

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

## Plasticulture for Hemp Production







## Trevor Hardy



# Brookdale History

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

- Brookdale Fruit Farm established in 1847
- Currently managed by the 5<sup>th</sup> 6<sup>th</sup> and 7<sup>th</sup> generations of the family
- Farming hundreds of acres
  - Certified Organic 6+ Acres
- 4 major business units
  - Wholesale, Retail, Pick Your Own, Farm Supplies



# Brookdale Pruit Farm Farm Supplies Brookdale Fruit Farm RT 130 Hollis NH Brookdale Farm Supplies Irrigation & Row Crop Supply Hollis NH (603) 465 2240

NETAFIM"

**Brookdale Fruit Farm** 







Irrigation Inc

FILE

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## Brookdale Farm Supplies RT 130 Hollis NH

System Design

Brookdale Fruit Farm Irrigation & Row Crop Supply

Hollis NH (603) 465 2240

	Brookdale Fruit Farm Irrigation and Row Crop Supplies					12/27/2016	
	38 Broad St PO Box 389 Hollis NH 03049 603 465 2240						
	Customer Irrigation Sales Slip Prepared by						
	Name		Trevor Hard	y			
	Address			603 860 1657			
	Contact						
		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 0.53 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					. <del> </del>	\$0.00	
27						\$0.00	
20					+	\$0.00	
23					+	\$0.00	
30					+	\$0.00	
20					+	\$0.00	
22					+	\$0.00	
24					+	\$0.00	
34					+	\$0.00	
35					-	\$0.00	
36						\$0.00	
	Notes:						
					Total	\$12,342.25	

- Field plan
  - Equipment
  - Plastic + tape
  - Water requirements
  - soil





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- Raised bed system 4 foot width
  - Warms soil
  - Blocks weeds
  - Conserves nutrients / water
  - Moisture retention
  - Increase yield deeper roots
  - Clean environment
- Plastic Mulch Types
  - Embossed plastic Raised Stetch 1 or 1.25 mil
  - Smooth plastic flat layer 1 or 1.25 mil
  - Biodegradable plastic
  - Roll length 4000 feet

0.6 or 0.8 mil

# Hemp Plasticulture

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

## PROCESS

1. Plow

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**Farm Supplies** 

**RT 130 Hollis NH** 

- 2. Harrow
- 3. Pick Rocks
- 4. Fertilize
- 5. Land Level
- 6. Lay plastic
- 7. Test Irrigation
- 8. Transplant
- 9. Water Plants In

## EQUIPMENT

- Plastic and Drip Tape
- Plastic layer
- Plastic lifter
- Plastic winder
- Transplanter
- Irrigation pump
- Irrigation Filter
- Fertilizer injector
- Fittings



# Field Layout

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

- Irrigating 5 acre zones or less
  - Ideal for Fertilization
- Rows less than 850 feet
- Flexibility
- Access Roads
- Spray / Harvest Rows





### **Brookdale Fruit Farm**

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## Rows / acre

- Row Spacing
  - 6'= 72" = 7260 row
    feet per acre
  - Tractor width factor
- Supplies / acre
  - 2 rolls plastic
  - 1 roll drip tape 8 mil

