Producing raspberries and blackberries out-of-season

(using high tunnels and greenhouses)

Why use high tunnels and greenhouses?

- **Overwintering is improved**
- **Season is extended so fruits are worth more**
- **Fruit quality is higher**
- **Yields are greater**

Thornless blackberries

Red raspberries

Prices range from $2.00 - $13.00/lb


Portugal


Scotland

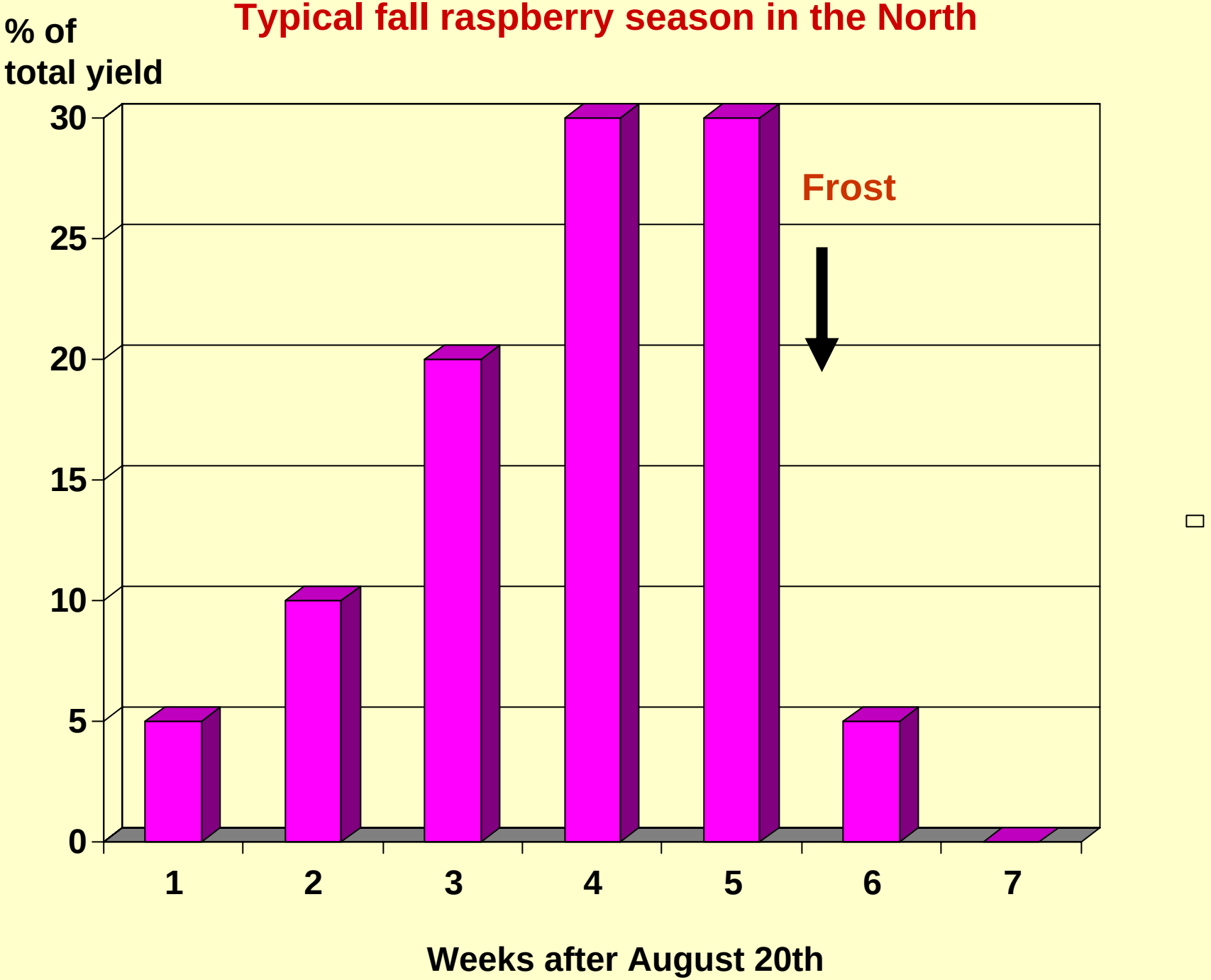

California

Advantages of tunnels in the Northeast

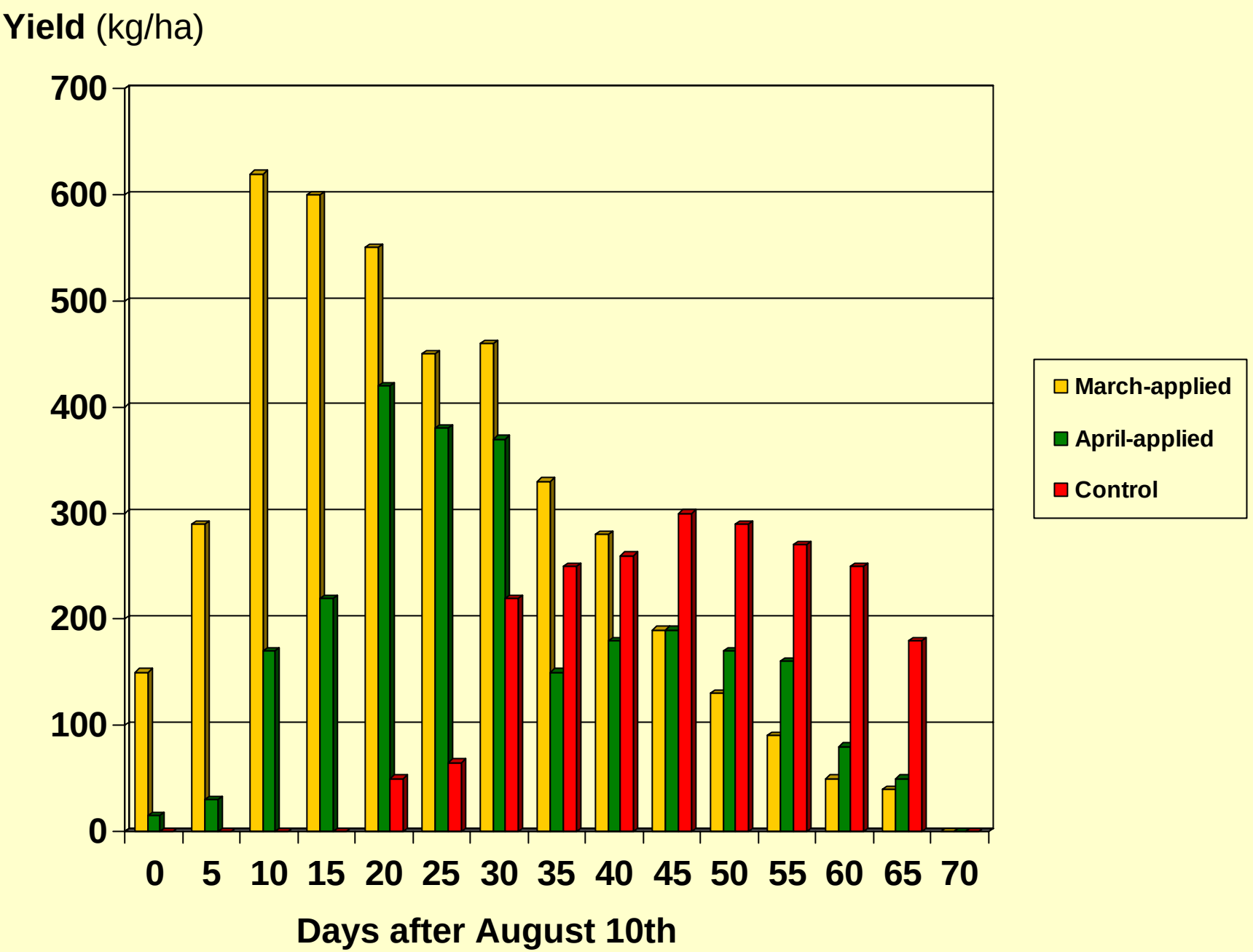
- **Reduction in wind damage**
- **Protection from the rain**
- **Season extension late**

