

How to fill in the Priorities Survey

(Please select the top 5 in each category and give each a unique rank from 1 to 5; 1 = highest)

**2015
Ranking**

General IPM Issues

Pesticide resistance

Invasive/exotic species

Weather/information delivery systems

Cost reduction

Pollinator conservation

Organic production

Pheromone technology

OP/carbamate replacements

Abandoned orchard impact

IFP certification

Groundwater monitoring

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2

4

3

5

1

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(write in) How to get trap stickum out of your hair

2

4

5

1

3

How not to fill in the Priorities Survey

(Please select the top 5 in each category and give each a unique rank from 1 to 5; 1 = highest)

**2015
Ranking**

General IPM Issues

Pesticide resistance	1
Invasive/exotic species	1
Weather/information delivery systems	1
Cost reduction	1
Pollinator conservation	1
Organic production	1
Pheromone technology	1
OP/carbamate replacements	1
Abandoned orchard impact	1
IFP certification	1
Groundwater monitoring	1

How not to fill in the Priorities Survey

(Please select the top 5 in each category and give each a unique rank from 1 to 5; 1 = highest)

**2015
Ranking**

General IPM Issues

Pesticide resistance	2
Invasive/exotic species	2
Weather/information delivery systems	1
Cost reduction	3
Pollinator conservation	2
Organic production	1
Pheromone technology	1
OP/carbamate replacements	2
Abandoned orchard impact	4
IFP certification	4
Groundwater monitoring	5

How not to fill in the Priorities Survey

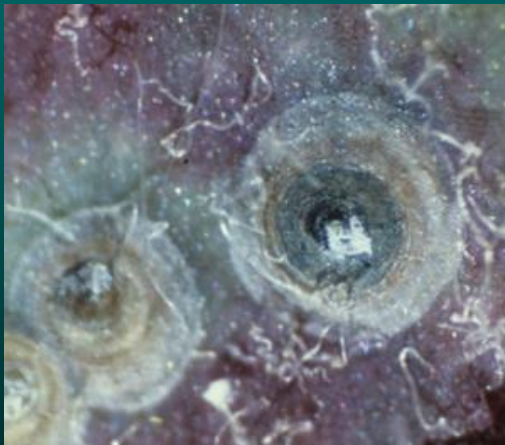
(Please select the top 5 in each category and give each a unique rank from 1 to 5; 1 = highest)

**2015
Ranking**

General IPM Issues

Pesticide resistance	8
Invasive/exotic species	2
Weather/information delivery systems	4
Cost reduction	3
Pollinator conservation	7
Organic production	10
Pheromone technology	5
OP/carbamate replacements	1
Abandoned orchard impact	6
IFP certification	9
Groundwater monitoring	11

Update on San Jose Scale Biology and Control



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San Jose Scale

- Originally from China, introduced into the US (Cal.) on infested plant stock in 1890s
- Frequent sources of infestation: nursery plants, or wind-dispersed crawlers from non-fruit hosts
- Mainly colonizes wood tissue of branches and twigs; establishes on fruit surfaces when pops are high (mostly stem and calyx)
- When infestation originates from nursery, scales located from base of tree to growing point tips
- Damage caused by feeding by crawlers – suck plant sap: weakens plant, reduces fruit & shoot growth, desiccates foliage
- Infested areas usually exhibit less foliage, smaller fruits; reddish “halo” surrounds point of scale attachment on fruit, under the skin – caused by plant reaction to toxin in saliva
- Smooth-skinned fruits (e.g. apples, pears) more susceptible than those with rough or velvety texture (peach)



