

# Hand Pollination in Sugar Apple

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*A simple hand pollination technique is recommended to enhance sugar apple productivity, a fruit that is highly appreciated in Guadeloupe.*  
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## introduction

Natural pollination rates are low in many *Annona* species, thus explaining their poor productivity.

*Annona* flowers are highly protogynous (i.e. the stigma are receptive before stamen maturity), which limits self-pollination. The morphology of the flowers (colour, shape) also reduces entomophilous and anemophilous cross-pollination.

Many cherimoya and/or atemoya producing regions (Australia, California, Chili, Spain, etc.) have overcome this problem through hand pollination practices.

These techniques were modified for sugar apple (*Annona squamosa*), a species that is closely related to cherimoya and atemoya but better adapted to dry tropical climates as found in the West Indies.

## material and methods

*Annona squamosa* trees from two different origins were used in this study:

- a 4 year old tree of Florida origin (cv Thai Lup grown from seed);
- eight 2.5 year old trees of New Caledonian origin (from local improved seed).

The method was simple: pollen was collected from flowers at the male stage (fully separated petals). It was then dusted onto the stigma of other flowers in the female stage (barely half-open petals) with a small fine-bristle brush. Trees were monitored for fruit setting 10-15 days postpollination.

This operation was repeated four times at 15 day intervals in order to treat as many flowers as possible.

Flowers on cv Thai Lup were only pollinated with pollen from the same variety of flowers (intravarietal pollination).

With the New Caledonian cultivar, intravarietal (with its own pollen) and intervarietal (with cv Thai Lup pollen) pollinations were carried out.

## results and discussion

### fruit setting rate

The low fruit setting rates noted in *A. squamosa* controls were in line with reported rates for *A. cherimoya* and *A. atemoya*, which have fruit setting rates of about 1% under natural pollination conditions.

Table 1  
Results of hand pollination in *Annona squamosa*.

Treatment	N <sup>*</sup> flowers	N <sup>*</sup> set fruits	% fruit budded	Mean wt/ fruit(g)	gain vs control
<b>cv Thai Lup</b>					
Control	40	0	0	143 (*)	
Intra poll.	38	38	100	230	+ 62%
Inter poll.	-	-	-	-	-
<b>cv New-Caledonia</b>					
Control	111	4	3.6	230 (**)	
Intra poll.	33	30	90.9	269	+ 17%
Inter poll.	54	50	92.6	313	+ 36%

\* mean for 83 fruits harvested outside of the test period (natural pollination).

\*\* mean for 39 fruits harvested from controls and outside of the test period.

A fruit setting rate of more than 90% was obtained in all cases with hand pollination, thus confirming the efficiency and benefits of artificial pollination (Table 1).

### mean fruit weight

Very marked fruit weight gains (17-62%) were obtained in all cases with hand pollination. These gains were great since the mean fruit weights under natural conditions were very low.

Mean weights of fruit produced on the New Caledonian variety after intervarietal pollinations were higher than those produced after intravarietal pollinations (gains of 36% and 17%, respectively).

This weight gain was associated with improved well-formed fruit (well rounded, no flattening), which could be explained by the fact that hand pollination improves pollen coverage on the stigma.

### conclusion and prospects

Sweet apple trees are only grown on a single-tree basis in some creole gardens in Guadeloupe. This fruit is therefore quite rare despite its popularity in Guadeloupe.

Nevertheless, sweet apple is very well adapted to the pedoclimatic conditions of Côte Sous le Vent (Basse-Terre) and Grande Terre. The hand pollination technique boosts production and could thus help promote sweet apple development in Guadeloupe.

This technique, based on a mean flowering/harvest interval of 110 days, would also be interesting for grouping and programming harvests.

The present preliminary results could be confirmed by:

- conducting the same study during the whole flowering period, with a larger sample if possible;
- checking the advantages of intervarietal pollination;
- adapting the technique for other *Annona* species such as *A. reticulata* (bullock's heart), and especially *A. muricata* (soursop); the initial results for this species were quite inconclusive. ●

### further reading

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