Session 33
amador.carmen@inia.es

Strategies to remove undesired introgression

Carmen Amador
Miguel Ángel Toro
Jesús Fernández

Undesired introgression

- Eliminate exogenous information keeping the characteristic genetic background
- Examples:
  - Quality products
  - Particular activity
  - Aesthetical reasons

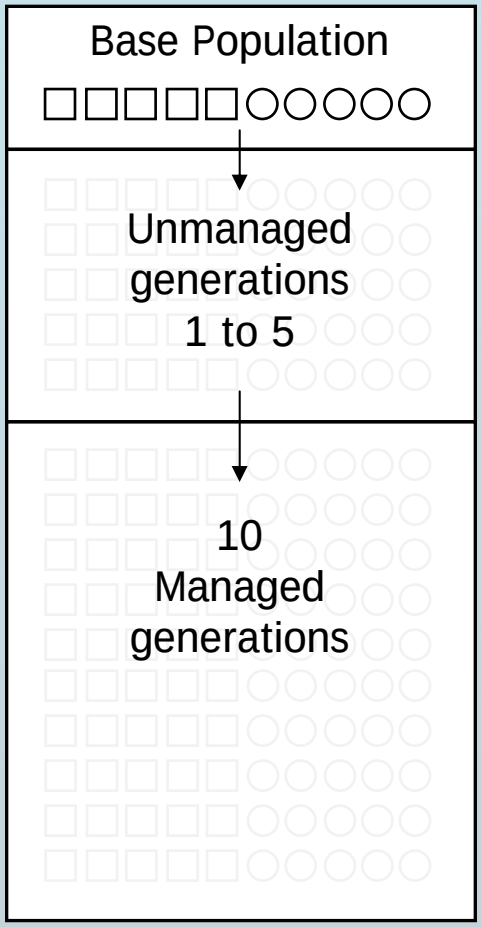
Undesired introgression

- Factors leading a population to suffer undesired introgression:
  - Incorrect management
  - High extinction risk
  - Regeneration of an extinct population (semen bank)

Objective

Find the best method to remove the maximum introgressed information from a population using the pedigree

Simulations



- Population size (N) = 10
- Exogenous individuals in base population: 1 to 5 (10-50% introgression)
- 1 to 5 unmanaged generations: random mating
- 10 managed generations
- N constant over generations
- Pedigree recorded