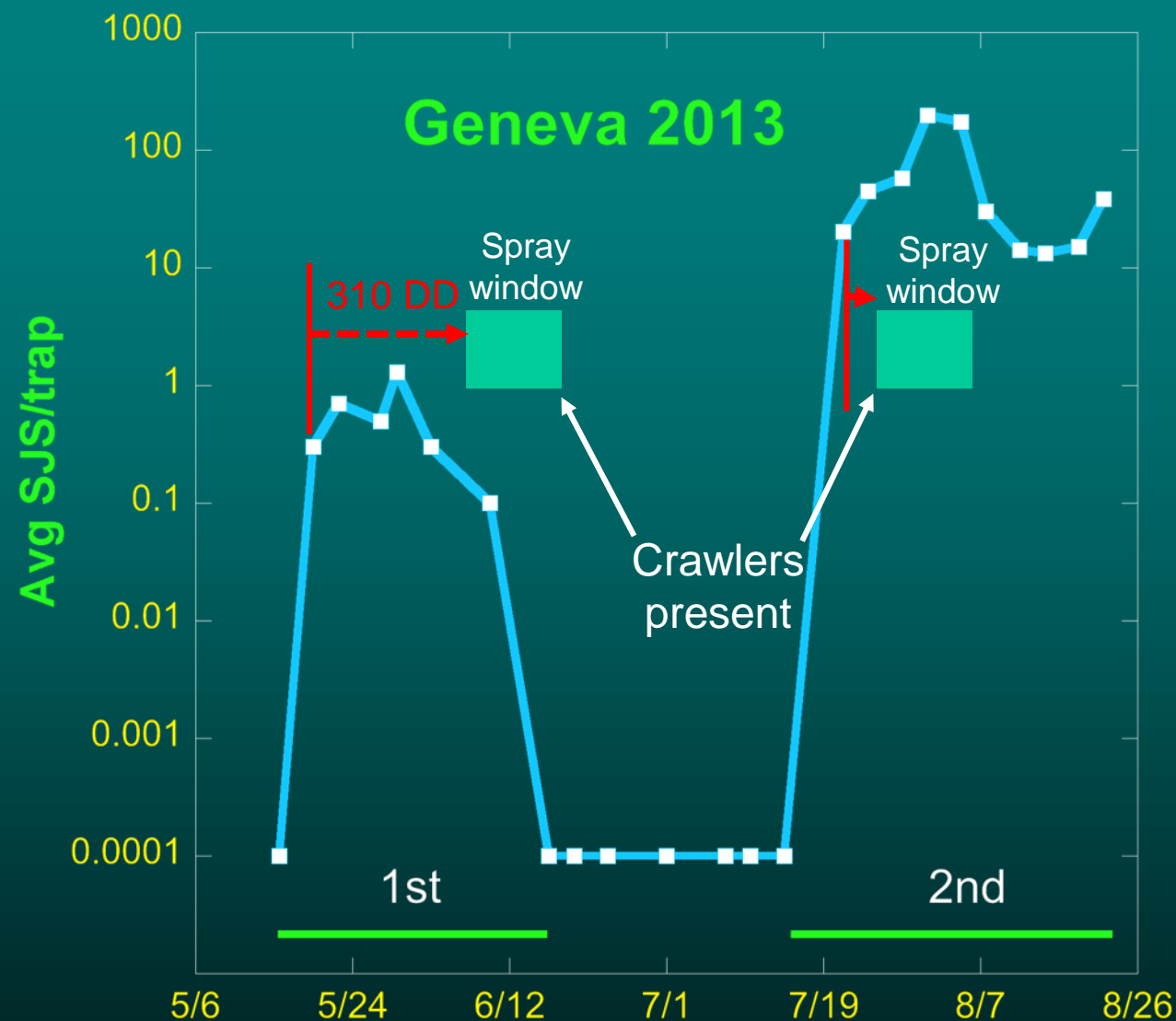
San Jose Scale

Two generations per growing season in NY

- Overwinter as immatures under scale covers called “black caps”; mature to adults in spring; males emerge and mate around petal fall
- Crawlers emerge about mid-June and in early August in WNY
- Can be timed by using DD accumulations:
 - 1st gen: 500 DD (base 50° F) from March 1, or 310 DD after 1st adult catch (~June 9-14)
 - 2nd gen: 1450 DD from March 1, or 400 DD after 1st adult catch (~Jul 29-Aug 4)
- Can monitor for crawlers using tape traps on scaffold branches



SJS Flight Timing



2013 – First catch of 1st generation: May 23; 2nd generation: July 22

2014 – First catch of 1st generation: May 27; 2nd generation: July 14

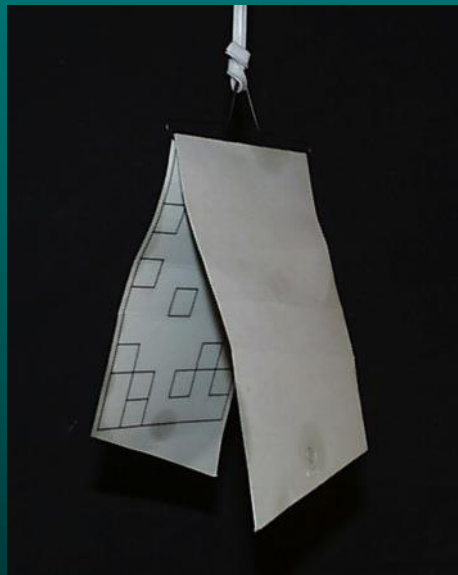
Monitoring

San Jose Scale

Pheromone trap

Developmental model

Physical trap



***Biofix + DD model to predict 1st & peak crawler activity
(e.g., 310 DD [base 50° F] after 1st adult catch for 1st gen);
double-sided carpet tape trap on branch
for 2nd generation crawlers***

San Jose Scale

Treatment Considerations

- Problem populations more common in larger, poorly pruned standard size trees with inadequate spray coverage
- Early season sprays help prevent SJS establishment
 - ½-Inch Green to Tight Cluster:
 - ◆ Oil (typical ERM spray)
 - ◆ Lorsban or Supracide
 - ◆ Esteem (IGR) plus oil
 - ◆ Centaur (IGR)
- Early season pruning to remove infested branches, open up canopy for better coverage
- Well-timed summer sprays at 1st and peak (7-10 days later) crawler activity: e.g., Admire, Assail, Esteem, Centaur, Imidan, Movento



San Jose Scale Insecticides

- **AdmirePro** (imidacloprid, IRAC Group 4A) – neonic; replaced Provado; **moderate** efficacy against crawlers
- **Assail** (acetamiprid, IRAC Group 4A) – neonic; **moderate** efficacy against crawlers
- **Centaur** (buprofezin, IRAC Group 16) – IGR; inhibits chitin synthesis, suppresses oviposition, reduces egg viability; **good** efficacy against all stages
- **Esteem** (pyriproxifen, IRAC Group 7C) – IGR; juvenile hormone analog; interferes with normal development, retards growth, causes sterility, ovicidal; **good** efficacy against all stages

San Jose Scale Insecticides, *cont.*

- **Imidan** (phosmet, IRAC Group 1B) – OP; contact plus stomach poison; **moderate** efficacy against crawlers
- **Lorsban** (chlorpyrifos, IRAC Group 1B) – OP; contact plus stomach poison; **good** efficacy against all stages
- **Movento** (spirotetramat, IRAC Group 23) – tetramic acid; 2-way systemic activity, moves to all areas of the plant, mode of action is lipid biosynthesis inhibitor (via ingestion), reduced fecundity and larval survival; **good** efficacy against all stages

[expected in future]

- **Sivanto** (Bayer – federally labeled; NY registration pending, IRAC Group 4D) – butenolide; nicotinic acetylcholine receptor agonist
 - Pest spectrum: aphids, leafhoppers, scales, psylla
 - Activity via oral/ingestion; some contact activity
 - Rapid feeding cessation
 - Systemic in xylem from root uptake; translaminar from foliar application
 - Reduced risk to bees, predators & parasites

