

**Modular Ecological Design (2007)**  
**An Intensive Fruit and Vegetable Polyculture System**  
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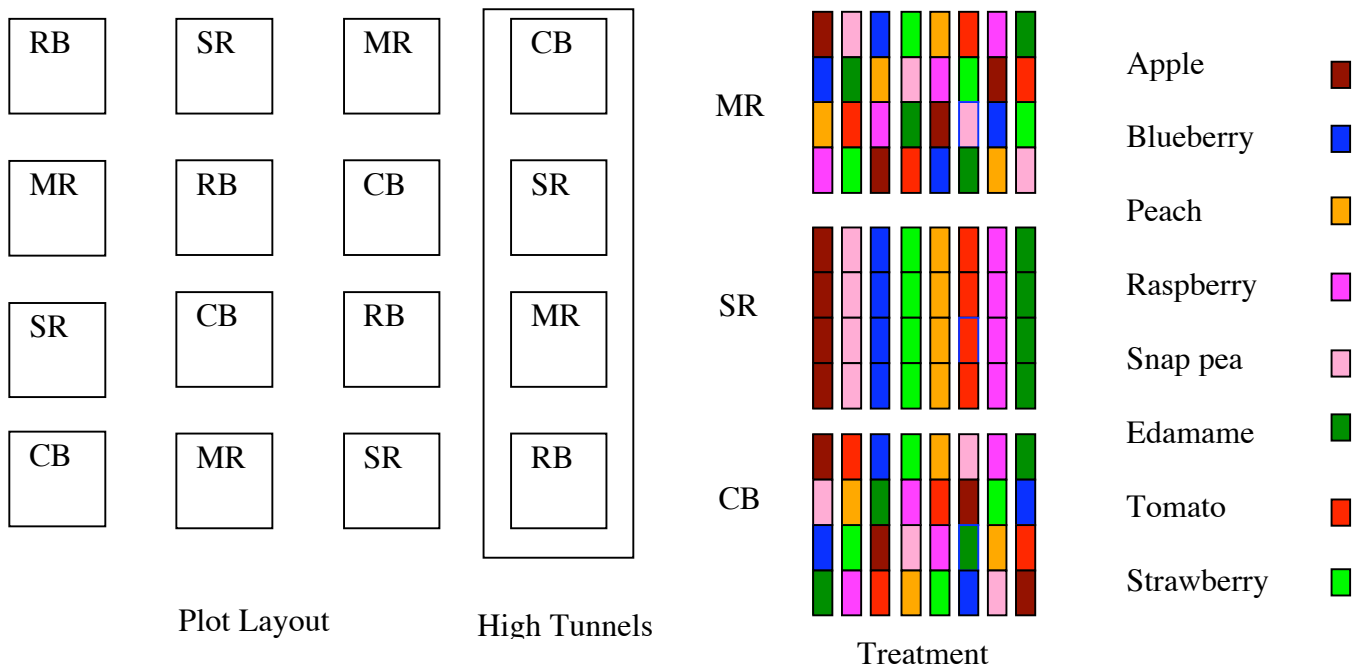
**Goal:** To determine the optimal layout (in terms of economics, pest density, efficiency) of an intensive fruit and vegetable polyculture system that can be used by the small urban farmer.

- Design a food production system that:
  - Simulates natural systems (genetic, temporal and spatial diversity)
  - Use ecological principles (minimize disruptions, prevention, biocontrol, compost)
  - Economically viable (\$10/ft of row ≈ \$90K/A)

**Methods** Each modular unit or plot (about 44' x 60') consists of 4 tree/shrub fruit crops (apples, blueberries, peaches, raspberries) and 4 herbaceous commodities (strawberries, edamame soybeans, tomatoes, and snap peas). Annual strawberries will replace snap peas in September.