Fall raspberries fruit on their primocanes

Typical fall raspberry season in the North



Accelerate development and fruiting


Yield (kg/ha)
700
600
500
400
300
200
100
0
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Days after August 10th
March-applied
April-applied
Control

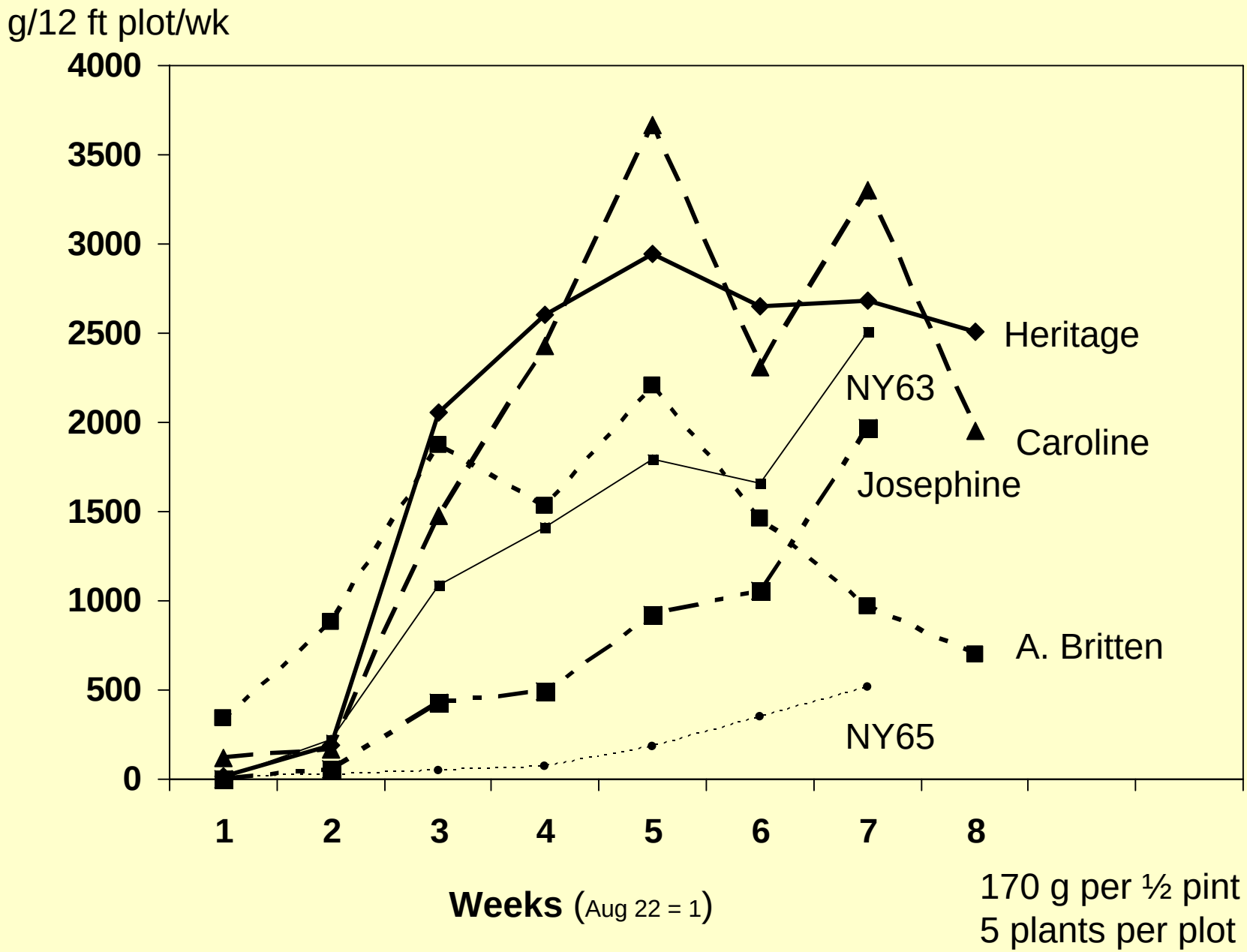
Strategy #1:

- **Plant late cultivars or delay harvest, protect fruit, and capitalize on high prices**


October 20th

Caroline in mid-October

Cultivar Yields Under Tunnels



Cultivar	2005 Yield (kg/plot)	2006 Yield (kg/plot)	2005 Size (g)	2006 Size (g)
Autumn Britten	**12.1**	**11.1**	*3.40*	*3.46*
Caroline	**21.5**	**18.4**	*2.94*	*3.26*
Heritage	**21.5**	**15.5**	*2.27*	*2.33*
Josephine	**11.3**	**14.3**	*4.11*	*4.47*

Was also the favorite for flavor

Heritage

Josephine

Treatments

- **Five manipulations of Heritage (applied in the second year)**
  - **Straw mulch**
  - **Mowing**
  - **Early pinching**
  - **Late pinching**
  - **Control**


First year at planting –
light mulch for establishment

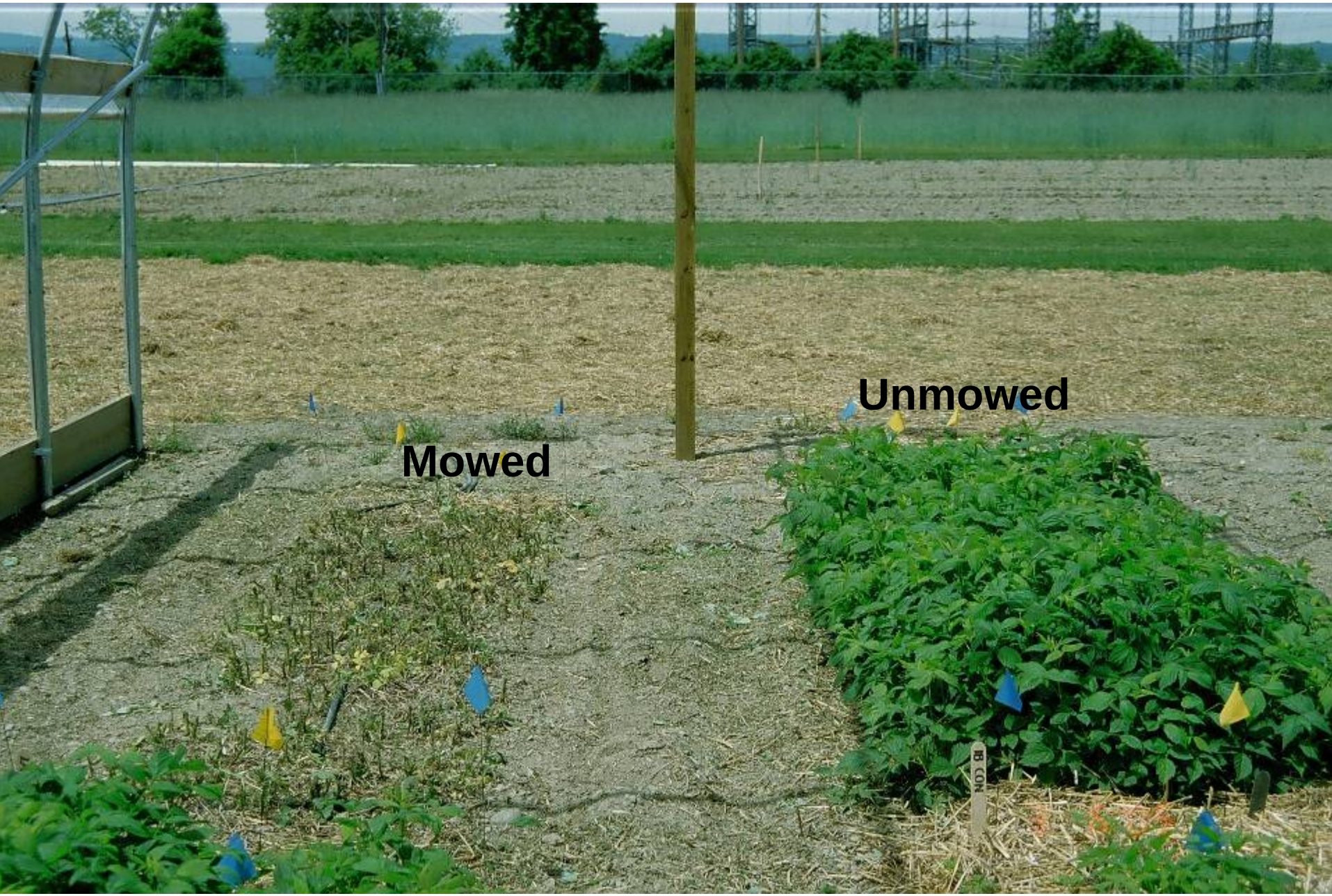
Beginning of treatments:

Middle of February of first year
Old canes are cut to the ground.

Here we removed snow on certain plots to freeze the soil.

After several days, mulch is applied to keep soil cold


No mulch
Mulch
SC MULCH


Unmowed
Mowed

Unmowed

Mowed


Pinching

Unpinched

Pinched

High tunnel prior to covering

Mid-August

September 13, 2005


October 20, 2005


12 10 09

Mid-October

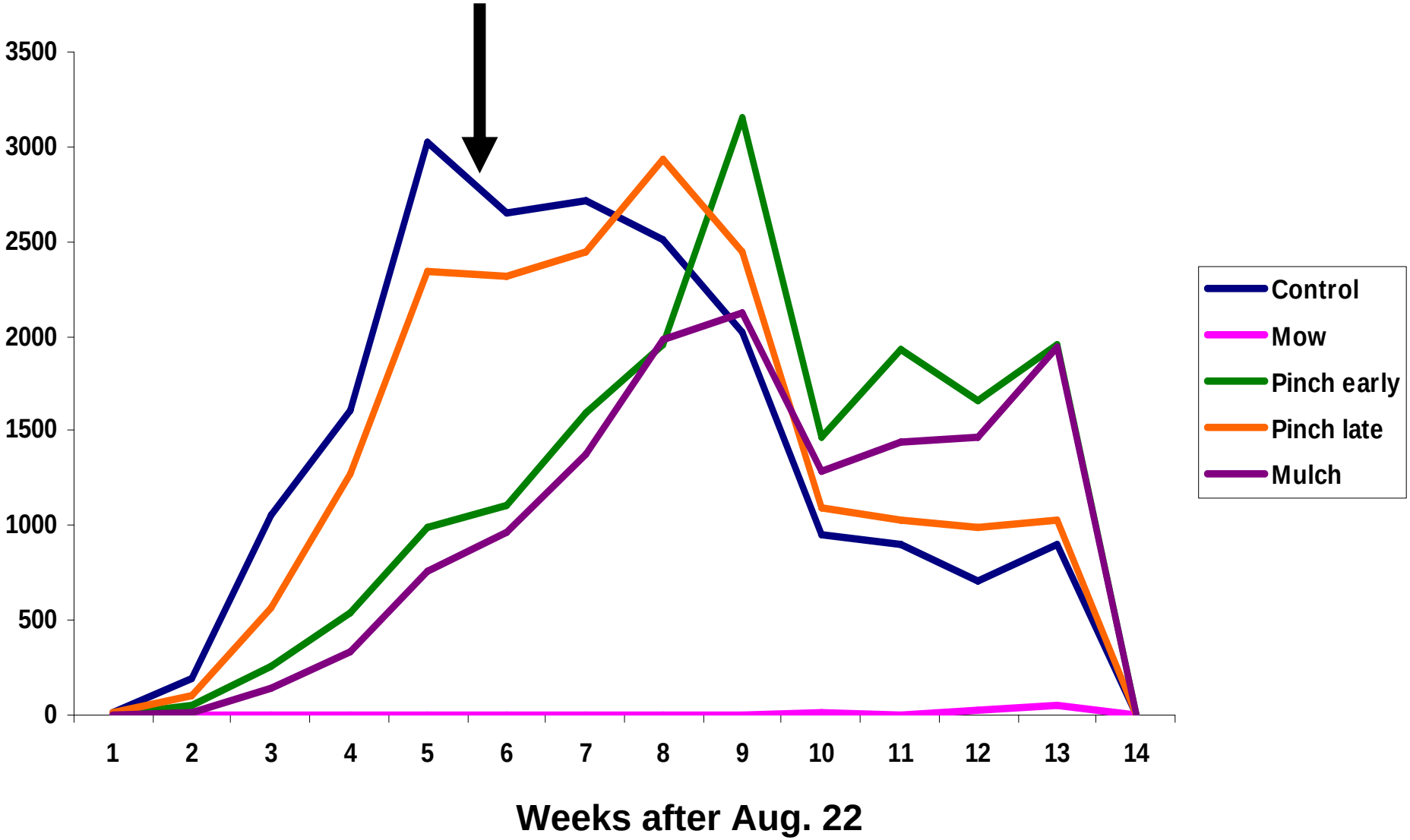
November 5, 2005

Fruit quality on November 5, 2005

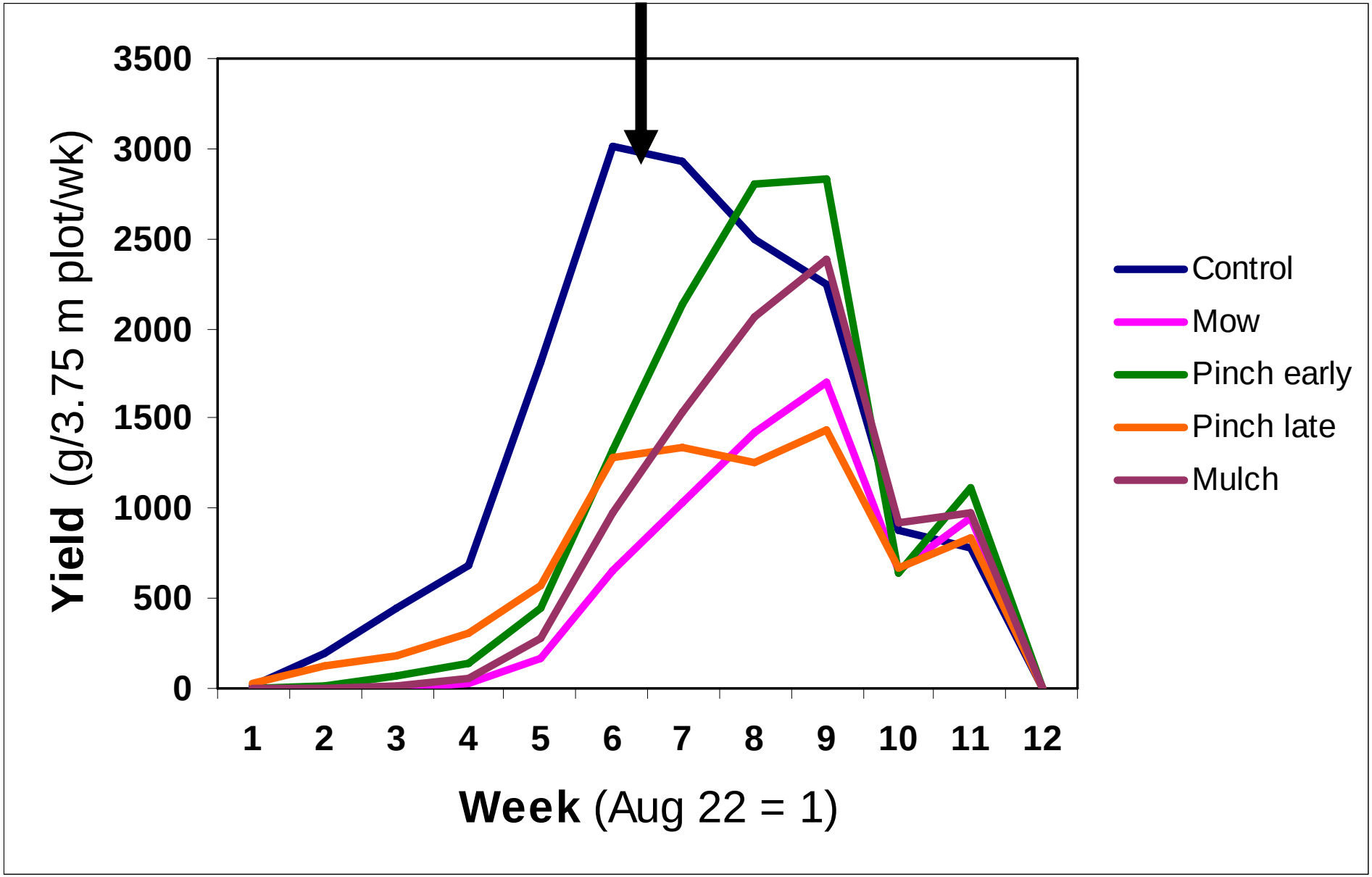
Cultural manipulations of Heritage 2005

g/plot

Normal season ends here



2006 data


3500
3000
2500
2000
1500
1000
500
0
Yield (g/3.75 m plot/wk)
1
2
3
4
5
6
7
8
9
10
11
12
Week (Aug 22 = 1)
Control
Mow
Pinch early
Pinch late
Mulch

Treatment	2005 Yield	2006 Yield	2005 Size	2006 Size
Control	19.3 a	15.5 a	2.2 bc	2.3 b
Tip early	16.7 a	11.5 b	2.1 c	2.2 b
Tip late	18.6 a	8.0 bc	2.1 c	2.2 b
Mulch	13.8 a	9.2 c	2.3 b	2.7 a
Mow	0.1 b	6.6 c	3.4 a	2.7 a

Yield = kg per 3.75 m or 12 ft plot. **20 kg/plot is 21,000 lbs/acre**

Strategy #2:

- **Early primocane-fruiting raspberry production**
  - **Early covering of the tunnel**
  - **Covering individual rows**
    - **Row cover**
    - **Plastic**

Field

High tunnel

Early season extension of primocane-fruiting Heritage

Treatment (Harvest dates)	Size (g)	Yield (meter)	% marketable
Control (8/23- 10/29)	2.02	5,353	86.4
Plastic (8/23 – 11/05)	1.98	6,474	84.1
Row cover (8/23 – 10/29)	1.98	5,692	81.7
Tip (8/29 – 11/05)	2.04	4,677	82.9
Field (9/4- 10/25)	2.00	5,694	74.4

Yield comparison

- Applying the plastic in September for extended fall harvest

2,860 half-pints per tunnel

- Applying the plastic in early spring for accelerated harvest

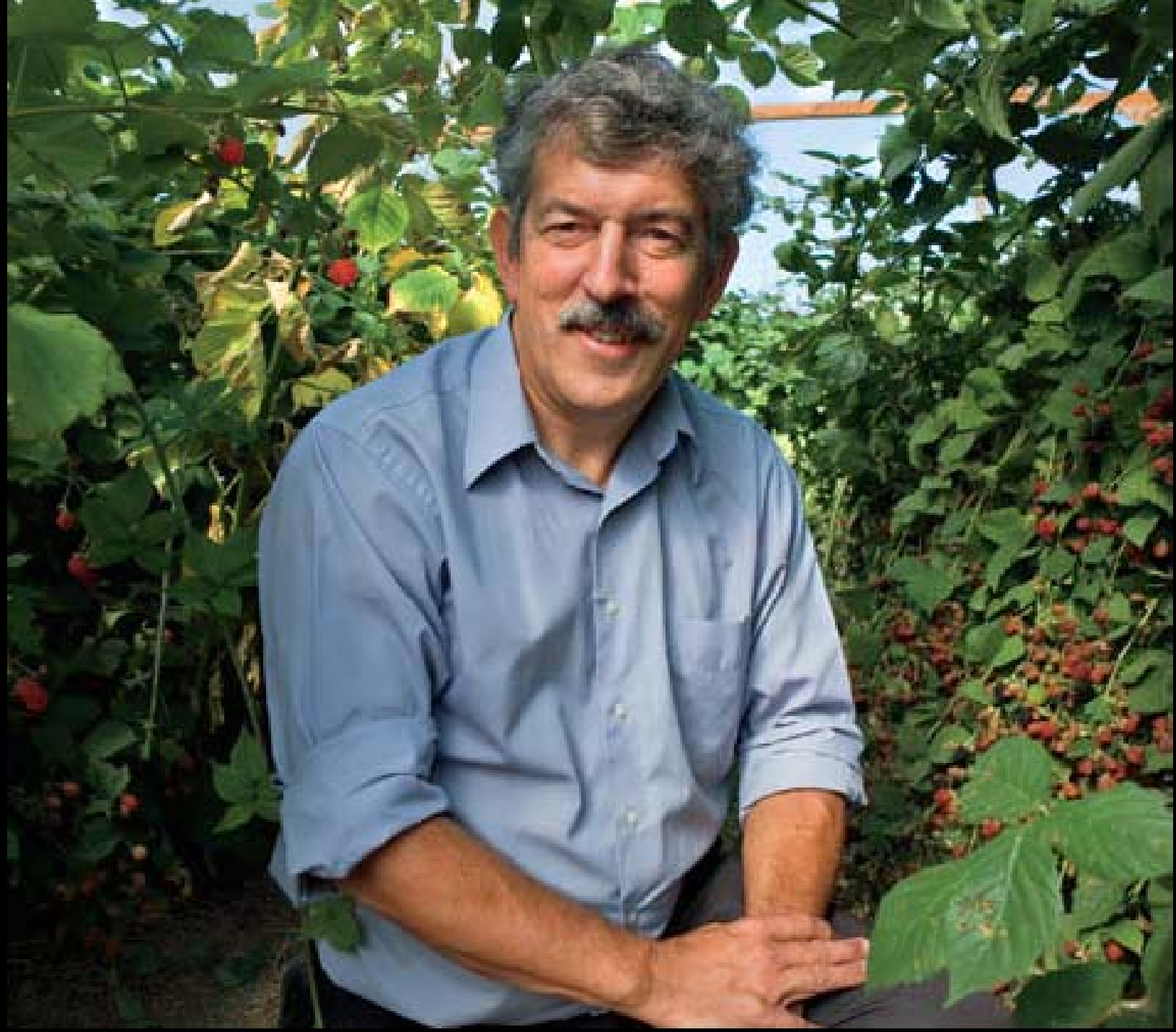
2,855 half-pints per tunnel

Heritage Cane Management Study 2008

	Cane Management	Crop	Size (g/berry)	Yield (g/meter)	Marketable (%)
Field	Double-cropped	Summer	1.90	1,637	63.2
		Fall	2.26	4,761	66.8
		Total	2.20	6,399	65.9
	Single-cropped	Fall	2.19	3,510	62.8
Tunnel	Double-cropped	Summer	1.69	2,371	72.2
		Fall	2.16	5,685	83.5
		Total	2.09	8,056	80.1
	Single-cropped	Fall	2.16	5,585	86.2

