Genetic Stability in Micropropagation

From mitigation strategies to epigenomics research?

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Somaclonal variation

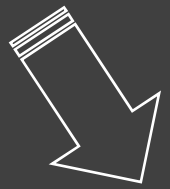
In vitro culture is known to destabilize the genetic program of isolated plant tissue

Somaclonal variation is:
Phenotypic variation among regenerated plants

The G X E dilemma

TRUE TO TYPE PHENOTYPE

Genotype X Environment



Mother plant ID
- Pedigree
- Species
- Ecotype

- Explant status
- Explant identity
- Biophysical parameters
  - Medium
  - Light
  - Gases
  - Temperature

Genetics X Epigenetics ?

Tackling the issue together

In the Production Unit

- Cost assessment: Go/NoGo
- Mitigation strategy
- Quality control
- Field control
- Customer acceptance
- Feedback

Certified Micropropagation Process

In the Research Lab

- Ploidy study
- DNA markers
- Genomics
- Transcriptomics
- Epigenetics
- Proteomics

Simple Cheap Reliable Early Markers

Mitigation strategies

No/reduced PGRs

- Growth rates
- Multilication rates
- Rooting
- Metabolites profile

Autotrophic/Mixotrophic

- Lower contamination
- Faster acclimatization
- Metabolite profile
- Automation/Bioreactors

Short cultivation time

- Delays in flowering
- Delays in harvesting
- Maturation status
- Rejuvenation
- Avaibility of explants

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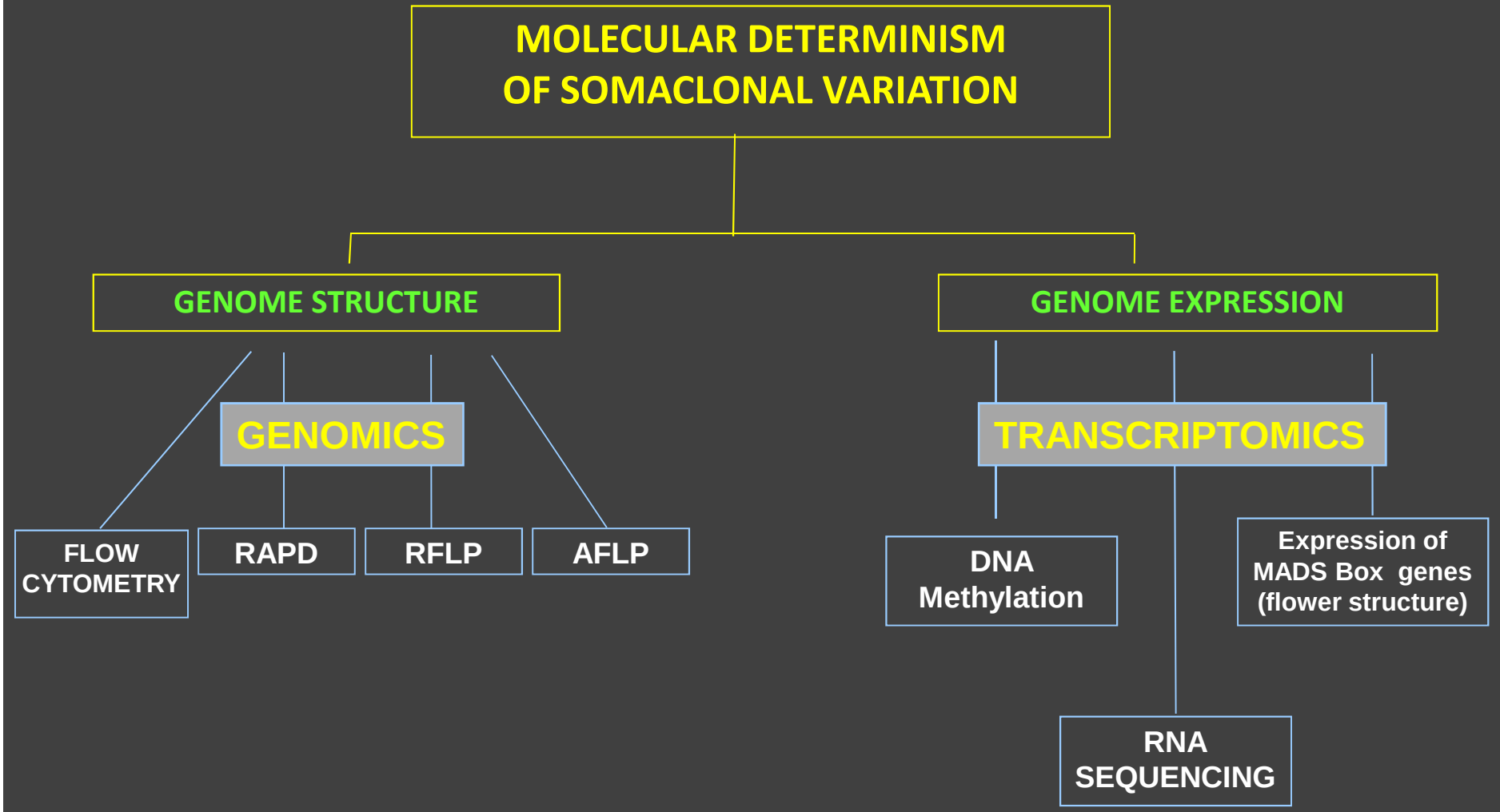
The *mantled* somaclonal variation in oil palm

Research strategy

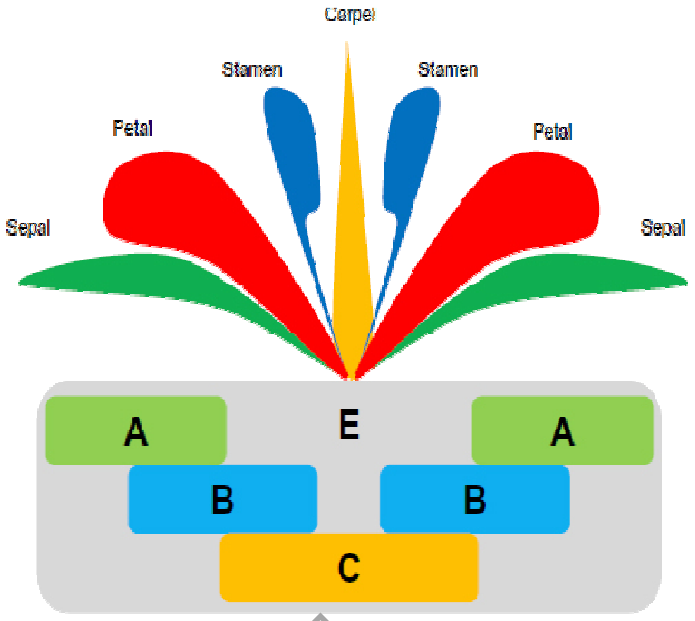


Epigenetic regulation of flower development

Polycomb-group genes

Transposable Elements

Floral MADS-box genes



Transcription factors

Different epigenetic marks in *mantled* flowers?

DNA Methylation
Chromatin remodelling

Different mRNA/sRNA levels in *mantled* flowers?

Transcriptome sequencing
Gene discovery

Chanderbali et al., 2010