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CARIFORUM



COCONUT HYBRIDIZATION

ALLIANCES FOR COCONUT INDUSTRY DEVELOPMENT IN THE CARIBBEAN

PRESENTATION BY THE COCONUT INDUSTRY BOARD (CIB), JAMAICA

RATIONALE FOR HYBRIDIZATION

- If all desired traits are present in one mother palm candidate cultivar, then self or sib pollination can be employed to reproduce such cultivar.
- If desired traits are spread across more than one cultivar, then hybridization is a better option.

SELECTION OF PARENTS

SURVEY OF AVAILABLE POPULATIONS



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EXAMINE THE HISTORY

- Do they have a good performance record?
- Are they known to be local landraces or introduced varieties?
- Is there evidence of hybridization?
- The experience of local farmers will be useful

DESIRED TRAITS

- Genetic integrity – maintenance of genetic characteristics
- Resistance / tolerance to important pests and diseases (as far as possible)
- High, stable yields

EXAMINE THE ENVIRONMENT

- In the case of the mother palms:
 - Do these palms appear to be surrounded by other palms with similar traits (uniform blocks)?
 - Are there palms of other varieties in close proximity (mixed stand)?
 - Are these palms easily accessible?

THE HYBRIDIZATION PROCESS

Major Considerations



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FOR THE MOTHER PALMS ISOLATION IS ESSENTIAL

- Preserves genetic integrity of results
 - Isolation of whole seed garden – ‘Mascopol’ method
 - Isolation of individual inflorescences – bagging
- Isolation ensures the desired result, by avoidance of genetic contamination
- For hybridization in a non-commercial situation the best option may be the bagging of inflorescences of mother palms.

THE COCONUT INFLORESCENCE

- The coconut is classified as monoecious.
- This means that both male and female flowers are present on the same inflorescence, on the same palm.
- The process of hybridization therefore involves the removal of the male flowers from the mother palm, and the fertilization of the female flowers with pollen from the desired paternal variety.



POLLEN COLLECTION

- The male flowers are collected from the selected paternal variety (pollen parent) by cutting the spikes from the open inflorescences



POLLEN PROCESSING

- The spikes are brought to the laboratory for processing.



STRIPPING OFF MALE FLOWERS.

- Male flowers are manually removed from the spikes.



CRACKING OF MALE FLOWERS

- The male flowers are cracked open by passing through counter-rotating rollers.
- This facilitates the drying process.



DRYING OF POLLEN



- The cracked male flowers are dried for 4 hours at 40 degrees Celsius in a Fluid Bed Dryer.
- The dried flowers are sifted, and the pollen obtained is stored at 4 degrees Celsius.

MECHANICAL SIFTING OF POLLEN.

- The cracked and dried male flowers are loaded in a machine with sieves of varying sizes.
- The flowers are loaded in the top sieve, which has the largest mesh.
- The apparatus is shaken for 15 minutes.



IF NO FLUID BED DRYER IS PRESENT

- The drying of male flowers is the crucial factor in the production of highly viable pollen.
- The male flowers can be placed inside the bags and cracked by rolling a heavy bottle on each bag. The bags are then placed inside a hot air dryer (or incubator, or drying room) to reduce moisture content to a level ensuring prolonged conservation.
- N.B. Sifting may also be done manually.

IF NO FLUID BED DRYER IS PRESENT

- Drying temperature must be maintained at no more than 40°C to avoid damage to the pollen grains. Total drying period varies from 24 to 36 hours. This brings the pollen moisture content down to about 5%.
- The palm numbers and the corresponding number of bags per palm are recorded. (Chapter 11. STANTECH Manual)