San Jose Scale Treatment Options

Crop	Admire	Assail	Centaur	Esteem	Imidan	Leverage	Lorsban	Movento
Apples								
<i>Prebloom</i>								
<i>Summer</i>								
Cherries								
<i>Prebloom</i>								
<i>Summer</i>								
Peaches								
<i>Prebloom</i>								
<i>Summer</i>								
Apricots								
<i>Prebloom</i>								
<i>Summer</i>								
Plums								
<i>Prebloom</i>								
<i>Summer</i>								

SJS Control Trial - 2009

(Mac & Cortland; Reissig/Combs)

Treatment	Rate/acre	% Infestation 17 Aug	% Infestation Harvest
Calypso+Movento PF	4 oz, 9 oz	9.7 a	29.7 a
Movento PF+2C	9 oz	7.0 a	1.7 a
Movento 2C	9 oz	13.0 a	25.3 a
Lorsban TC, Movento 4C	1.5 lb, 9 oz	5.0 a	11.0 a
Lorsban TC, Esteem 2/gen	1.5 lb, 4.5 oz	14.7 a	26.0 a
Untreated Check	—	18.7 a	26.3 a

- High pop pressure; Movento at PF + 2C numerically lowest (better than Lorsban at TC + Esteem 3C & 4C)

SJS Control Trial - 2010

(Mac & Cortland; Reissig/Combs)

Treatment	Rate/acre	% Infestation 4 Aug	% Infestation Harvest
Lorsban TC, Movento PF	1.5 lb, 9 oz	2.3 a	4.0 a
Lorsban TC, Movento 2C	1.5 lb, 9 oz	0.8 a	3.3 a
Lorsban TC, Movento 4C	1.5 lb, 9 oz	2.5 ab	5.5 a
Movento PF	9 oz	10.3 bc	8.5 a
Movento PF+2C	9 oz	5.8 ab	9.0 a
Lorsban TC, Esteem 2/gen	1.5 lb, 4.5 oz	1.5 a	3.5 a
Untreated Check	—	23.3 c	35.8 a

- Moderate pop pressure; Movento-only program had numerically higher damage, but Lorsban at TC *plus* Movento at either PF, 2C or 4C effective

SJS Control Trial – 2011

Empire, Cortland, Jonagold, Red Del; Reissig/Combs)

Treatment	Rate/acre	% Infestation 15 July	% Infestation Harvest
Movento PF	9 oz	0.3 c	2.0 b
Movento 1C	9 oz	0.7 bc	0.0 b
Movento 2C	9 oz	0.7 bc	9.3 ab
Untreated Check	–	11.0 a	17.3 ab

- Moderate pop pressure; single spray of Movento all fairly effective, but PF or 1C with lower damage

SJS Control Trial – 2012

Empire, Cortland, Jonagold, Red Del; Reissig/Combs)

Treatment	Rate/acre	% Infestation 26 July	% Infestation Harvest
Movento PF	9 oz	0.0 b	42.7 ab
Movento PF+2C	6 oz	0.0 b	16.7 ab
Movento 1C+3C	6 oz	0.0 b	19.9 ab
Untreated Check	–	7.8 a	55.7 a

- Moderate pop pressure, increasing late; best results with Movento at PF with 2nd spray at 2C

SJS Control Trial – 2013

Empire, Cortland, Jonagold, Red Del; Reissig/Combs)

Treatment	Rate/acre	% Infestation 15 August	% Infestation Harvest
Lorsban+oil TC, Movento 2C	1 qt, 1 qt, 6 oz	3.7 bc	15.0 b
Sivanto+oil TC, Movento 2C	14 oz, 1 qt, 6 oz	0.3 c	13.7 b
Imidan PF, 2C-6C	3 lb	0.7 c	7.7 b
Untreated Check	–	25.3 a	77.7 a

- High pop pressure; lowest fruit infestation with Imidan (seasonal program), or TC treatments followed by Movento at 2C
[Not shown: 68-80% inf in other treatments (numbered products)]

SJS Control Trial - 2013

(McIntosh; Jentsch)

Treatment	Rate/acre	% Infestation 2 July	% Infestation Harvest
Movento PF	9 oz	1.8	10.3 a
Movento PF+2C	6 oz	2.5	0.8 a
Sivanto DD, Calypso PF+1C	14 oz, 6 oz	0.0	2.3 a
Centaur DD, Imidan PF-7C	46 oz, 3 lb	0.0	0.8 a
Lorsban TC, Imidan PF-7C	2 qt, 3 lb	4.2	0.5 a
Esteem TC, Imidan PF-7C	10 oz, 3 lb	2.3	3.5 a
Untreated Check	—	33.5	39.0 b