	DKIP	IAPE;	G.P.	M. PER		ັພັ	P.3.1.	
			FLOW					
ROW	FEET OF	8"	8"	12"	12"	16"	16"	24"
(INCHES)	HOSE PER ACRE	.67	.34	.45	.22	.34	.17	.28
30	17,424	117	59	78	38	59	30	49
32	16,335	109	56	74	36	56	28	46
34	15,374	103	52	69	34	52	26	43
36	14,520	97	49	65	32	49	25	41
38	13,756	92	47	62	30	47	23	39
40	13,068	88	44	59	29	44	22	37
42	12,446	83	42	56	27	42	21	35
44	11,880	80	40	53	26	40	20	33
46	11,363	76	39	51	25	39	19	32
48	10,890	73	37	49	24	37	19	30
50	10,454	70	36	47	23	36	18	29
52	10,052	67	34	45	22	34	17	28
54	9,680	65	33	44	21	33	16	27
56	9,334	63	32	42	21	32	16	26
58	9,012	60	31	41	20	31	15	25
60	8,712	58	30	39	19	<u>`</u> 30	15	24
62	8,431	56	29	38	19	29	14	24
64	8,168	55	28	37	18	28	14	23
66	7,920	53	27	36	17	27	13	22
68	7,687	52	26	35	17	26	13	22
70	7,467	50	25	34	16	25	13	21
72	7,260	49	25	33	16	25	12	20
74	7,064	47	24	32	16	24	12	20
76	6,878	46	23	31	15	23	12	19
78	6,702	45	23	30	15	23	11	19
80	6,534	44	22	29	14	22	11	18
82	6,375	43	22	29	14	22	11	18
84	6,223	42	21	28	14	21	11	17
86	6.078	41	21	27	13	21	10	17
88	5,940	40	20	27	13	20	10	17
90	5,808	39	20	26	13	20	10	16
92	5,682	38	19	26	13	19	10	16
94	5,561	37	19	25	12	19	9	16
96	5,445	36	19	25	12	19	9	15
98	5,334	36	18	24	12	18	9	15
100	5,227	35	18	24	11	18	9	15



# Plastic Layers

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# Machine Parts

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



- 1. Metal Shoes collect mound soil
- 2. Bed former
- 3. Rollers
- 4. Tensioning wheels
- 5. Covering discs
- 6. Dirt Shields
- 7. Drip Tape spool
- 8. Drip tube applicator

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# Laying Process

- Start with prepped field
- Drive around edge mark line
- Lower plastic layer
- Dirt on plastic under wheels
- Tie drip to stake behind plastic
- Drive forward to lay plastic
- Adjust coulters cover edge
- Check for firm bed





# Covering Discs

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- Disc Adjustment
  - Angle / height / pressure
- Dirt Shields
- No clumps
- Practice and Time Adjustment



# Adjustments



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**Farm Supplies** 

RT 130 Hollis NH

- Level machine
- Tape 1 to 3 inches deep
- 4 to 6 inch raised bed
- Position of tape in raised bed

Goal Uniform raised firm bed with sight crown center 4 inches cover per side



# Drip Tape Tube

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## NO SHARP EDGES CAN CUT DRIP TAPE Most Common Problem for tape Defects

# Brookdale Farm Supplies Field Prep Key to Success

### **Brookdale Fruit Farm**

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• No clumps



- Shovel
- Knife
- Magnet
- 2 stakes
- Paint Marker



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Tips



- Bio parallel tensioning wheels
- No roll tension



## Smooth Ends

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Video

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• Pokes hole plastic

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**Farm Supplies** 

**RT 130 Hollis NH** 

- Adjustable spacing
- Adds water hole
- Add starter fertilizer
- Light pressure on bed
- Rigidly mounted
- Drive careful -
- 1500 2000 / hour
- 48" spacing 1815 plants acre on 72 inch row center

Water Wheel Planter





## Water Wheel

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- Hit drip tape
- Center tow
- Create void





## Wolf

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# 3 row machines

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- 3 x adjustments
- 3 x problems
- 1.5 times labor savings not 3
- Greater potential for error
- Flat ground



Row Cover

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- Early Establishment
- Warmer soil
- Control environment



# Weed Management

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Farm Supplies RT 130 Hollis NH

- 1.7 OZ Black Row Cover Fabric
- UV Stabilized
- Pinned every 3 feet with staples
- 3 to 5 year life span
- Re useable weed barrier



- Permeable for rain water filtration
- Cost effective weeding solution
- 4 and 5 foot widths
- Cost \$700 to \$850 / acre / spacing



# Field Clean UP

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- Plastic Lifter
- Plastic Winder
- Tape Winder