Strategy #3:

- **Overwinter tender blackberries and raspberries in a high tunnel**



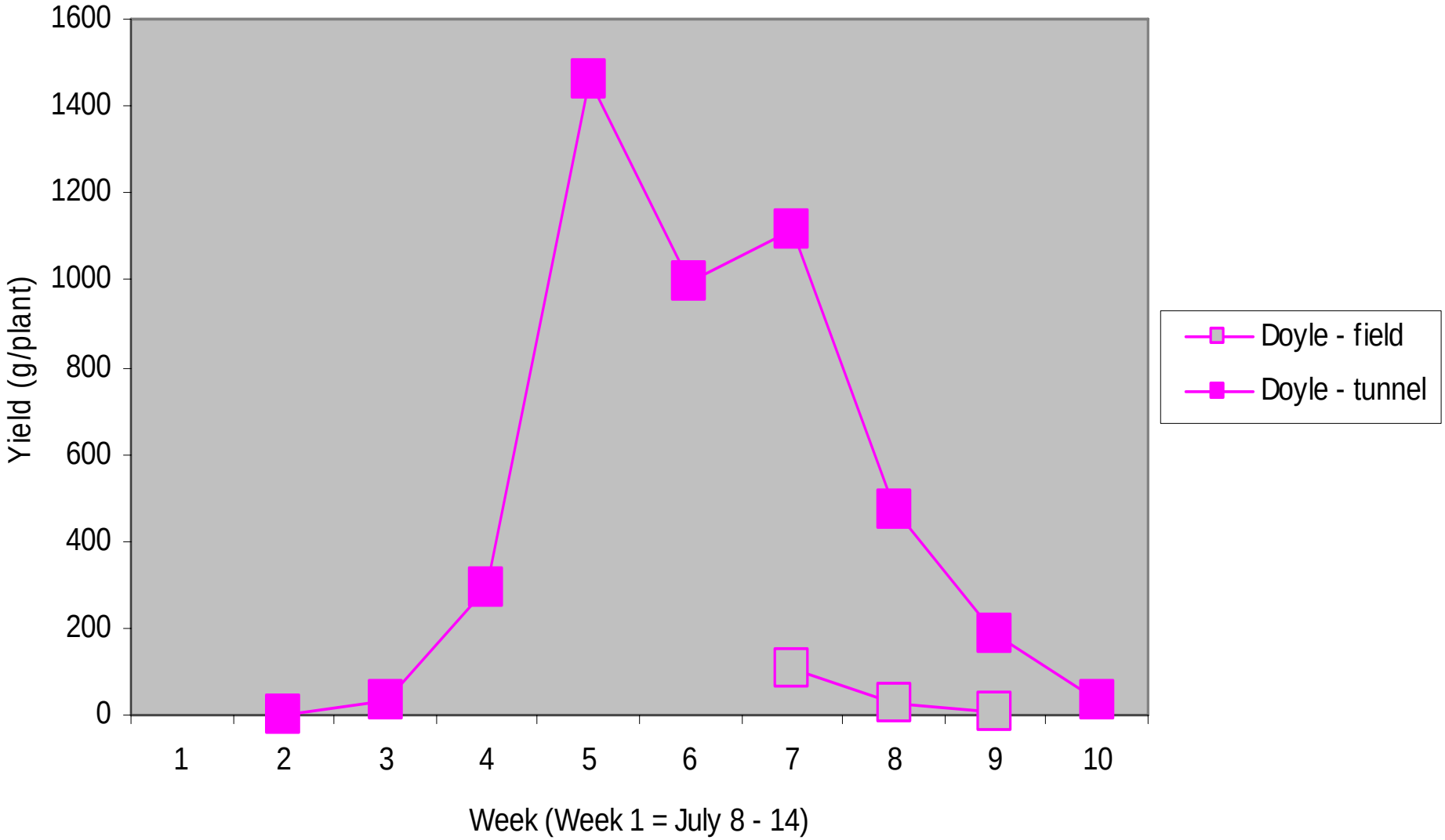
Black Raspberries

Treatment	First harvest	Last harvest	Size	Yield (g/plant)	Marketable (%)
Field	7/20	8/06	3.74	101	63
Tunnel	7/18	8/13	3.97	128	77