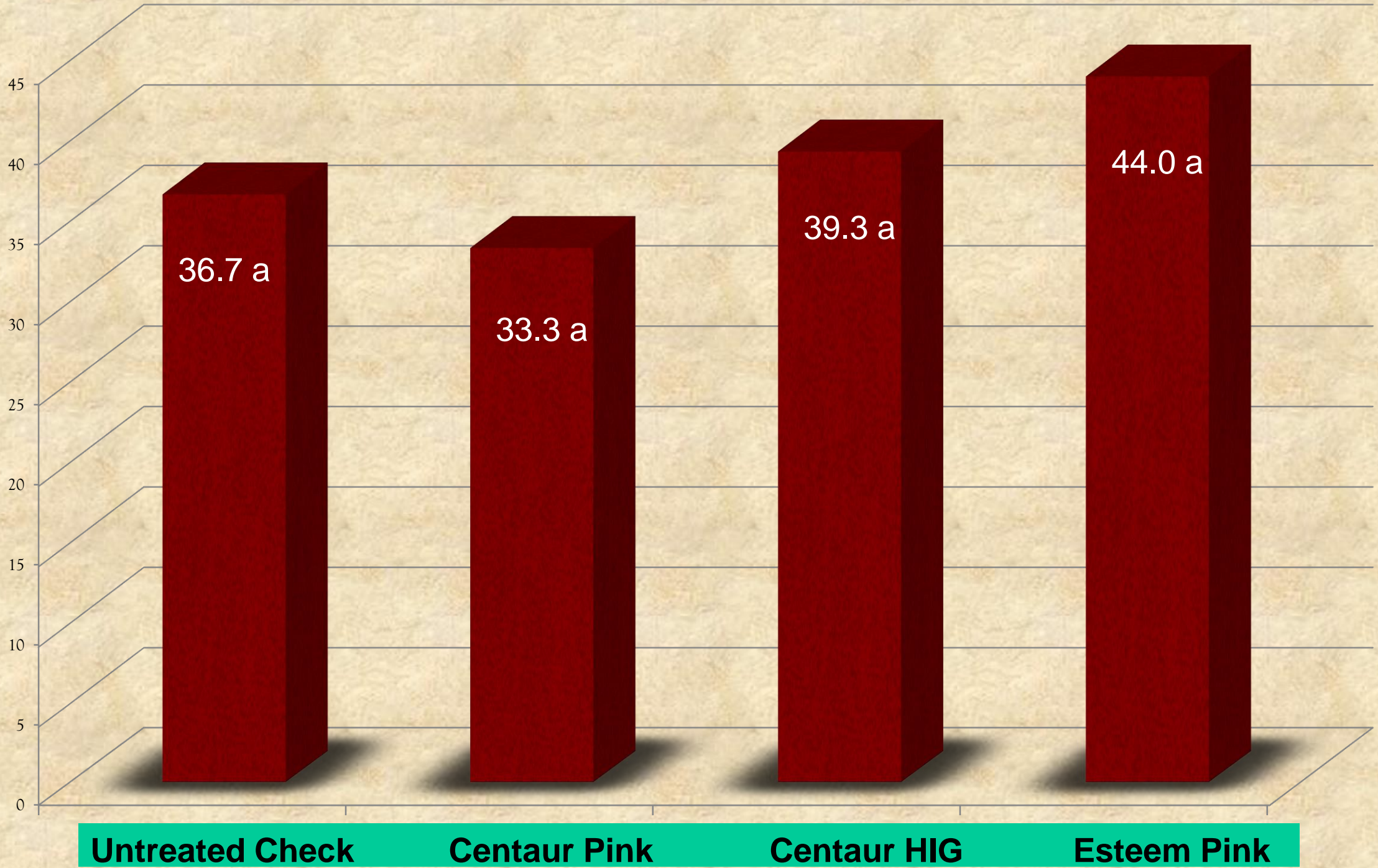
- Moderate pop pressure; Movento at PF+2C, Centaur or Lorsban pre-bloom followed by Imidan most effective

2014 Treatments

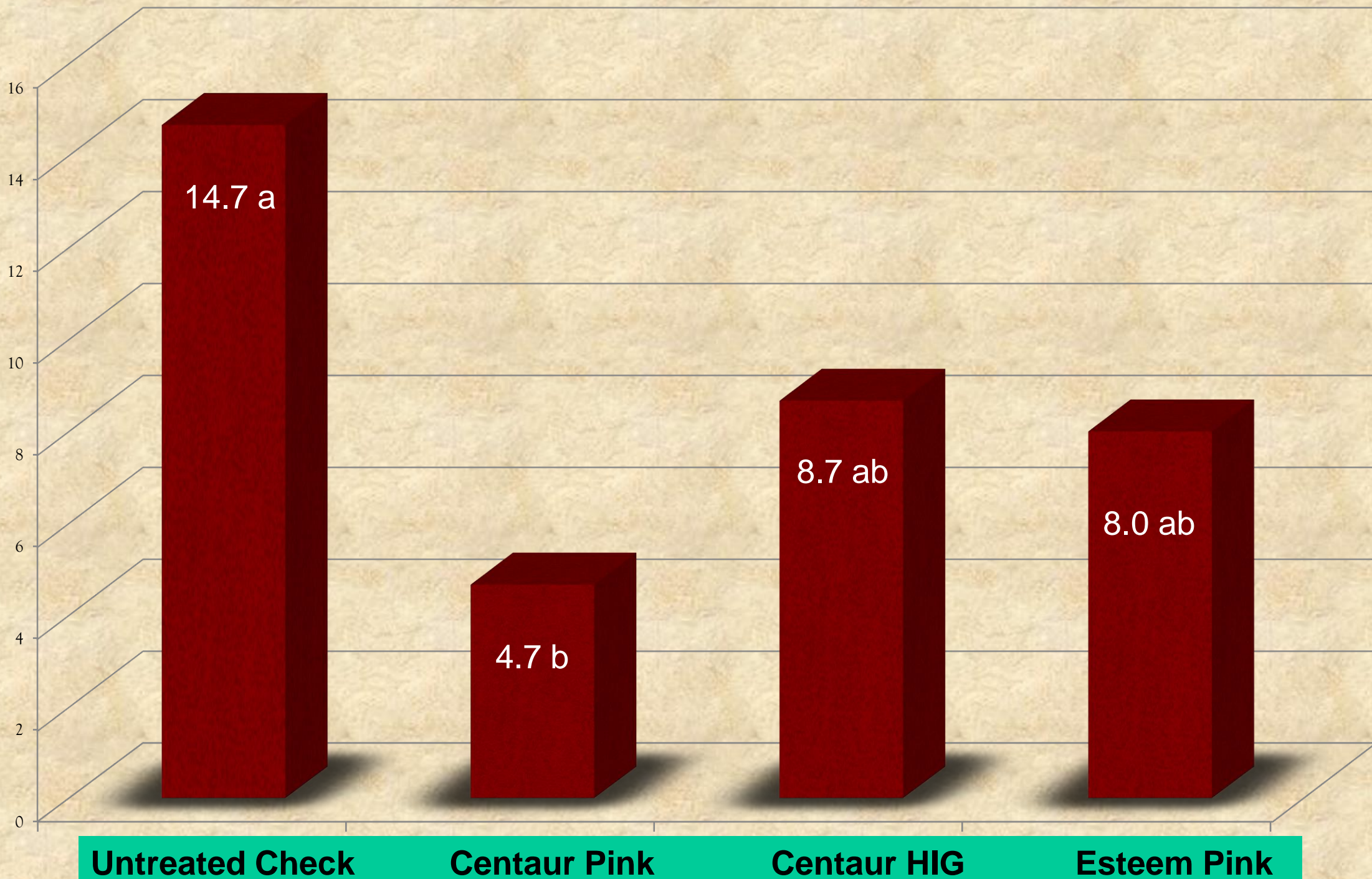
- Esteem 0.86 EC
 - Applied at 'pink' (13 May)
 - 16.0 oz/A
 - Active ingredient – Pyriproxyfen
- Centaur WDG
 - Applied at '1/2-inch green' (24 Apr) and 'pink' (13 May)
 - Both treatments 34.5 oz/A
 - Active ingredient – Buprofezin
- Untreated Check



