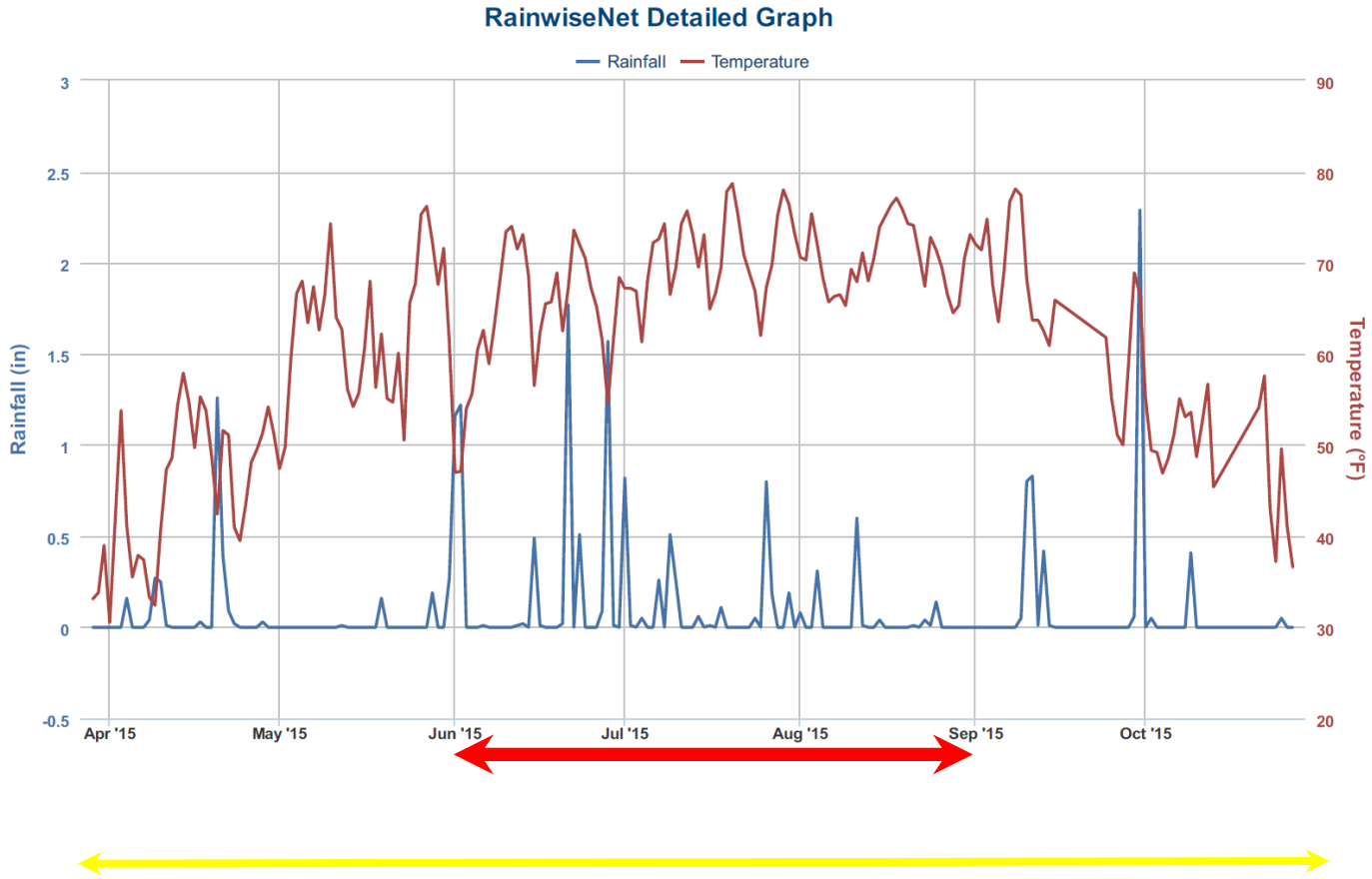
Too much irrigation


RainwiseNet Detailed Graph
Rainfall
Temperature
Rainfall (in)
Temperature (°F)
2.25
2
1.75
1.5
1.25
1
0.75
0.5
0.25
0
-0.25
100
90
80
70
60
50
40
30
20
10
0
Mar '17
Apr '17
May '17
Jun '17
Jul '17
Aug '17
Sep '17
Oct '17
Nov '17