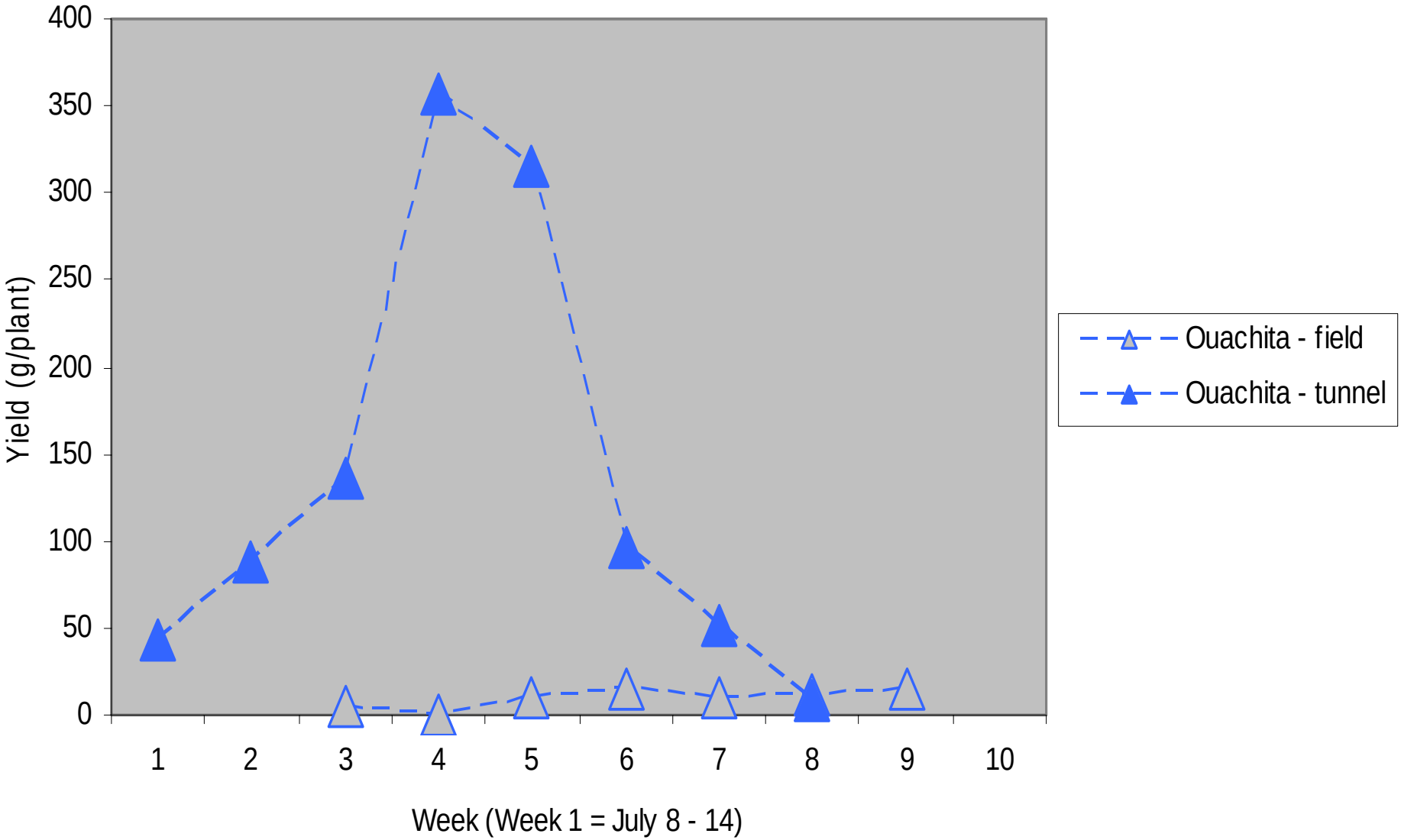
Blackberries

		Season length	Size (g)	Yield (g/plant)	% marketable
Doyle	Field	12	4.30	146	42
	Tunnel	52	6.13	4,591	85
Ouachita	Field	44	5.33	267	30
	Tunnel	51	7.90	1,092	72
Triple Crown	Field	36	6.31	460	59
	Tunnel	50	9.57	5,046	86