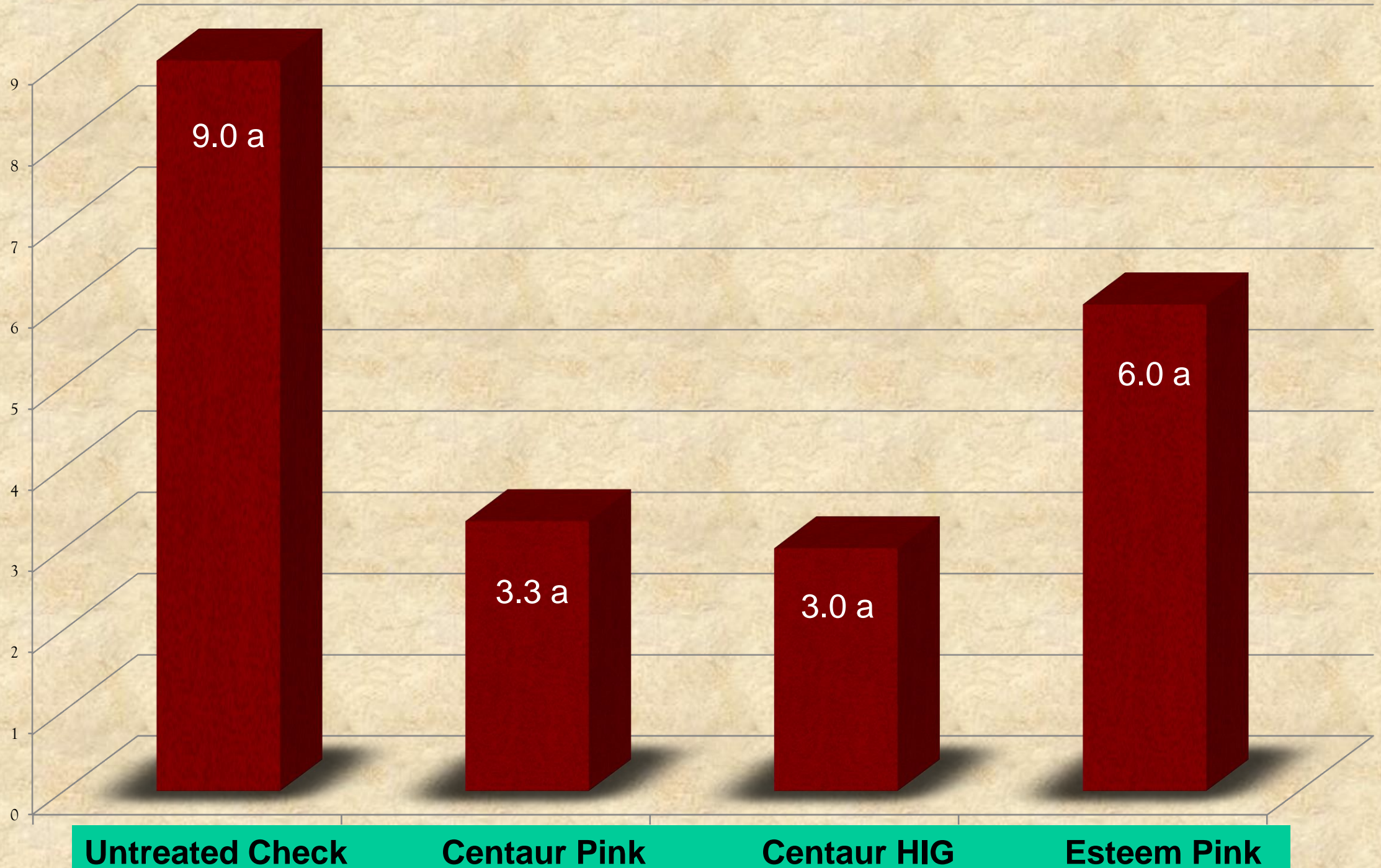
1st Yr Wood Pre-Application % SJS Overwintering Survival - 24 Apr