Management methods

1. Random (R)

2. Optimum contributions (OC)

   Minimum Coancestry

$$\sum_{i=1}^{N}\sum_{j=1}^{N} c_i c_j f_{ij}$$

3. Minimum exogenous contribution (MEC)

   Exogenous information

$$\sum_{i=1}^{N} c_i a_{Ex,i}$$

4. Minimum partial coancestry (MPC)

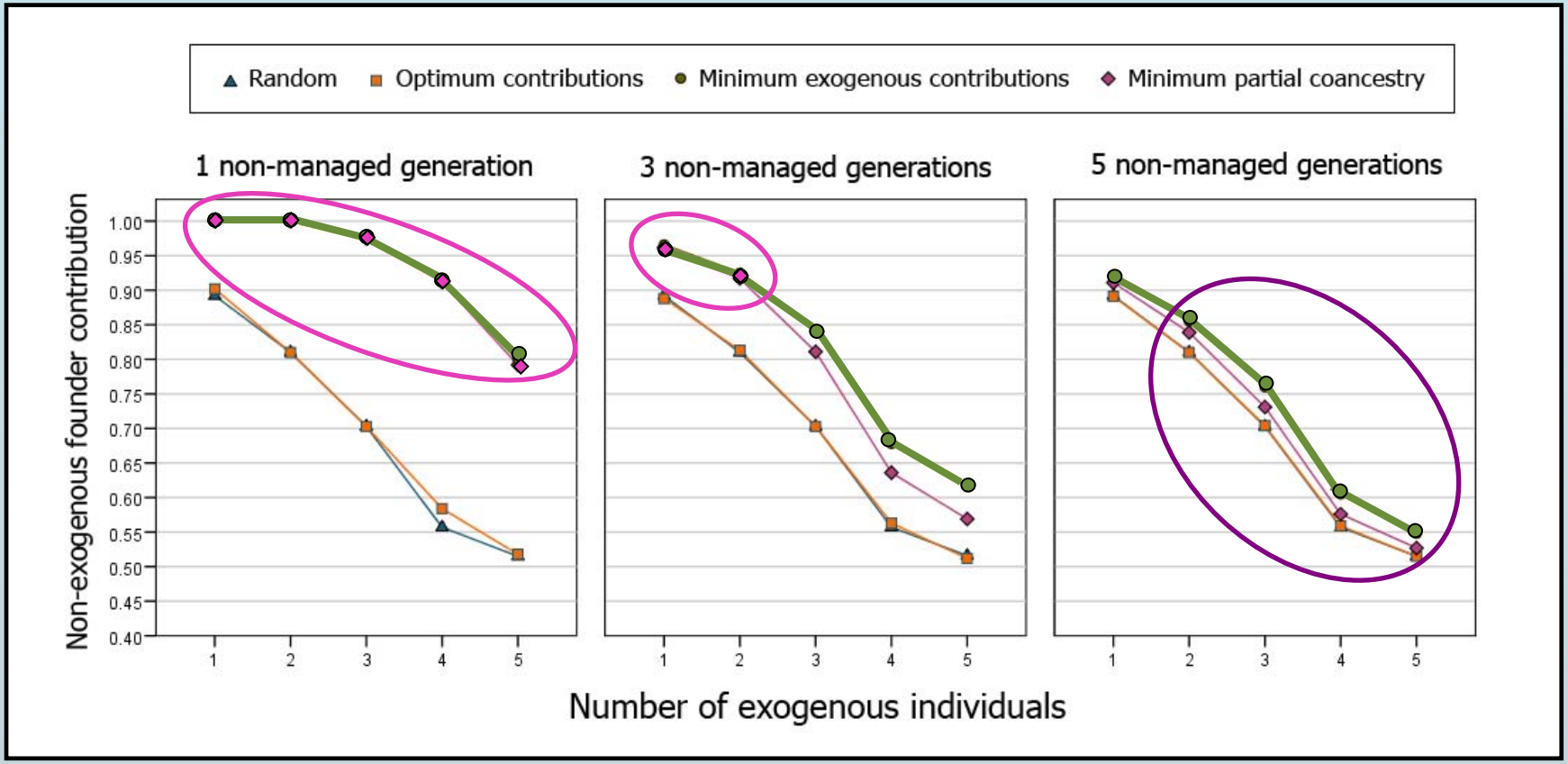
   Kinship due to exogenous founders

$$\sum_{i=1}^{N}\sum_{i=1}^{N} c_i c_j f_{ij}^{*}$$

Parameters

- To evaluate the efficiency of the methods, several parameters were calculated:
  - Non-exogenous founder contribution
  - Inbreeding coefficient
  - Mean Kinship
  - Allele diversity