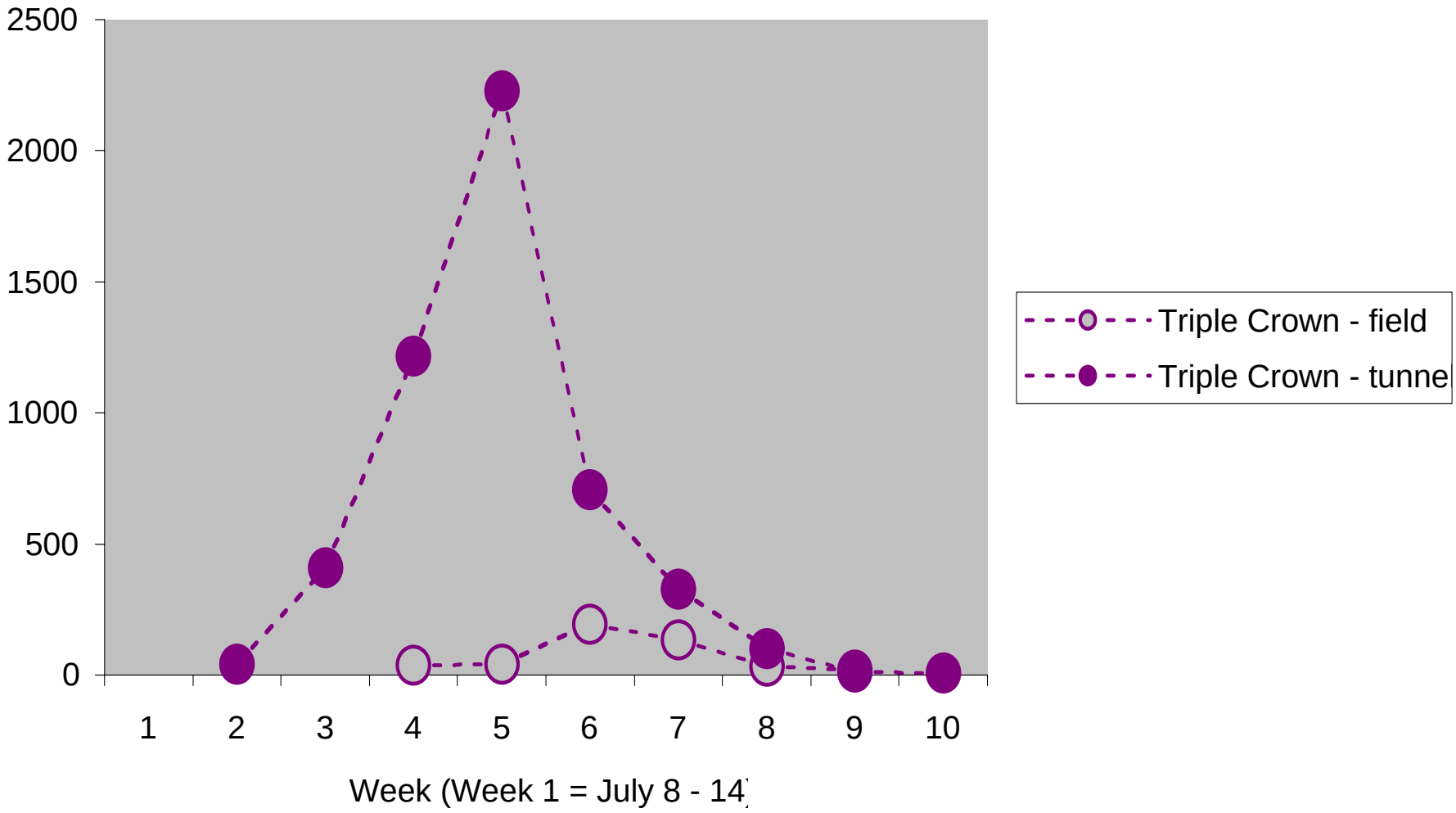
Doyle Blackberry 2007



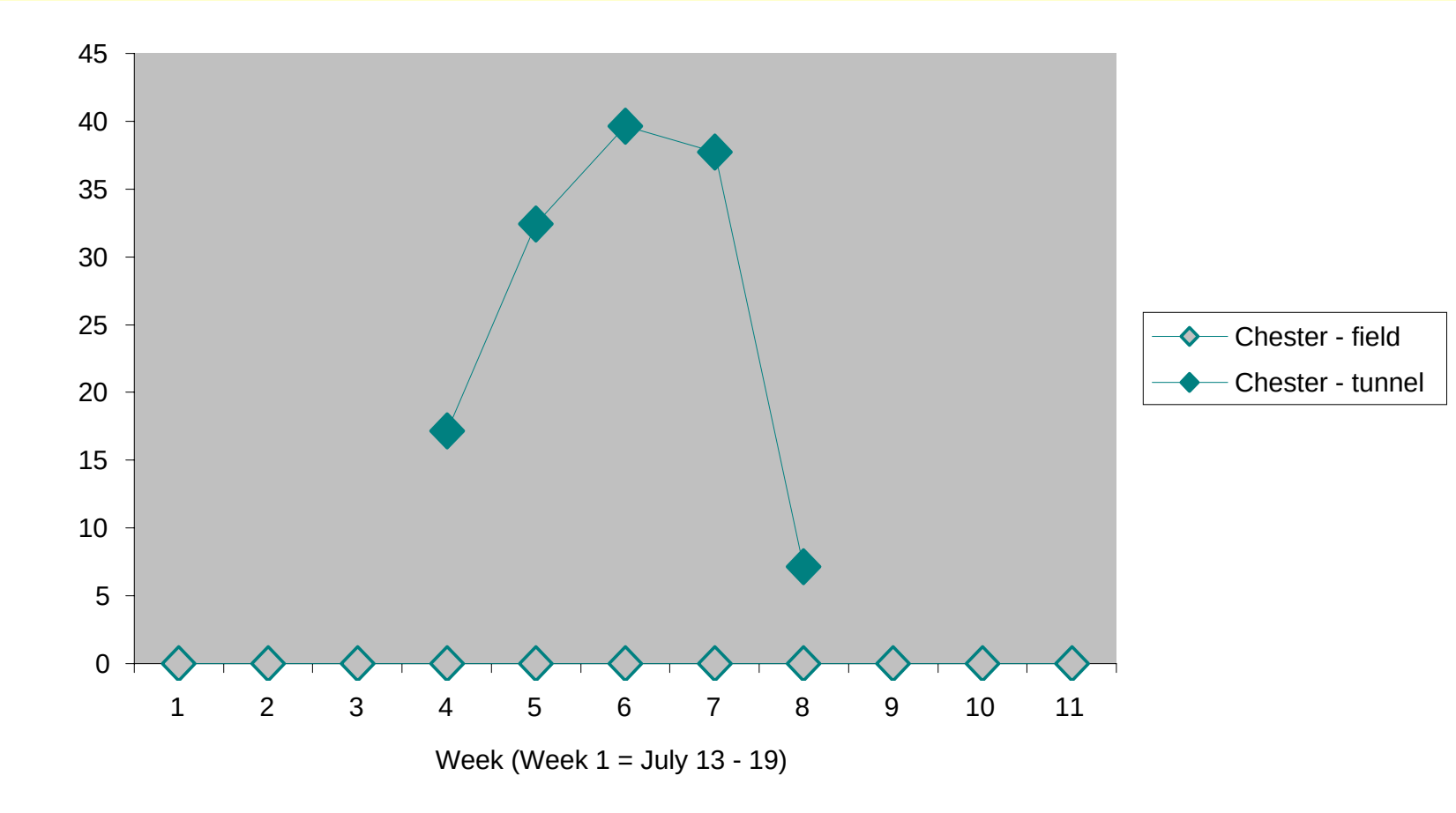
Ouachita Blackberry 2007



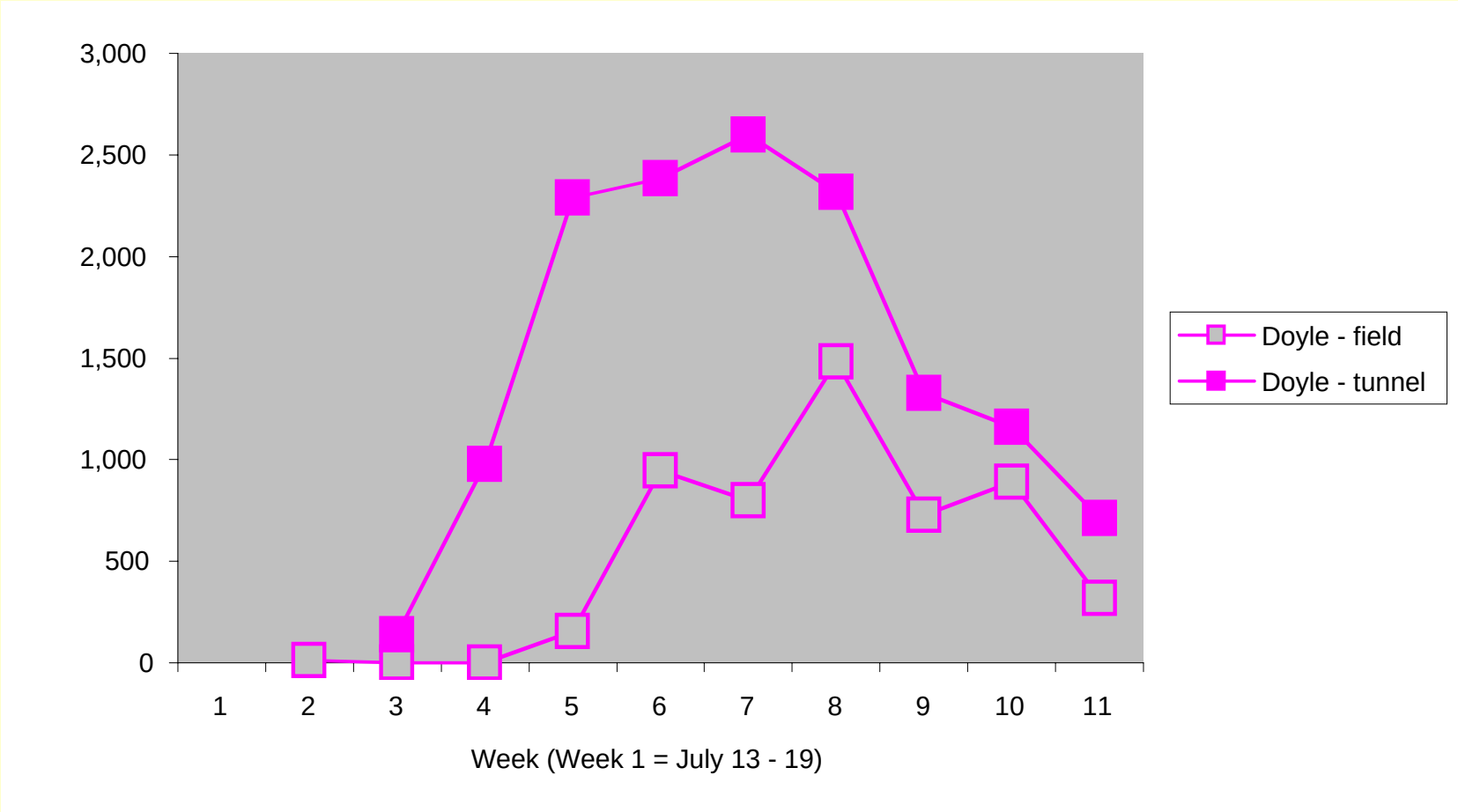
Triple Crown Blackberry
2007



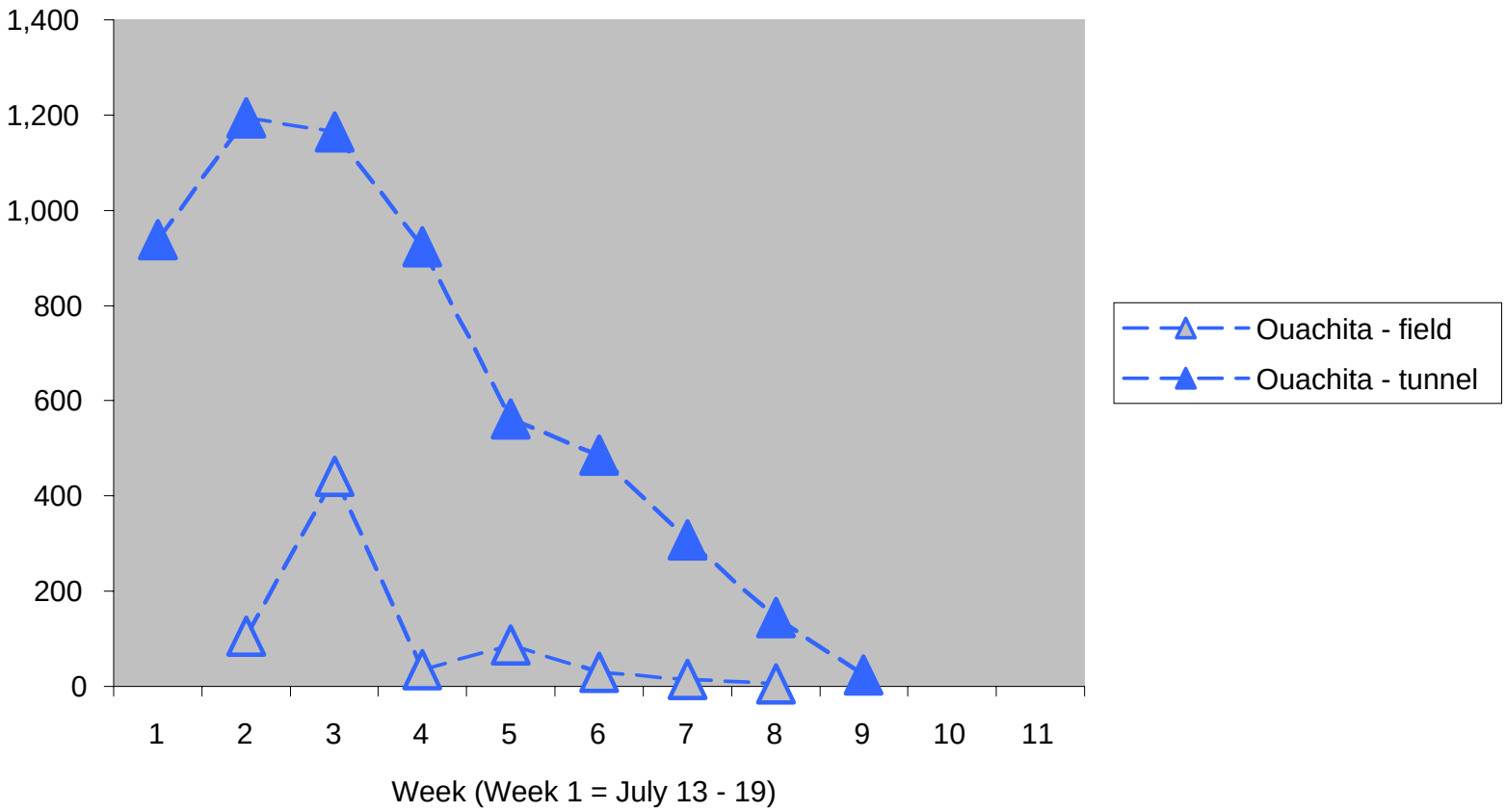
Chester blackberry 2008



Doyle blackberry 2008



Ouachita blackberry 2008



2008 Yield Data

		Size (g/ berry)	Yield (g/ plant)	Marketable (%)
Chester*	Field	---	0	---
Chester*	Tunnel	3.76	134	76.7
Doyle	Field	5.38	5,333	66.1
Doyle	Tunnel	5.48	13,901	81.2
Ouachita	Field	7.70	2,879	51.9
Ouachita	Tunnel	6.84	5,748	85.3
Triple Crown	Field	8.24	8,563	72.5
Triple Crown	Tunnel	8.72	13,002	86.8

* First fruiting season

Strategy #4:

- **Grow primocane-fruting blackberries under tunnels to obtain a fall harvest**

Primocane-fruiting blackberries

Treatments

- **Control**
- **Early pinching**
- **Late pinching**
- **Cane bending**

Trellising Systems

Designing trellising systems for tight spaces that are exceptionally strong yet flexible.

Trellis Growing Systems LLC

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TrellisNews

Trellis Growing Systems LLC will be exhibiting at the Mid-Atlantic Fruit and Vegetable Convention in Hershey, Pennsylvania, January 29 – 31, 2008. Our booth number is 171.

Resources

Blueberries
Brambles
- Blackberries
- Red Raspberries

Flowers
Grapes
Kiwi
Ribes
Tree Fruit
Vegetables

About Us

Trellis Growing Systems LLC (TGS) was founded in 2007 by Richard Barnes. Barnes has more than 30 years experience in product design and manufacturing. In addition, Barnes founded Tanglewood Berry Farm in 2000. This small operation (9,000 row feet) is located in Wells County, Indiana with seven varieties of raspberries and blackberries.

The need for more sophisticated trellising methods at Tanglewood Berry Farm evolved into TGS.

TGS developed a fiber reinforced round profile shape which can be used for trellis post and cross members. These profiles are connected with fiber reinforced brackets and secured with set screws. This modular concept enables the grower to economically construct trellis systems to their desired requirements. Profiles can be supplied to customer's required lengths. The TGS trellis system has many features such as weather ability and strength for long life, labor savings in installation and maintenance, adjustability of cross members, and adjustable wire stays for

TGS Products

- Fiber Reinforced Profile
- Hardware
- Monofilament Wire

Trellis Systems

- Adjustable "V" Trellis
- Rotating Cross Arm Trellis

Other Products

- Ground Anchors
- Tools
- Fabrics

Costs per tunnel (2 yrs)

Preplant preparation	$120
Tunnel construction	$9,632
Plant establishment	$547
Irrigation system	$220