## Contact

**Brookdale Fruit Farm** 

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



Trevor Hardy Brookdale Fruit Farm Inc. 38 Broad Street Hollis NH 03049 603 465 2240

tractortry@aol.com

www.brookdalefruitfarm.com







**Brookdale Fruit Farm** 

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## **SUMMARY**



NOVAMONT, WHO WE ARE: MISSION & NETWORK



MATER-BI®: BIODEGRADABLE AND COMPOSTABLE SOLUTIONS



MATER-BI® MULCH FILM: CHARACTERISTICS



MATER-BI® MULCH FILM: FIELD EXPERIENCES







## Who we are



A world leader in the sector of BIOPLASTICs and biochemicals obtained through the integration of chemistry, environment and agriculture.

A company with a triple vocation: ✓ Industrial reality ✓ R&D CENTRE ✓ Training CENTRE

We promote a BIOECONOMY model as a driving force for enhanced territorial regeneration.



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## **Our mission**



Developing materials and biochemicals through the integration of chemistry and agriculture, by starting up third-generation biorefineries in local areas and providing application solutions that ensure an efficient use of resources throughout their entire life cycle, with advantages for social, economic and environmental systems.



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## **Our unique identity**

## The company

- € Turnover: 145 mln/€
- MATER-BI: 120.000 ton/y
- Polyesters: 70.000 ton/y

## Research and development

- 7,2% of investments compared to 2014 turnover
- Sover 25 years of experience
- Equipment and facilities ranging from lab scale to innovative pilot plants



## 412 Employees\* (20% in R&D)+28% of growth in the last 3 years

People and training

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\$

Over 300 training activities since 2000 for young researchers and experts in collaboration with universities and research centres of excellence in Italy and abroad





## A company with roots in the territory





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## A worldwide company



## MATER-BI®: BIODEGRADABLE AND COMPOSTABLE SOLUTIONS



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## **MATER-BI IN AGRICULTURE**

### INNOVATIVE SOLUTIONS BIODEGRADABLE IN SOIL







### **Brookdale Fruit Farm**

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## Mater Bi® mulching film: 15 years of evolution



2000:

The first Mater Bi<sup>®</sup> mulching film is placed on the market

## 2007:

A new generationnog the Mater Bi<sup>®</sup>mulching film was born: better performances and longer lasting 3° generation of Mater Bi®mulching film was born with better field performances

2013:











## Mater - Bi® biodegradable mulching film



Mater-Bi® mulching film contents starch and vegetable oils and it is biodegradable in soil, so a t the end of the crop cycle it can be plowed with crop vegetables residues and microrganisms in the soil will biodegrade it producing **carbon dioxide**, water and biomass

It is suitable for several crops (short, medium and long cycle) and in different climatic conditions

## **CHARACTERISTICS OF THE FILM**

- Color: **black** with biodegradable masterbatch Mater-Bi®based
- Standard thickness: **12, 15, 18, 20** microns
- Lasting in field: 2-6 months for 15microns film, until 10 months for 20 microns, higher than10 months and until 24 months for 40 microns film.



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## **Biodegradation: the process**



Bioplastic



Soil microrganisms



WATER + CO<sub>2</sub> + Biomass



## **Biodegradability: the certification program**

Mater Bi® mulch film complies - compostability and biodegradability certifications:

- ASTM D 6400:2004 (USA)
- UNI EN 14995:2006 (EUROPE)
- UNI EN 13432:2002 (EUROPE)
- UNI11183:2006 (ITALY)
- NF U 52-001 (FRANCE)

Main European organisms certification programs: Vinçotte (Belgium) e DIN CERTCO (Germany)















## **Biodegradability in soil**

- ONLY Mater-Bi® mulch film received **"OK BIODEGRADABLE SOIL"** certification from Vinçotte (both on raw material and on processed film)
- Mater Bi mulch film is the <u>first on the market getting this certification on the</u> <u>processed product</u>