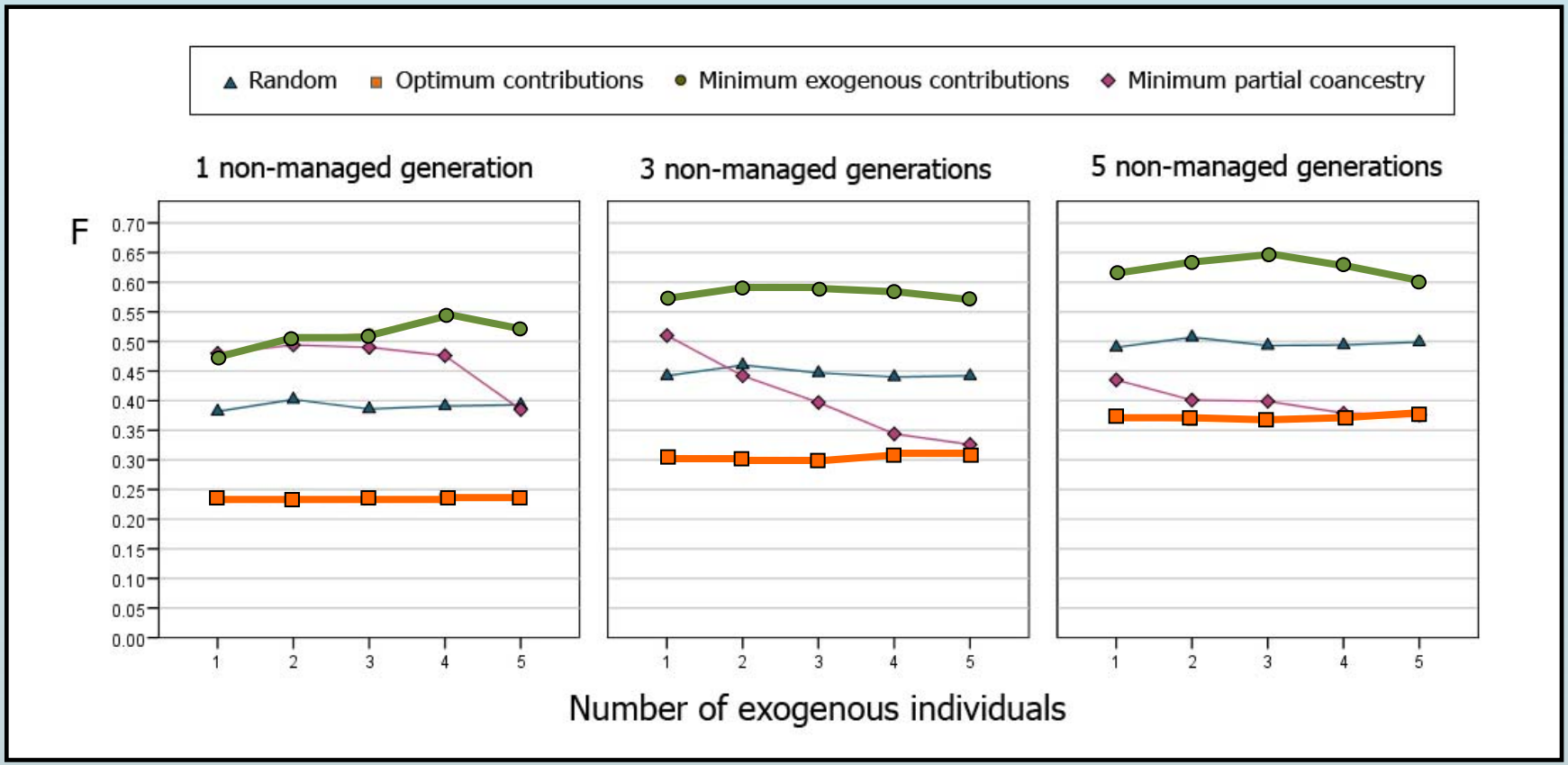
Non-exogenous founder contribution



The best result was obtained by MEC method

Reached in FIRST generation of management

Inbreeding coefficient



The best method in removing foreign information gets larger values of F

Larger population simulation

New simulation carried out:

- 100 individuals (5 exogenous)
- 5 unmanaged generations
- 10 managed generations (each of the 4 methods)

In all cases MEC method removed the whole foreing information

- Best method to eliminate foreign influence with pedigree information:

  Minimize exogenous contributions

- As most removal of foreign influence achieved in first generation of management and method brings high F, Best strategy:

  t=1 Minimize exogenous contributions

  t>1 Optimum contributions

- Cases with high introgression and a few generations of admixture become almost impossible to recovery only with pedigree information
- Very important to be careful about this undesired introgression to keep it under control

Future Work

When genealogical information is not enough to remove the undesired introgression

- Pedigree not available
- Many generations of admixture
- Recovery of an extinc population (semen bank)

Use of information in the genome:
Markers

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