Trellis system	$577
TOTAL	$11,096

Production and Harvesting

Production $621

Harvesting $2,659 (0.50/half-pint + containers and lids)

Total $3,280

Yield = 4,000 half-pints X $2.50 = $10,000

Year	Expenses	Gross sales	Net profit (Excluding marketing costs)
0	$11,983	$0	-$11,983
1	$4,501	$10,000	- $6,484
2	$3,799	$10,000	- $283
3	$3,303	$10,000	$6,697

Equivalents

- 20,000 lbs/acre in tunnels vs. 2,000 in field
  - row spacing (2X)
  - harvest season (2.5X)
  - physiology (2X)
- Price is $5.00/pt in fall vs. $2.50 in season
- Gross revenues: $150,000 per acre equivalent

Winter production of summer-bearing raspberries in greenhouses


BERRIES
12 Dry Half Pint Berries

Cornell Fruit Resources

Berries

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Berries Main Page

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Attention: Max Welcome
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Cornell University
Ithaca NY 14853-5904

Greenhouse Raspberry Production Guide
[Entire guide, 38 pages, 4,505 KB .pdf file]

With slower connections, you may want to download individual sections:

- Part 1 [8 pages, 1,210 KB .pdf file] Includes introduction, biology, choosing production types, preparing the greenhouse, container spacing, plant selection, plant types.

ges, 1,067 KB .pdf file] Includes more on plant
blishment, potting mediums, first season

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Michigan Greenhouse-Grown Raspberries

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All Season Fruit Company Inc.

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Strategy:

Fertigation in peat-filled poly bags.

Use cultivars that tend to produce primocanes more-or-less continuously. Remove primocanes when they complete fruiting in order to stimulate new primocane growth.

- John Cooper, Simcoe, Ontario
- Moves potted primocane-fruiting raspberries inside greenhouse in late fall for fruiting. They go out again after fruiting to make way for tobacco plants.

Canada

- Happy Valley Berry Farm, Bridgeton, New Jersey.
- Shirley Kline uses a combination of greenhouses, high tunnels, and field production, and primocane and floricane-fruiting raspberries, to produce raspberries year-around.

Conclusions

- Raspberries can be manipulated in different ways to fruit over a very long period of time
- Coolers, row covers, tunnels, and greenhouses, coupled with cultural manipulations, can extend the season to year around, even in cold climates.

High Tunnel Raspberries and Blackberries

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Authors: Cathy Heidenreich, Marvin Pritts, Mary Jo Kelly, and Kathy Demchak
On line at: http://www.fruit.cornell.edu/berry.html