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

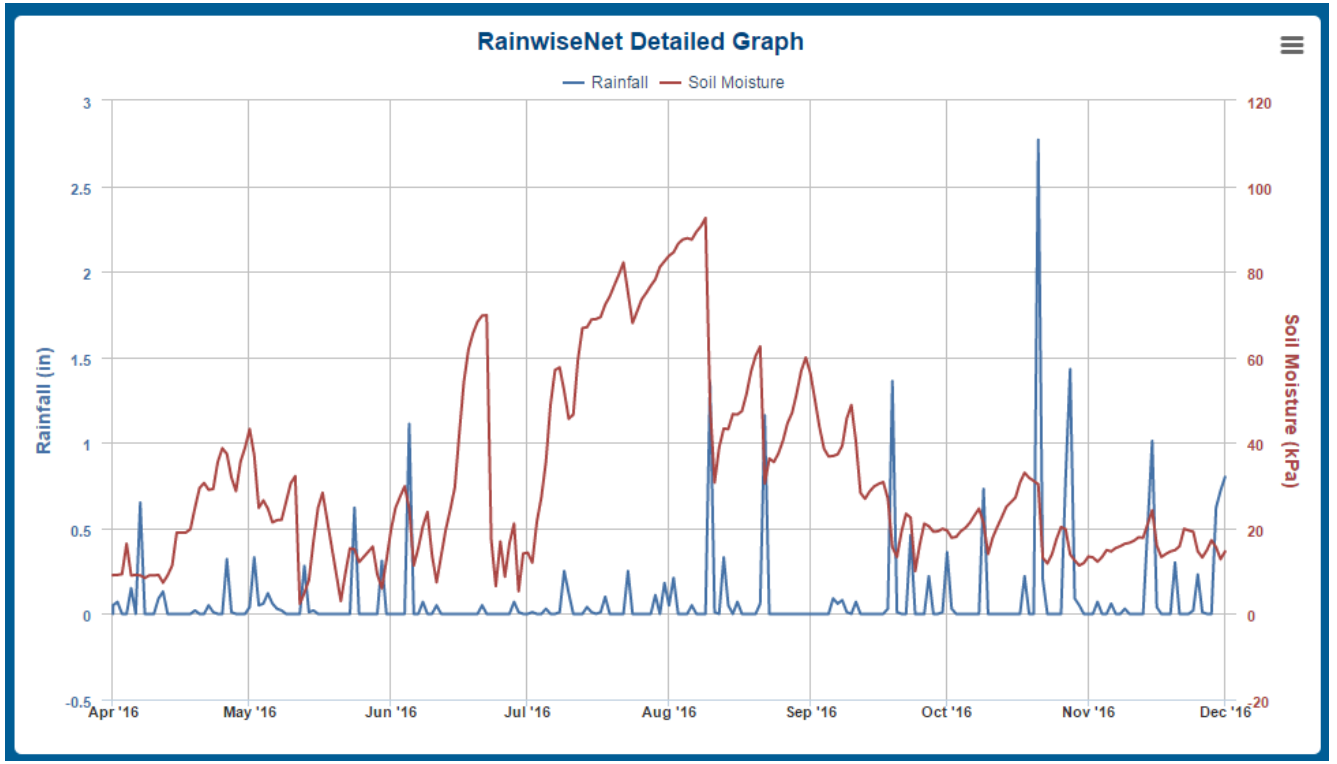


Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

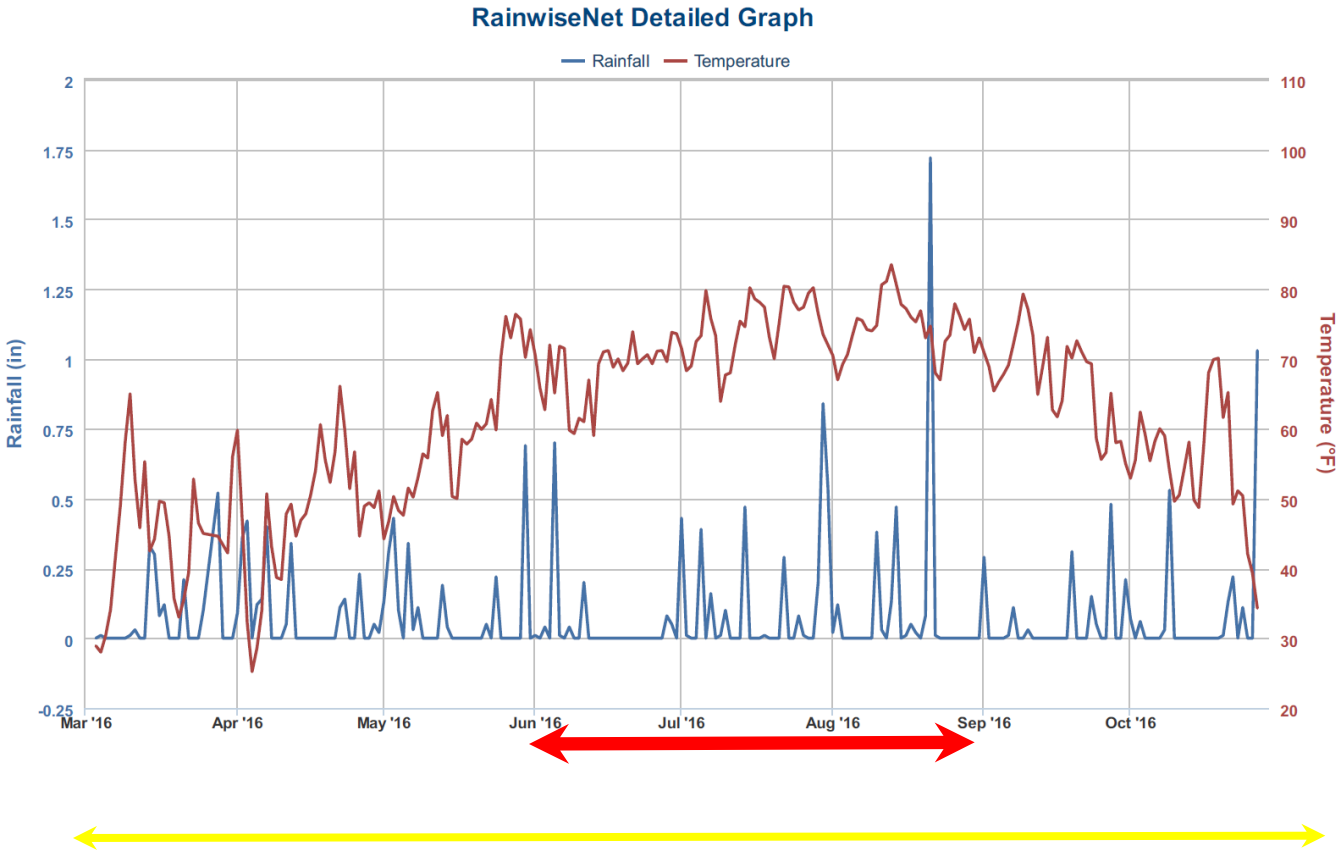


Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

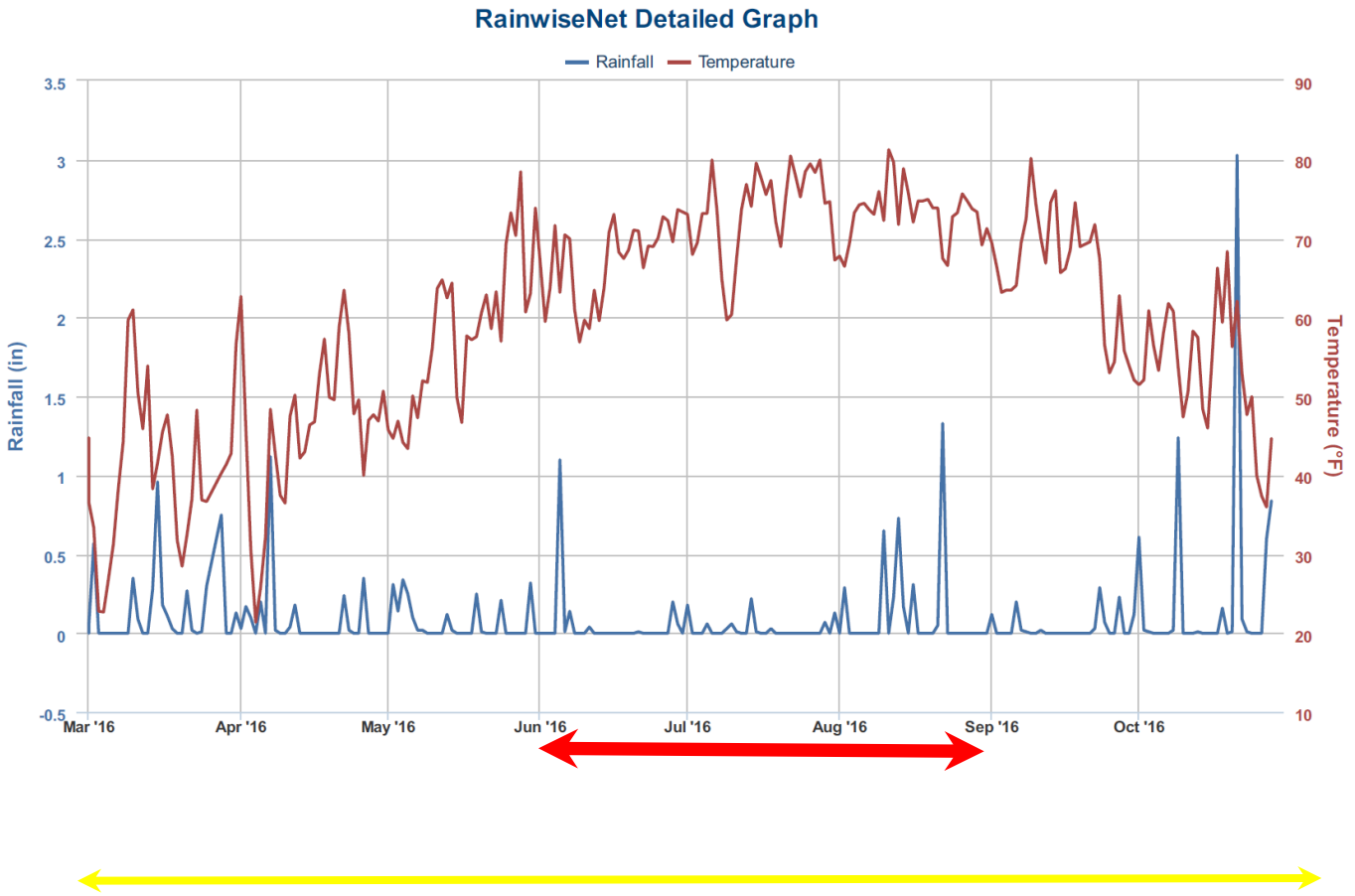
2016 Rainfall versus Soil Moisture Data – Hollis, NH



Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240



Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240



Automate Soil Moisture

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

SOLAR POWERED -Wireless- DATA LOGGING SYSTEM

IRROmesh

IRROmesh is a wireless solar powered data logging system that simplifies irrigation management using transmitter Nodes that "talk" to each other along a network that relays site-specific data.

IRROmesh utilizes compact, solar powered wireless radio Nodes for measurement of soil moisture, soil temperature and other environmental data. When deployed in an interactive mesh radio network, Nodes collect data that transmits to the Base Node where it's forwarded to an external device or the Internet for compilation and viewing. Each Relay Node sends data along multiple paths to the Base Node allowing coverage over greater distances. End Nodes provide additional measurement locations and send their data to a Relay Node to be forwarded to the Base.

A complete system includes a Base, the desired number of Nodes with their Sensors and either the Logger, Cellular Gateway or PC Link. The system offers WEB access with data available for management, storage and display in real-time.

975 Node

975B – Base
Receives data from Nodes and transmits to selected Data Collection Device.

