

Optimising Tree Breeding Strategies: A course and workshop

Breeders and their companies are faced with new and increased challenges which demand economical and yet competitive breeding strategies. Globalisation is expanding markets and increasing competition and only those companies who position themselves strategically to respond to the future market effectively will survive.

Rapid technological changes, such as advances in cloning, biotechnology, genetic engineering and computer power, all increase the breeders opportunities to achieve maximum genetic and economic gain through breeding. This dynamic environment necessitates regular revision of a flexible breeding strategy.

Tree breeding is known to have one of the largest impacts on plantation productivity, and therefore the profits of companies. Breeding and deployment strategies are often the point at which most impact can be made on genetic gains. Tragically, breeding strategy decisions are all too often neglected, made on an uninformed basis, or made by outside consultants and treated as 'black box' decisions.

This course and workshop will empower participants to develop, optimise and implement effective breeding strategies for forest tree species.

WHY ARE WE OFFERING A BREEDING STRATEGY OPTIMISATION WORKSHOP/COURSE?

All too often, researchers are forced to make breeding strategy choices on 'gut feel' and do not have reliable information on which to base their decisions. The CSIR has been contracted to model a large number of breeding strategies, and it has done so by developing a programme which graphically presents the expected genetic gains over a range of parameter options and breeding strategies. This software has proved very useful and revealing- and we wish to share the benefits of this in a group participation format, as we explore the multitude of options available.

WHO SHOULD ATTEND?

This workshop is for those who wish:

- to understand the trends, options and consequences of various breeding strategies
- to model the effects of breeding strategies
- to network with other tree breeders in exploring the pro's and con's of the multitude of options available to tree breeders
- to make a contribution towards advancing our collective wisdom regarding breeding strategies.

The course is aimed at tree breeders and forest geneticists with a tertiary qualification and some exposure to biometry. Participants who are actively involved in the development, management or implementation of breeding strategies will benefit most from the course.

The course will be presented in English.

OBJECTIVES

The course will provide a comprehensive review of traditional tree breeding strategies and will also expose participants to common breeding strategies used in the improvement of field crops. This will enable participants to gain a broader perspective beyond the barriers of crop type. Traditionally, tree breeding strategies have been regarded as very rigid but present global market and environmental drivers necessitate that flexible dynamic breeding strategies be developed to respond to changing environments. The primary objective of the course is to empower participants to make informed decisions around the development, management and implementation of breeding, production and conservation strategies for their particular environment.

The management of the multi-faceted risks involved in breeding tree species will be an important focus. The course will assist participants in understanding factors affecting genetic gain. Genetic and economic gain will be modeled to optimise gain and minimise the time taken to realise the genetic improvement in production.

Group and other exercises and practical examples will challenge participants to apply the knowledge gained.

The course will consist of lectures, practical examples and discursive sessions that will allow the group to enter into a workshop mode of sharing experiences and tackling problems together.

COURSE CONTENT

The course lectures and manual will cover the following main themes:

- 1) A framework for breeding strategies
- 2) Selected statistical and genetic concepts, such as :
 - inbreeding
 - heterosis
 - forward and backward selection
 - selection intensities
- 3) Genetic parameters
- 4) Starting a breeding programme
- 5) Breeding strategies
Including discussion of :

- nucleus breeding
- line breeding
- breeding seed orchards and multiple breeding populations
- the rolling front strategy
- cloned breeding population, and other strategies
- 6) Interspecific breeding
- 7) Production strategies
- 8) Conservation strategies
- 9) Building equations for predicting genetic gain
- 10) Measures of inbreeding and effective population size, including exploration of:
 - the rate of inbreeding
 - the inbreeding coefficient
 - effective population size
 - changes in gene frequency
- 11) Optimising genetic gain through modeling- visiting the equations- and looking at the influence of varying:
 - population sizes
 - population/family structures
 - selection intensities
 - heritabilities
 - roguing strategies
 - breeding cycle lengths, etc
- 12) GEI and breeding strategies
- 13) Strategies for a changing environment, including discussions around:
 - risk management and environmental responsibility
 - global warming
 - biotechnology
 - improved analytical tools (e.g., BLUP)
 - advances in cloning
- 14) Learning from strategies in other agricultural crops
- 15) Glossary

ENQUIRIES

For more information, please contact the course coordinator between 08h00 and 16h00 (Central African time).

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