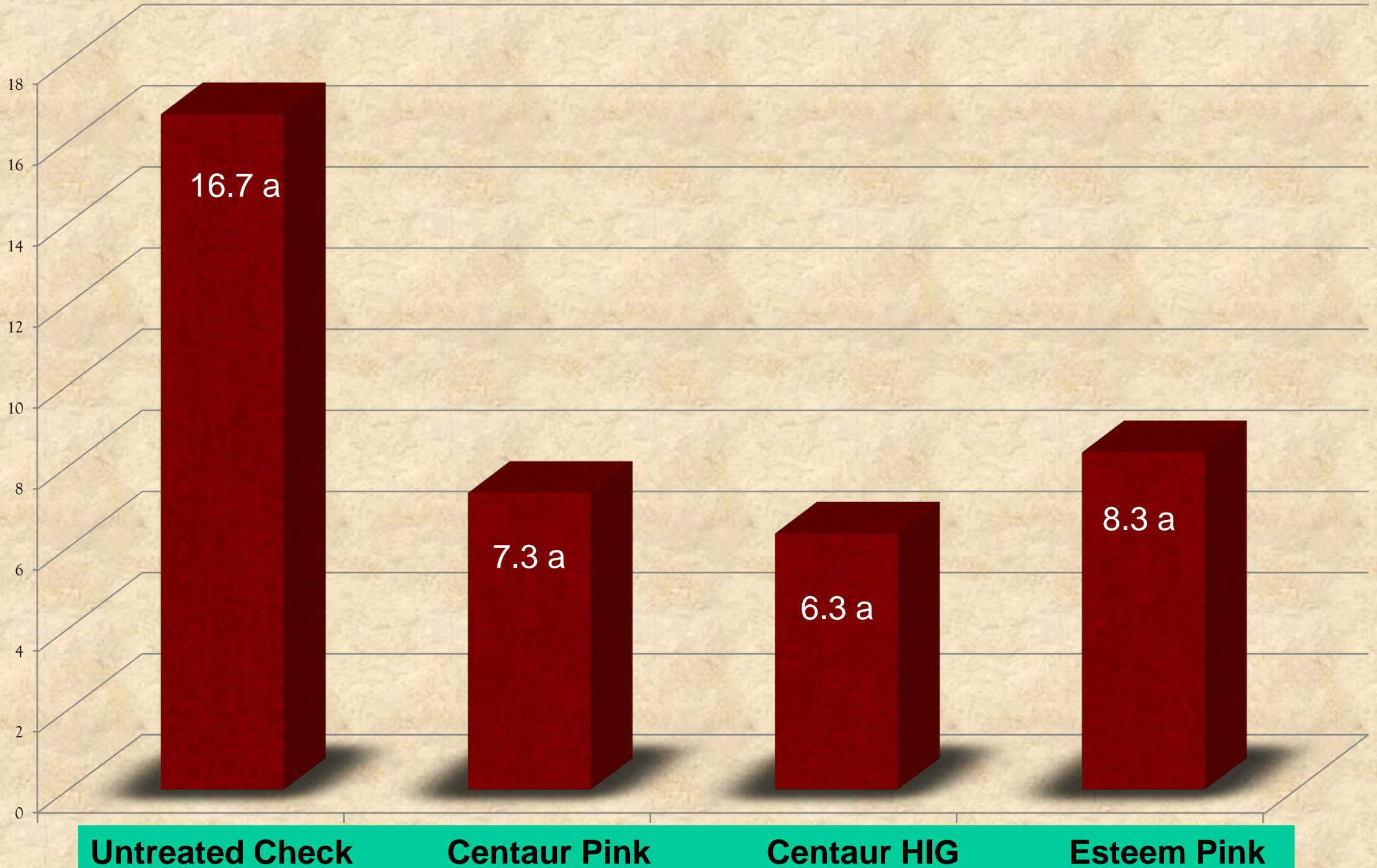
1st Yr Wood Post application % SJS Survival - 21 May