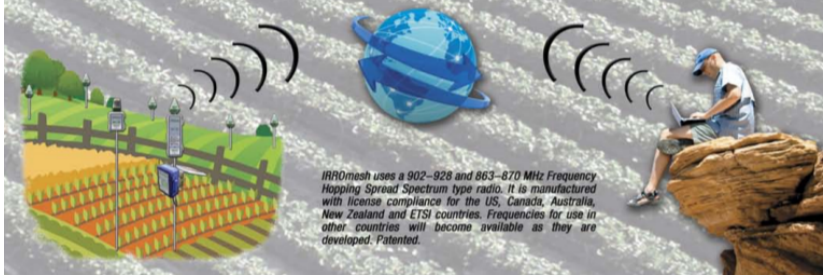
975P – PC Link
Desktop Data Collection Device continuously streams data to the WEB portal through your computer.

975G – Cellular Gateway
Cellular Data Collection Device mounts outdoors at the IRROmesh Base location and provides dedicated cellular connection hardware for Internet access.

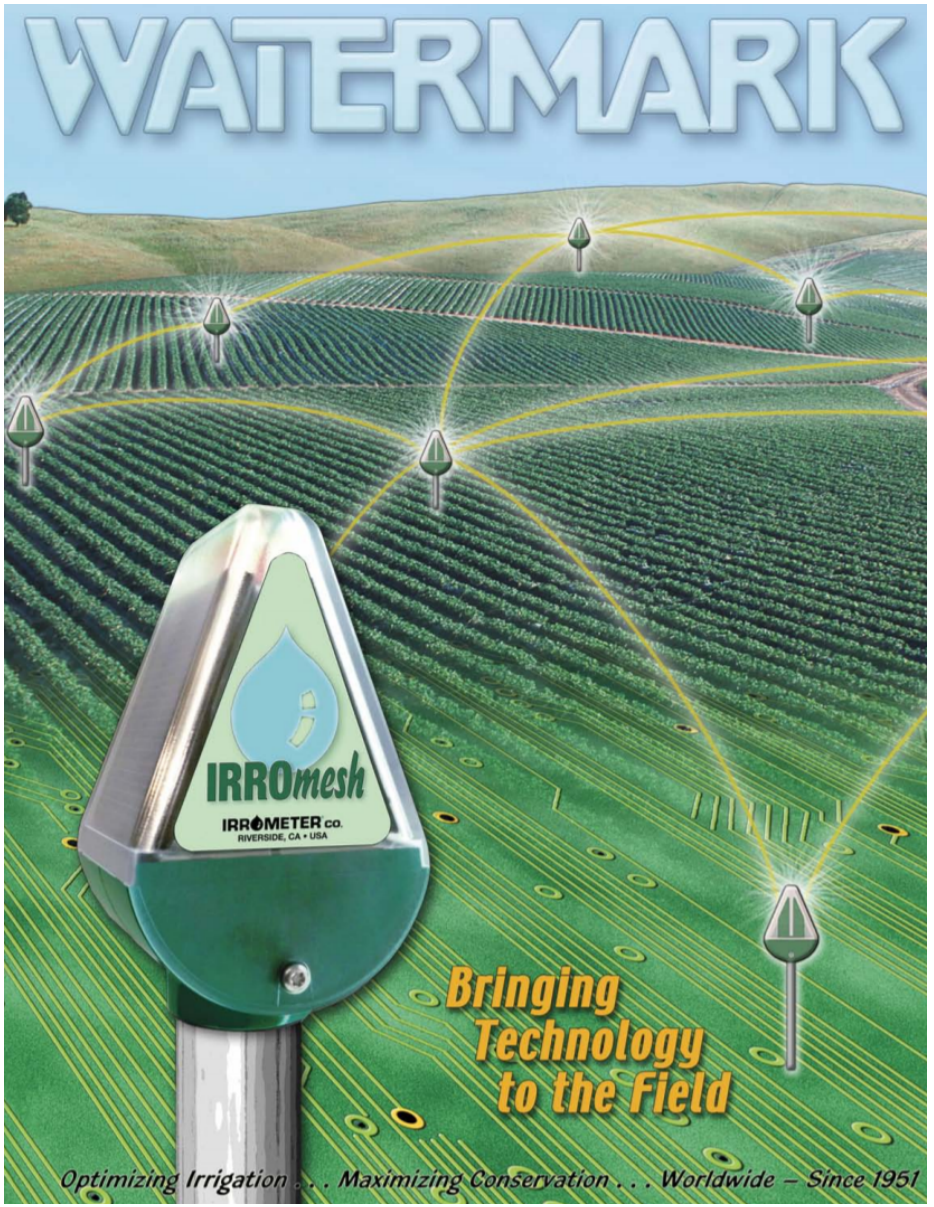
975L – Logger
Manual Data Collection Device to manually download and view data in the field on a laptop.

