Cultivar, Rootstock, and Training Method Influence Flower Bud Production in Pawpaw

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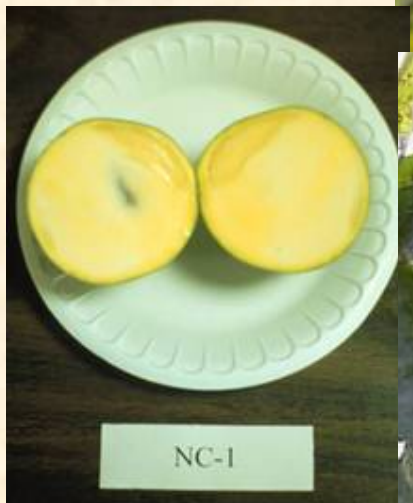
Introduction: What is Pawpaw?

- Pawpaw: *Asimina triloba* (L.) Dunal.
  - *N*ative tree fruit in the southeastern U.S.
- Tropical-like flavor
  - mixture of banana, mango, and pineapple.
- Early stages of commercial production.

Pawpaw Flowering and Harvest

- Flower on 1 year old wood
- Cross-pollinate
- Pollinated by flies and beetles
- Ripe fruit should yield when squeezed and give way with a gentle tug
- Color change not a reliable indicator of ripeness
- Fruit may be harvested from the same tree over several weeks



Pawpaw Propagation and the Nursery Industry

- Historically, pawpaw has been a difficult tree species to propagate
  - Seed stratification needed
  - Desiccation sensitive
- Commercial clonal propagation is via chip budding
  - Seedling rootstock
  - No clonal rootstocks available

Pawpaw Propagation and the Nursery Industry

- High tree prices are limiting development of an industry
  - Seedlings $5-$10
  - Grafted trees $15-$30
- Our goal is to identify seedling rootstocks that would enhance pawpaw scion growth, improve tree establishment, and promote precocity.

Pawpaw Training and Pruning

- Tend to form narrow-angled weak branches at the trunk.
- Therefore, pawpaws are prone to wind damage.
- A central leader training system would develop a strong framework and a desirable form for harvesting.
  - Will pruning dwarf a young tree and delay bearing in pawpaw?
  - Will fruit suffer sunburn?

Objective

- To determine if cultivar, rootstock, and training method would influence early flower bud production in pawpaw

Materials and Methods

- The rootstock trial was planted on May 10, 2004.
  - Rootstocks: 5 seedling rootstocks
  - Scions: ‘Sunflower’ and ‘Susquehanna’
  - Two pruning systems: minimal pruning versus central leader
- 8 replicate blocks with each treatment combination for a total of 160 trees (2 x 5 x 2 x 8= 160).

Why Did We Choose These Selections?

- Scions:
  - ‘Sunflower’
    - Noted to flower and produce fruit in 4th year in Princeton, KY trial.
  - ‘Susquehanna’
    - Slow to flower and to come into production.
- Seedling rootstocks:
  - Cultivars vigorous: Sunflower and PA-Golden
  - Cultivars lack vigor: Susquehanna and K8-2
  - Commercial mixed seed: RVT
- Studies with seedlings in containers
  - Seed size and genetic background important


End of 2004
9/21/04


End of 2005
3/03/06

End of 2006


End of 2007
1/28/08


Central leader


3/23/07
Minimal pruning


Central leader


1/28/08
Minimal pruning

After 2005 Growing Season

Scion	Survival %	TCA (cm^2)	% of trees flowering	Number of flower buds per tree	Flower density (Tot flw tr/TCA)
Susquehanna	63	3.4	8% b	0.4 b	0.09 b
Sunflower	71	3.5	51% a	3.7 a	0.93 a
Significance	0.37 NS	0.75 NS	0.0000***	0.001**	0.006**

Rootstock	Survival %	TCA	% of trees flowering	number of flower buds per tree	Flower density (total flowers/TCA)
RVT	77% a	3.4	40%	2.1 ab	0.50
Sunflower	90% a	3.2	25%	2.2 ab	0.70
PA-Golden	84% a	3.9	36%	3.4 a	0.74
K8-2	77% a	3.3	21%	0.8 b	0.14
Susquehanna	52% b	3.4	33%	1.7 ab	0.51
Significance	0.004 **	0.40 NS	0.63 NS	0.58 NS	0.71 NS

TCA=Trunk Cross-sectional Area

After 2006 Growing Season

scion	survival	TCA	% of trees flowering
Susquehanna	68%	6.4 b	62% b
Sunflower	82%	8.5 a	83% a
Significance	0.06 NS	0.006**	0.002**

rootstock	Survival	TCA	% of trees flowering	number of flower buds/tree	Flower density
RVT	77% a	7.4 ab	78%	11 b	1.09
Sunflower	90% a	9.0 a	75%	11 b	0.95
PA-Golden	84% a	9.0 a	74%	21 a	1.57
K8-2	73% a	6.7 ab	60%	8 b	0.89
Susquehanna	52% b	5.1 b	82%	11 b	0.98
Significance	0.005**	0.01*	0.33 NS	0.03*	0.07 NS

After 2007 Growing Season

Scion	Survival %	TCA	Percent of Trees Flowering	Flower Density (Tot flw tr/TCA)
Susquehanna	68%	14.3	94% b	1.6 b
Sunflower	82%	14.3	100% a	6.0 a
Significance	0.06 NS	0.64 NS	0.04 *	0.0000***

Rootstock	Survival %	TCA	Percent of Trees Flowering	Flower Density (Tot flw tr/TCA)
RVT	77% a	13.8	96%	3.8
Sunflower	90% a	14.0	96%	4.2
PA-Golden	84% a	15.7	100%	4.1
K8-2	73% a	14.0	95%	3.5
Susquehanna	52% b	13.7	100%	4.7
Significance	0.005 **	0.32 NS	0.63 NS	0.13 NS

After 2007 Growing Season

Training Method	Survival %	TCA	Percent of Trees Flowering	Number of Flower Buds Per Tree	Flower Density (Tot flw tr/TCA)
Minimal Pruning	72%	17.4 a	98%	63 a	3.8
Central Leader	79%	11.5 b	97%	50 b	4.3
Significance	0.20 NS	0.0000***	0.63 NS	0.015 *	0.18 NS

Conclusions

- Genetic background of seedling rootstock did not influence scion precocity or growth.
  - Survival of Susquehanna seedling rootstock was poor.
- Sunflower was more precocious than Susquehanna.
- Central leader training tended to reduce vigor (TCA) and the number of flowers/tree.


Questions?