- ✓ Based on EN 13432
- ✓ Biodegradation test at 20-25 °C (soil T°)
- ✓ 90% in 2 years



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## Biodegradability in soil of Mater-Bi® mulch film



14th JUNE 28th JULY 12th AUGUST 22th SEPTEMBER 29th OCTOBER (15 dd after laying) (60 dd after LAYING) (75 dd after LAYING) (120 dd after LAYING) (150 dd after 4AYING)



## **Biodegradble mulch films and oxophotodegradable films:** the difference

## **BIODEGRADABLE FILM:**

- In soil it is converted to **carbon dioxide, water and biomass** by microrganisms
- Biodegradation process complies national and international norms and standard requirements and it can be measured using specific and standardized methods
- Search At the end of the biodegradation **not residues or ecotoxical effects** are recorded.

## **OXOPHOTODEGRADABLE FILM:**

It's a traditional plastic added with additives that in presence of oxygen and light activate the disintegration creating the fragmentation of the film until its pulverization

- There are not tests demonstrating a complete biodegradation after the disintegration (maximum rate up to 60%; standards requirement are at least 90%)
- These materials don't comply national and international standards requirement on biodegradation



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## **Biodegradble mulch films and oxophotodegradable films:** the difference

Biodegradable film after 150 days in soil



Film oxofotodegradabile after 150 days in soil









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## Biodegradble mulch films and oxophotodegradable films: The difference????? Don't Stop at Biodegradable.

## You have to be aware! Know the difference between OXO's and Compostable

Ask the questions:

- 1) Does the film contain PolyEthylene? (PE)
- 2) Does the film have compostable certifications
  - 1) For the raw material or film

Do not take the representatives word. Ask the questions

**ONLY YOU CAN PROTECT YOUR SOIL** 

If there is 20% or more price difference --- Be cautious

Remember Compostable is eaten by Microbs. Oxos only fragment



## If your interested here are some resources – Google it!

## You can find these on the internet –Novamont Website

- 1) Biodegradable Mulch Product testing 2006 Cornell Vegetables
- 2) PSU extension BioDegradable Mulch Film Fact Sheet 2010
- 3) AgroBioFilm 2013 PDF Compostable Films for Agriculture
- 4) Handbook of Biodegradable Polymers 2° Edition
- 5) Technical Evalualtion Report 2012 USDA
- 6) USDA NOSB memo 15-1 January 2015 for Organics
- 7) SCRI research group. USDA funded Acedemic Group UT WS others











## **Further Discussion needed on Organics / NOSB**

## **What specifically can organic farmers use now for mulching?** 7 CFR 205.601

Currently allowed options for mulching are:

- 1. Non-synthetic, untreated materials such as wood chips, leaves, or straw
- 2. Newspapers or other recycled paper, without gloss, glossy inks, or color inks
- 3. Plastic mulches and covers provided they are removed from the field at the end of the growing season, and they are petroleum-based, but not polyvinyl chloride (PVC)
- 4. Biodegradable bio-based mulch film provided that it complies with the requirements and restrictions of the USDA organic regulations, and Policy Memo 15-1 in the NOP Program Handbook.
  HOWEVER, no such mulches are currently approved for organic farming.