System Features:

- ***No Batteries Required*** – Solar Panels on two sides for optimal charging
- ***Self-Initializing*** – Nodes power up with initial sun exposure and associate themselves with the base receiver
- ***Self-Routing*** – Nodes route communication for maximum efficiency
- ***Self-Healing*** – Nodes will re-route for maximum efficiency
- ***In-Field Logging Capability***
- ***Small Size*** – Easy field installation
- ***WEB Based Data Management and Display*** – Store and analyze data through the Internet
- ***Data is Recorded every 30 Minutes***
- ***Automatically Manages Power*** – Unique sleep/wake cycling ensures continuous reliable transfer during all light conditions



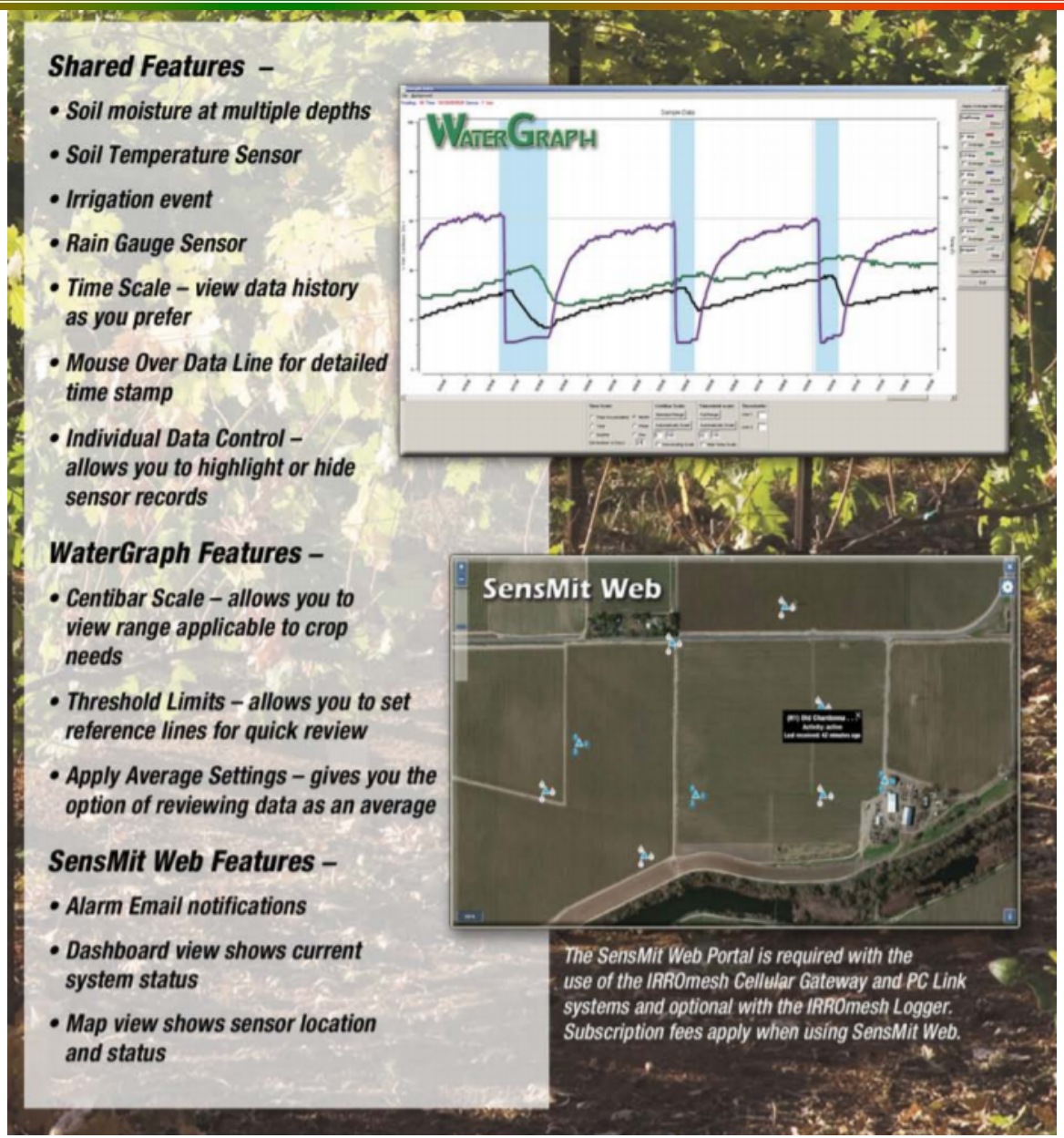
IRROmesh uses a 902–928 and 863–870 MHz Frequency Hopping Spread Spectrum type radio. It is manufactured with license compliance for the US, Canada, Australia, New Zealand and ETSI countries. Frequencies for use in other countries will become available as they are developed. Patented.



