



Does Grafting Cucurbits make Sense? When, Why and How

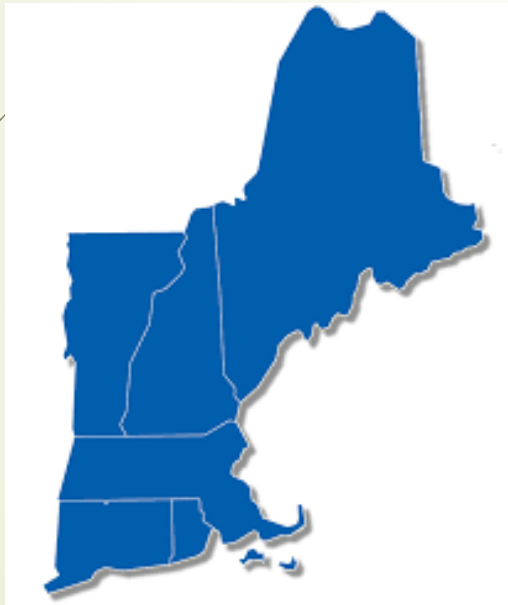
Janel Martin

Graduate Student M.S Agricultural Sciences

Advisor: Dr. J. Brent Loy

Introduction – NE Production

- ▶ ~147 acres in Melons (2007)



- ▶ Season Length
- ▶ Sudden wilt or vine-decline





Background

- ▶ Biotic and abiotic resistance (Lee and Oda, 2003)
- ▶ Interspecific hybrid squash tolerate colder soil (Riviero et al, 2003; Schwarz et al, 2010)
- ▶ Rootstock vigor
 - ▶ fruit size, yield, and quality of the fruit. (Ruiz et al, 1997)
- ▶ Higher yields in water limited environments. (Rouphael et al, 2008)
- ▶ Row covers and black plastic mulch create microclimate (Well & Loy, 1985)

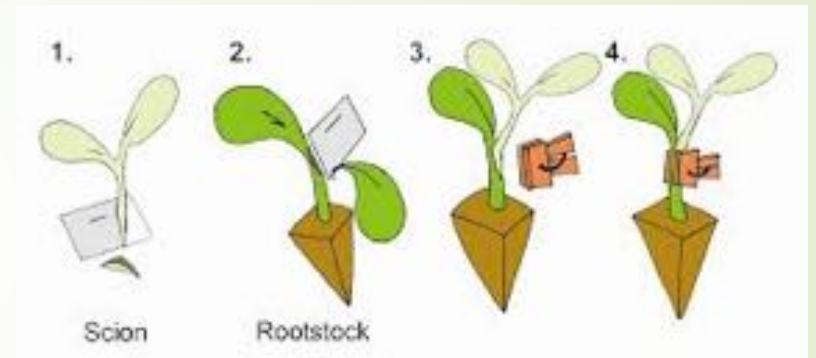
Benefits

- ▶ Disease resistance of rootstock
 - ▶ Soil borne disease
- ▶ Deeper root system
 - ▶ Increase nutrient uptake
- ▶ Greater cold tolerance
 - ▶ Plant Early
- ▶ Tolerant to Water Stress
 - ▶ Save Water
- ▶ Higher yield
 - ▶ Increase Revenue



Grafted Melon

- **Scion** = melon [*Cucumis melo*]
- **Rootstock** = Interspecific hybrid squash [*Cucurbita maxima* and *C. moschata*]
- Began in Korea and Japan late 1920's
- Continual cropping in greenhouses



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Results you can see!



Grafted

Non-grafted

10 plants=**15** melons



Photos: Janel Martin



2015 Results

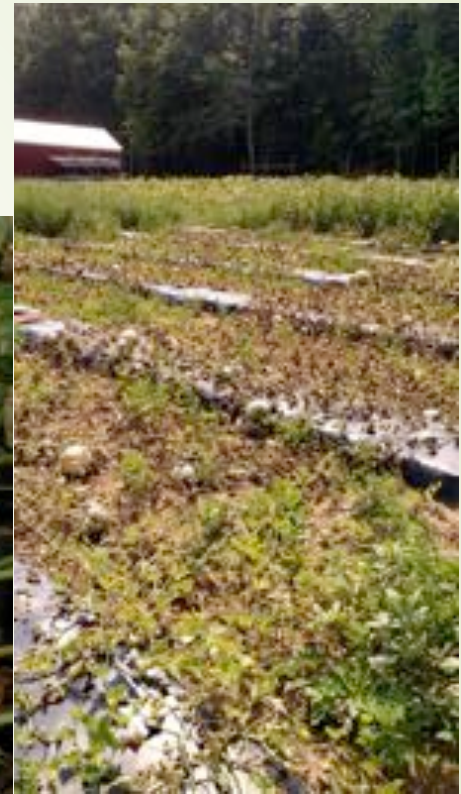
Woodman Farm

Treatment	Melons per Plot		Marketable Yield kg/plot
	Marketable	Cull	
Halona/NH1320	36	3	71 b
Halona/Carnivor	38	1	77 a
Non-Grafted	32	1	49 c
Halona/Kazako*	31	2	59

Consistent size, ~ 4.5 pounds each
11-13 Brix



But then...downy mildew!