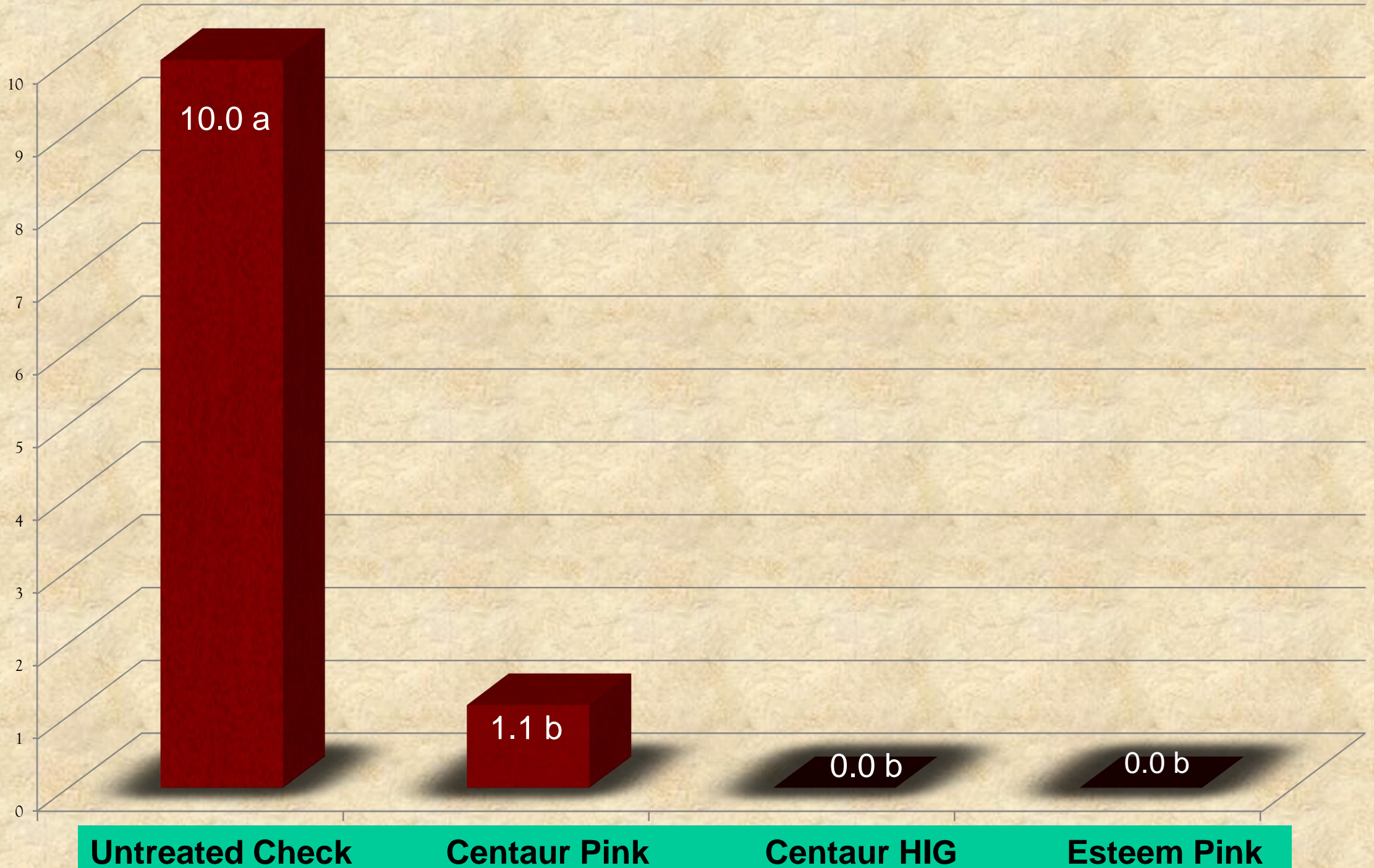
1st Yr Wood Post Application % SJS Survival - 29 May



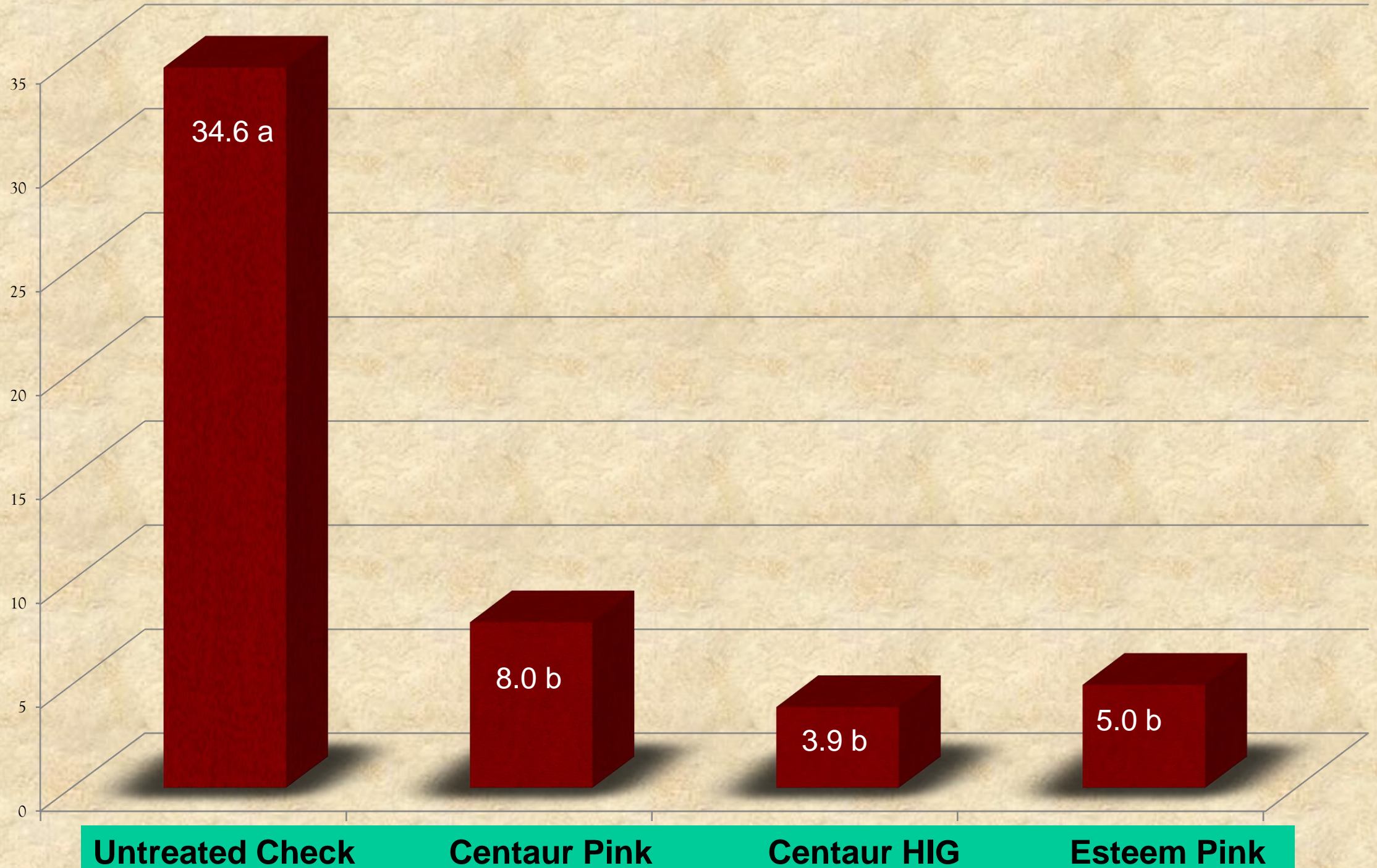
1st Yr Wood Post Application % SJS Survival - 4 Jun