## MATER-BI® MULCH FILM: FIELD EXPERIENCES



## **APPLICATIONS**

Several horticultural crops	Spring - Summer	Open field/tunnel	Itaaly, Greece, Spain, Germany, USA, Australia	3 -8
Zucchini	Spring - Summer	Open field	Italy	3 - 5
Pumpkin	Spring - Summer	Open field	Italy, Germany	4
Lettuce	Spring - Summer	Open field/tunnel	Italy, France, Germany	2 - 3
Solanaceae (tomato, pepper, aubergine)	Spring - Summer	Open field/tunnel	Italy, Spain, France, Australia, USA, Canada	4 - 6
Melon	Spring - Summer	In tunnel/lowtunnel	France, Italy, Greece	3 - 4
Melon, watermelon	Spring - Summer	Open field	Italy, Greece	3 -4
Grape	Spring - Summer	Open field	Italy	6
Basil	Spring - Summer	Open field	Italy, France	4
Potato	Spring - Summer	Open field	Italy	4
Cabbage	Spring - Summer	Open field	Italy, Spain, Germany	4 - 5
Onion, garlic	Spring - Summer	Open field	Italy, France	6 - 8
Gherkin	Spring - Summer	Open field	Germany	6
Corn	Spring - Summer	Open field	Italy, Canada	4 - 6
Processing tomato	Spring - Summer	Open field	Italy, Spain	5
Strawberry	Summer- Spring	Open field/tunnel	Italy, Spain, Belgium, Germany	6 - 12
Vinegrape	From Spring/Autumn	Open field	Italy (North e South)	12
Berries (cranberry, raspberry)	Autumn/Spring	Open field	Italy (North e South)	6 - 12



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## **MELON (Italy)**





MATERIAL	Average fruit weight (Kg)	Total production (Kg/m <sup>2</sup> )	Fruits/plant	
Mater-Bi 15 µm	1,3	5,0	3,8	
ΡΕ 40 μm	1,3	4,2	3,1	

MATERIAL	Flesh firmness (Kg/cm³)	Sugars content (°Brix)	
Mater-Bi 15 µm	2,5	11,25	
PE 40 μm	2,0	8,95	

Productive results show similar data beetwen Mb film and PE, without statistically significative differences

Qualitative data show good influence on sugars content (important commercial parameter) probably due to the water permeability of Mb film higher than PE film, enancing sugar concentration.



## **LETTUCE (Italy)**

MATERIAL	Head weight
Mater Bi®	229,97
Not mulched	220,13

MATERIAL	Chlorophyll a (µg/cm²)	Chlorophyll b (µg/cm²)	b/a
Mater Bi® 15µm	3,99	3,05	0,77
Not mulched	3,41	2,55	0,75

- Productive results show similar data beetwen Mb film and PE, without statistically significative differences
- Qualitative data show similar chlorophyll content for plants on MB films and on PE







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## **PROCESSING TOMATO (Italy)**



(foto del CIO Parma)

30 days after transplant, plants mulched show more uniform and higher growth compared to not mulched ones. During crop cycle this difference will be mitigated.



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## **PROCESSING TOMATO (Italy)**



Presence of Mater-Bi<sup>®</sup> mulch film doesn't disturb mechanical harvest and tomato fruits picked are not contaminated from film pieces.



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## **PROCESSING TOMATO (Italy)**



Recording soil humidity under mulched and not mulched plants, it has been evaluated that mulch film allows 15-20% of water saving in the soil.



**Brookdale Fruit Farm** 

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## **PROCESSING TOMATO (Italy)**

MATERIAL	Average fruit weight (Kg)	Fruits/plant	Average weight per plant (Kg)	Fruit caliber (mm)
Mater-Bi 15 µm	72	60	4,32	46
Not mulched	68	52	3,54	42

Plants mulched with MB mulch film show higher fruits weight, higher fruits number pe rplant and higher fruit caliber. Presence of mulch film positively influences productive aspects.



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## Laying Compostable mulch is an exciting adventure!



Read the technical reports and get tips from your approved representatives





## Mater-bi Biodegradable mulch film: advantages

**NO REMOVAL & DISPOSAL** at the end of the crop cycle: a biodegradable mulch film at the end of the crop cycle should be **worked into the soil**, in order to properly biodegrade (thought the mineralizing action of soil microorganisms) = **NET REDUCTION OF PLASTIC WASTE** 

**COSTS REDUCTION** in terms of manpower (removal, dispose of, transport)

**REDUCTION OF IMPACTS** on the environment when the plastic films are not properly removed and disposed of



""The challenge of our millennium is in the balance between the technical means that humanity possesses and the wisdom in how we will make use



## THANK YOU FOR YOUR ATTENTION

www.novamont.com