- Each perennial commodity includes three cultivars (early, mid and late). Cultivars were usually selected for their pest resistance and cold hardiness (peaches).
- There are 4 treatments, replicated 4 times: 1) Solid rows (SR), 2) Woody fruit commodities and herbaceous commodities mixed within a row (MR), 3) Woody fruit and herbaceous commodities mixed in a checkerboard arrangement (CB) and 4) the mixed row configuration on raised beds (2 landscape timbers).
- Approximately 1.5 acres. In 2007 The eastern most treatments were covered by Haygrove high tunnels (May1-3) and a deer fence added.

**Treatments:** Mix Row (MR), Solid Row (SR), Checkerboard (CB), Raised Beds Mixed Rows (RB)



## Costs

2005-2006 - Establishment cost – \$24,477 (\$3.20/ft of row)  
 2007 – Dear/racoon/fox fencing - \$730 (\$0.75/ft)  
 Haygrove high tunnels - \$18,306 for 0.25 A (\$9.50/ft – only HT plots)  
 Labor - \$1.00/ft for \$8/hr for 6 months.

## Growth

2006 - RB treatment had the most yield/growth (14-81% inc.) for most crops

### Difference in High Tunnel Growth (cm) (applied 1 May 2007)

Treatment	All	Apple	Blue	Rasp	Peach	Soy	Straw	%Trees w/ aphid/mites
No High Tunnel	172 a	232 a	118 a	142 a	271 a	74 a	41 a	19 a
High Tunnel	<b>196 b</b>	<b>243 a</b>	<b>123 a</b>	<b>185 b</b>	<b>333 b</b>	<b>86 b</b>	<b>44 b</b>	<b>38 b</b>
% increase	14%			30%	23%	16%	7%	

**Pest Problems** - *Septoria* on tomato, powdery mildew on HT strawberries, Jap. beetles on raspberries and soybeans, Potato leafhopper on apples, HT apples = Woolly apple aphid, Green apple aphid, Mites (ERM&TSSM)

## Japanese Beetles

**2005 = 15K** beetles, primarily on soybeans  
**2006 = 60K**, most on raspberry and peaches  
**2007 = 280K**, soybean and raspberry (HT = 4%, No HT = 96%)

Treatment	JB/5ft/date
<b>RB</b>	<b>17.3 a</b>
MR	14.9 b
SR	14.7 b
CB	13.6 b

Raspberry			Peaches			Soybean	
Treatment	2006	2007	Treatment	2006	2007	Treatment	2007
MR	10.4 a	35.0 b	MR	13.8 a	4.3 ab	MR	38.1 b
CB	11.7 ab	29.8 c	CB	10.1 bc	3.6 b	CB	35.7 bc
<b>RB</b>	<b>13.3 bc</b>	<b>43.6 a</b>	<b>RB</b>	11.5 ab	<b>2.5 c</b>	<b>RB</b>	<b>45.7 a</b>
SR	15.3 c	37.8 b	SR	7.7 c	4.9 a	SR	30.3 c

Cultivar	2006	2007	Cultivar	2006	2007	Cultivar	2007
<b>Royalty</b>	<b>3.1 a</b>	<b>15.5 a</b>	<b>Flamin Fury</b>	<b>16.8 a</b>	<b>5.6 a</b>	Say Early	31.2 a
Caroline	12.0 b	36.4 b	Bounty	8.1 b	3.0 b	Say Mid	20.4 b
Prelude	22.9 c	57.7 c	Glowingstar	7.3 b	2.8 b	<b>Mooncake</b>	<b>60.7 c</b>

## Economics - Best plots, local supermarket price

Crop	Gross \$/ft
Green Beans '05	1.99
Sw. Corn '05	2.25
Edamame '05	3.35
Tomato '05	11.83
Strawberry '06	9.21
Summer Raspberry '06	8.80
Fall Raspberry '06	7.46
Tomato '06 (cupid)	26.67
Strawberry '07	13.48
Peaches '06, '07	0.00
Apple '06, '07	0.00

## Total Harvest Times - 2005 (green beans, tomato, soybeans, sw. corn)

Treatment	Hours/Meter/Person
SR	5.8
RB	6.8
MR	6.4
CB	7.3

2006



2007