POLLEN PREPARED FOR STORAGE

SIFTED POLLEN

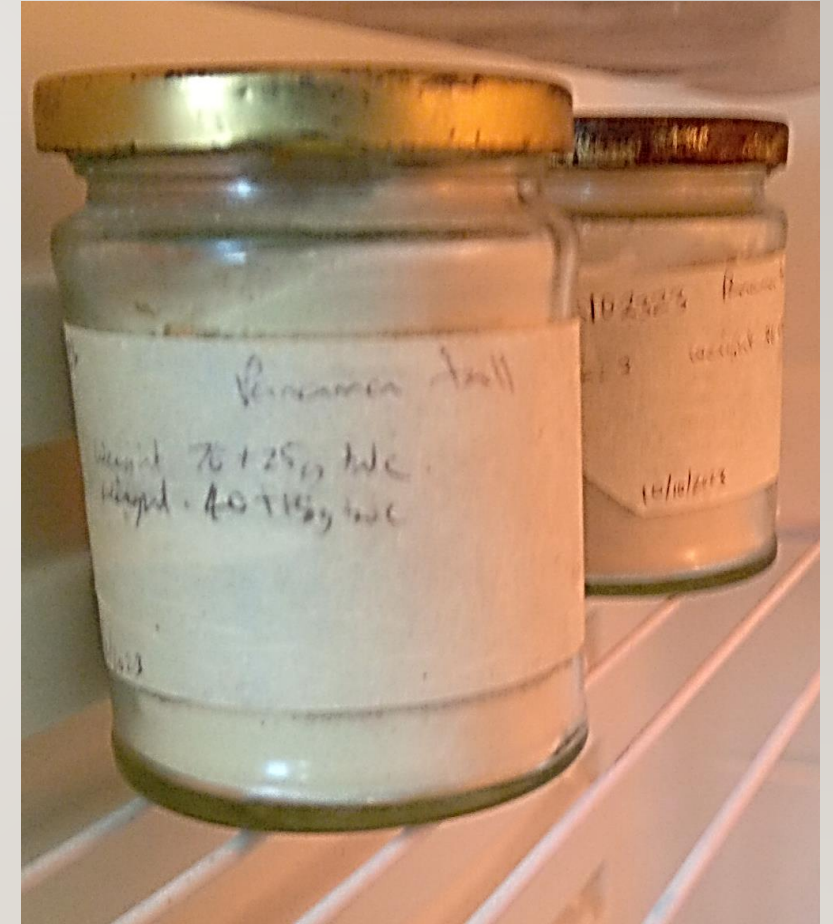


WEIGHT RECORDED



POLLEN STORED IN THE REFRIGERATOR

- Dried and sifted pollen is transferred to airtight bottles, diluted at a 1:4 ratio with carbonate filler (or talcum), labeled and stored in the refrigerator at about 4 degrees Celsius.
- Dilution may be postponed until time of dispatch to the field for pollination.



DISPENSING OF POLLEN FOR FIELD USE

- The diluted pollen is transferred to small containers with sponge applicator for use in the field.



EMASCULATION

- The male flowers on the spikes are removed from the inflorescences of the mother palms at the Seed Farm.
- This is done just before they open naturally, to prevent their ‘contamination’ by the mother palm pollen.



DISPOSAL OF MALE INFLORESCENCES

- Immature male flowers are covered under dry leaves in the field.
- This prevents the possibility of contamination.



POLLINATION



- The diluted pollen is applied to female flowers of the mother palm, when they enter the 'receptive' phase.

THE RECEPTIVE FEMALE FLOWER

- The female flowers are considered to be receptive to pollen when the stigmas open.
- This gives a white appearance at the lower end of the flower.
- This is the only window of opportunity for fertilization.

THE RECEPTIVE FEMALE FLOWER



THE RECEPTIVE FEMALE FLOWER

- At the end of this window, the lower ends of the flower becomes brown in appearance.
- The flower is now considered to be post-receptive.
- Not all flowers on an inflorescence become receptive at the same time.
- Successfully pollinated female flowers develop into hybrid fruit.

AT THE NURSERY

- The hybrid seed nuts obtained a year later are set in seedbeds in the nursery.
- Seedlings adjudged to be true hybrids are supplied to farmers when they are about five months old.



ADVANTAGES OF HYBRIDIZATION

- Utilization of cultivars already adapted to local conditions
- Cost-effectiveness - material is already present
- Maximization of potential of local germplasm
- New cultivars (hybrids) have the 'best of both worlds' traits of their parents.