Tech Cost

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

10 to 20 sensors plus 5 node relays and receiver ballpark $5000.00 plus Subscription $140/year



Prioritization for Drought

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- Plant like crops for water use / similar root depth
- Prioritize irrigating cash crops
- Proper water timing for set and size
- Irrigate early or late, not during heat day
- Record Keeping
- USE SOIL MOISUTE DATA
- USE ET data NEWA (FREE)
- Irrigate with data and forecast

Soil Health

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- NH Hillsboro County Cons. Dist. 5 Year soil health study program
- Rent no till drill
- Cost share Cornell soil health assessment
- Group actions with NRCS practices on farms

Cornell Soil Health Assessment

Hardy
Brookdale Farm
Agricultural Service Provider:
None

Sample ID: Nn_977
Field/Treatment: Brookdale F86N
Tillage:
Crops Crown:
Date Sampled: 11/27/2015
Given Soil Type: No Soil Type Given
Given Soil Texture: No Soil Texture Given
Coordinates: Coordinates Not Provided

Measured Soil Textural Class: Sandy Loam **Sand: 63%** **Silt: 31%** **Clay: 6%**

Test Results

	Indicator	Value	Rating	Constraint
Physical	Available Water Capacity	0.23	92	
Physical	Surface Hardness	113	76	
Physical	Subsurface Hardness	375	27	Subsurface Pan/Deep Compaction, Deep Rooting, Water and Nutrient Access
Physical	Aggregate Stability	29.0	12	Aeration, Infiltration, Rooting, Crusting, Sealing, Erosion, Runoff
Biological	Organic Matter	2.6	37	
Biological	ACE Soil Protein Index	7.0	34	
Biological	Respiration	0.43	31	
Biological	Active Carbon	544	59	
Chemical	pH	6.6	100	
Chemical	Phosphorus	6.5	100	
Chemical	Potassium	129.9	100	
Chemical	Minor Elements Mg: 141 Fe: 1.9 Mn: 2.0 Zn: 1.0		100	
	Overall Quality Score		64	Medium

Zone Till Compaction

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Silage Tarps / weed mat

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- Tarps 24-100, 32-100 not larger
- Sand bags
- Ground staples

No Till Crimping

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- Takes a bit to set up
- Need foam markers
- Cover needs to DEAD
- Pop up fertilizer
- Adjust Dawn crimpers down row 700 psi

Double Crop No Till

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- Harvest Hay
- Kill crop
- plant

NO Till Hay Field

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Irrigate !!!!

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

New Tools

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Control sources

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

- Grassed waterways for field drainage
- Brook or stream maintenance
- Properly designed culverts
- Buffer strips
- Cover Crops

Soil Health + H2O

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Lots of Rain

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Low water problems

- Dirty Filters
- Reduced operating pressure
- Clogged impellars
- Muck build up main lines
- Clogged drippers

Disc Filter System

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Low Water Problems

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Sediment build up

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Too much suction

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Floats or cages

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Flow over Foot Valve

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Pond Cleaning

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Create low sump point

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Questions

Brookdale Fruit Farm
Irrigation & Row Crop Supply
Hollis NH (603) 465 2240

Contact

Trevor Hardy
Brookdale Fruit Farm
38 Broad Street
Hollis NH 03049
603 465 2240 x 3
tractortrv@aol.com
www.brookdalefruitfarm.com