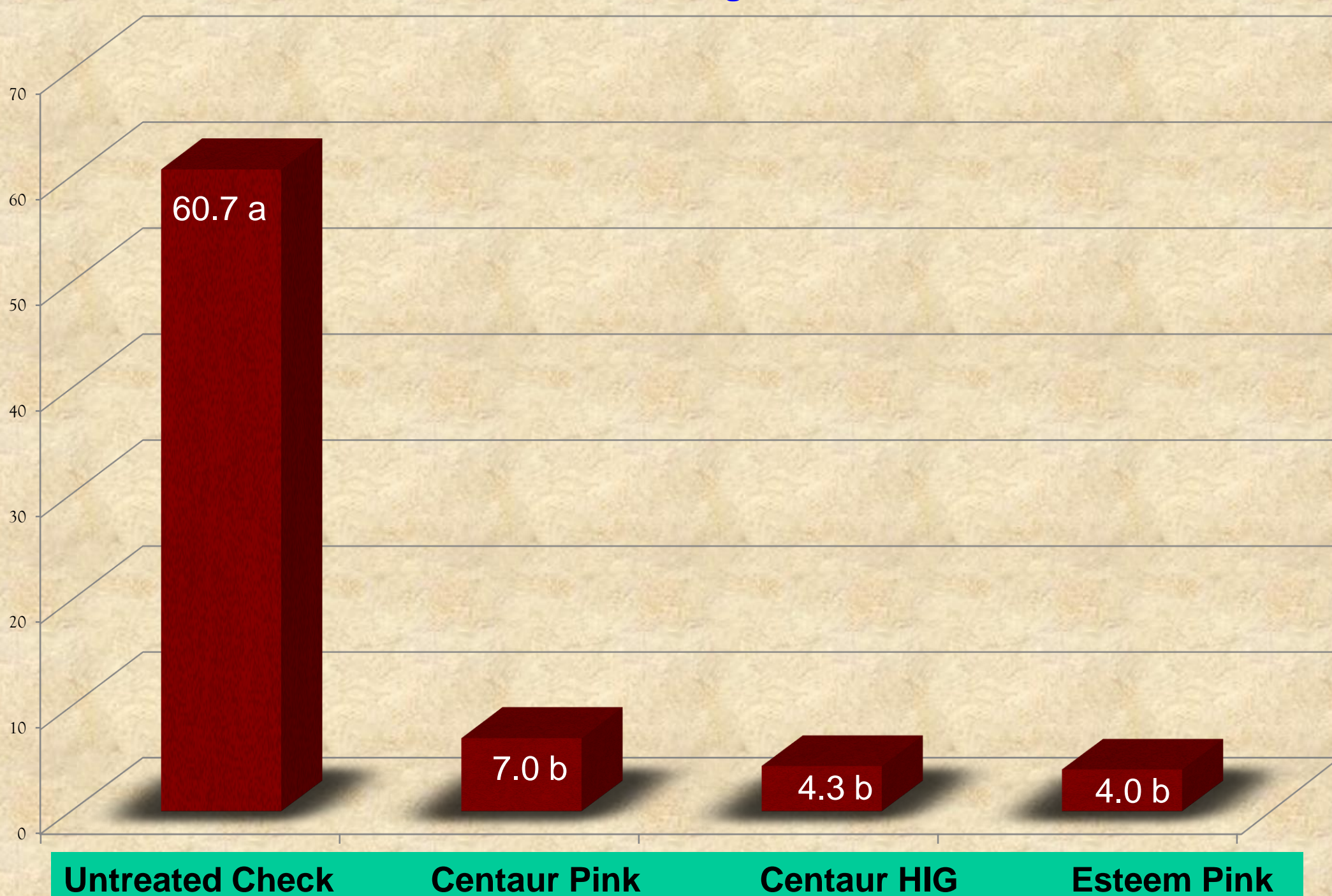
1st Generation % SJS Fruit Damage - 27 Jun



2nd Generation % SJS Fruit Damage - 29 Jul



% SJS Fruit Damage at Harvest



San Jose Scale Management

- Obtain clean plant stock from nursery
- Knowledge of potential host plants upwind of planting can inform you of the need for preventive measures
- In high infestation areas, pruning can reduce pest levels by removing potential sources of re-infestation
- Dormant oil sprays (1.5-2.0%), alone or in combination with insecticide, applied at high volume to completely wet the wood surfaces
- Complement with 2 summer sprays directed at crawlers (10-12 day interval)
 - **Movento use generally most effective in 2 applications – Petal fall plus (1C or) 2C**
- Use insecticides with different modes of action (IRAC groups) to avoid development of resistance
 - in 1914, entire US apple industry was threatened with extinction because of SJS resistance to lime sulfur – first documented case in US



White prunicola scale
Pseudaulacaspis prunicola



White Prunicola Scale

- Related to White Peach Scale (more common further south)
- Prunicola scale more common in temperate climates (NY/New England)
- Infestations characterized by numerous white scales => “whitewashed” appearance
- Feeding reduces tree vigor, causes foliage to become sparse & yellow
- Heavy infestations can cause death of twigs, branches, entire tree
- Overwinters as adult female, deposits eggs in spring
- Management:
 - Oil during dormant period
 - follow up with insecticides (e.g., Movento, Centaur) against crawlers in mid-June through early July
 - (700-1150 DD base 50° F from March 1).