2016 Study

Variety Evaluation

- ▶ 5 Melon Varieties, 8 plants/plot
- ▶ 1 Rootstock = NH1320
- ▶ Transplant
 - ▶ June 5
- ▶ 3 reps
- ▶ Control = Non-grafted melon

Season Extension/Low Water

- ▶ Main=Planting Dates
 - ▶ May 12, 21 and June 1
- ▶ Secondary=Water Regimen
 - ▶ Halona melon variety
 - ▶ Rootstock: Carnivor
- ▶ Control= Non-grafted
- ▶ 8 plants/plot, 4 replicates



Possible Outcomes

- ▶ Season extended
 - ▶ Earlier to market
 - ▶ Longer season
 - ▶ Higher yield
- ▶ Irrigation Regimen
 - ▶ Maintain yield and quality w/ less water
 - ▶ Reduce dilution of SS, increase quality
- ▶ Varieties
 - ▶ Compatibility

Floating Cover



June 1 Flowering



Weed Suppression





From the Air





Season Extension

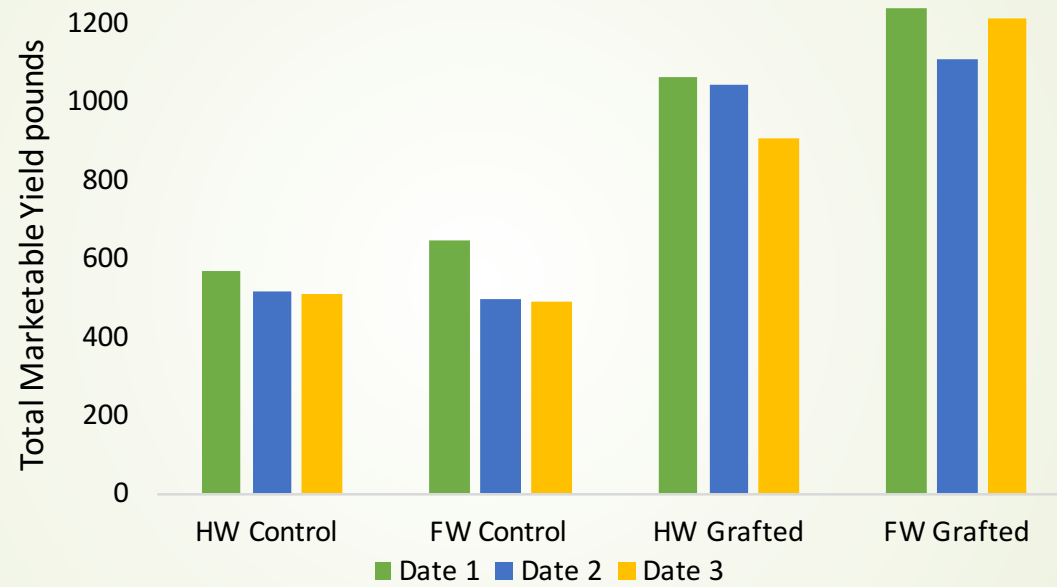


Figure 1: Mean yield in kilograms of marketable melons, compared by treatment and planting date. Error bars are Standard Error. Means with the same letter are not significantly different ($p>0.05$).



Season Extension Study

		Pounds per Acre		
		Control	Grafted	Yield Increase
Full Water				
	May 12	54,900	104,410	90%
	May 21	40,810	94,080	131%
	June 1	41,540	103,150	148%
Half Water				
	May 12	46,082	90,040	95%
	May 21	43,324	88,730	105%
	June 1	42,918	76,930	79%



Variety Study

	Pounds Per Acre		Yield Increase
	Control	Grafted	
Sarah's Choice	33,540	45,630	36%
Diplomat	38,510	68,400	77%
Athena	46,650	88,690	90%
Goddess	39,240	60,500	54%
Snow Leopard	35,590	59,300	67%



Grafting and Sustainable Farming

- ▶ Crop Diversity for Farmers in Northeast
- ▶ Longer growing season
- ▶ Increased production and revenue
- ▶ Food Security
- ▶ New England Food Vision 50/60



How to Graft Cucurbits

Grafting melons

- One Cotyledon Method
 - Melons
- Hole Insertion
- Cleft graft



Basics of Grafting

- ▶ Same growth stage
- ▶ Sharp razor blade
- ▶ Grafting clip, foil strips, or wrap
- ▶ 2 Spray Bottles
 - ▶ One water
 - ▶ One disinfectant
- ▶ Draft Free Area



Healing Chamber Design

- ▶ ~ 95% Relative Humidity (RH)
- ▶ 77°F to 86°F Temperature range
- ▶ Low Light Intensity
 - ▶ Double Shade Cloth
- ▶ Clear domed lids
- ▶ Mist inside of container
- ▶ LED lights, adjustable intensity, low wattage use



For successful graft union

- ▶ Low light for 2 days $\sim 100 \mu \text{ mol m}^{-2} \text{ s}^{-1}$
 - ▶ Light compensation point
- ▶ Slowly increase light exposure each day
- ▶ After 5-7 days grafts knit together
- ▶ Acclimate slowly to lower humidity
- ▶ Keep clips on for transplanting



Root Excision

- Root Development
- Improved Graft Union
- 5 - 7 days





Recommended Rootstocks

- Interspecific Hybrid Squash (Many varieties)
- Bottle gourd [*Lagenaria siceraria*]
- Other Melon species

- **www.vegetablegrafting.org** has current list

- Compatibility is important

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Questions?



Photo credit: Dr. Brent Loy