Quadrant II – Transcript and Related Materials

Programme : **Bachelor of Science (Third Year)**

Subject : **Botany**

Course Code : **BOC108**

Course Title : **Cytogenetics and Plant Breeding**

Unit IX : **Methods of crop improvement**

Module Name : **Selection methods – for cross pollinated crops**

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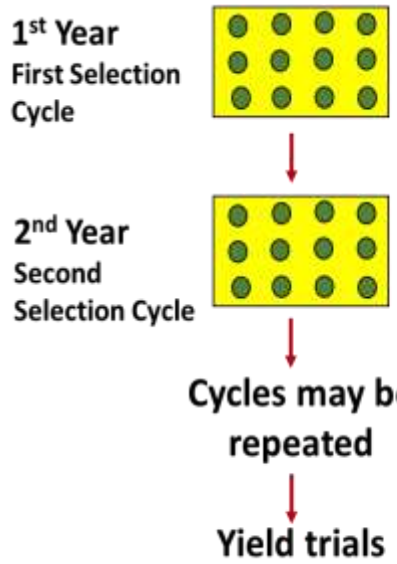
Methods of selection for cross pollinated crops

Methods

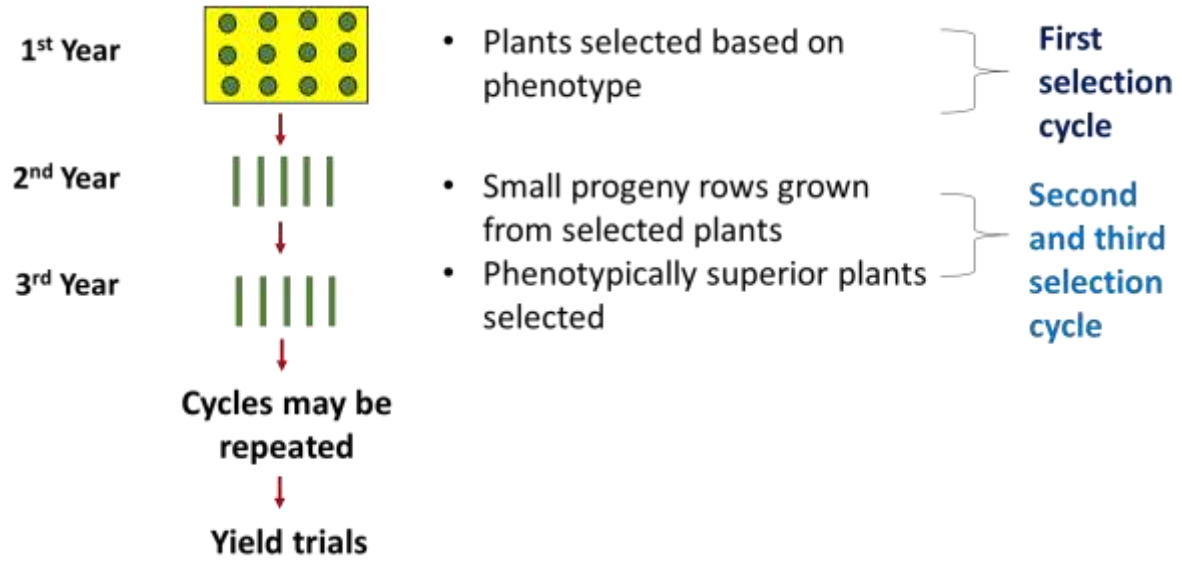
- Without progeny testing
  - Mass selection
- With progeny testing
  - Recurrent selection

Mass Selection



- Plants selected on the basis of phenotype, seeds harvested and bulked
- Bulk seeds from the selected plants grown

Selection with progeny test



Merits and demerits of progeny test

Merits

- Selection is based on progeny and not on the phenotype of individual plant
- More efficient in identification of superior genotype than mass selection
- Inbreeding may be avoided

Demerits

- No control on pollination
- Selection cycle is usually of two years

Recurrent Selection

Idea of recurrent selection was first suggested by Hayes and Barber in 1919 and independently by East and Jones in 1920.

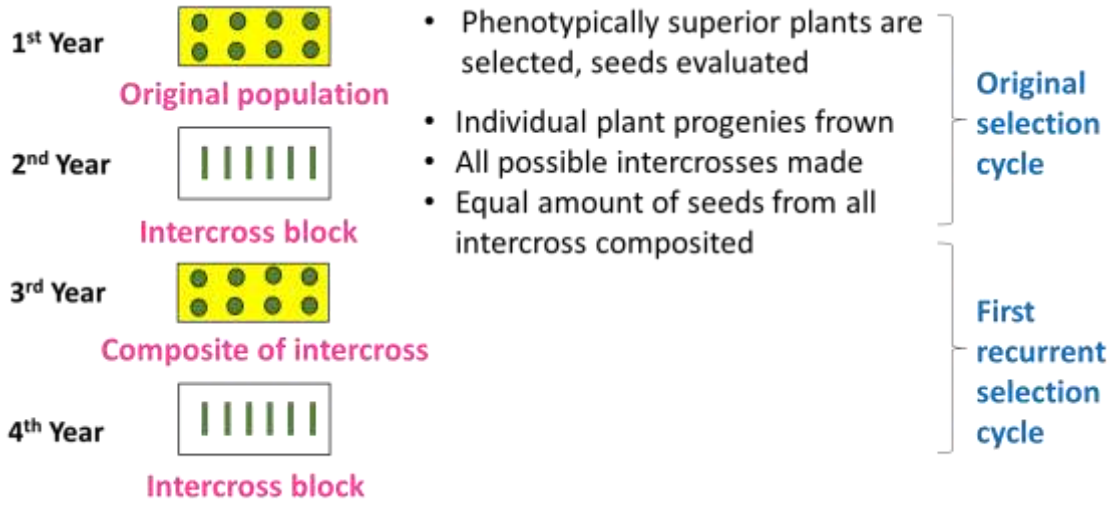
The idea was to ensure the isolation of superior inbreds from the population subjected to recurrent selection for their ultimate utilization in the production of hybrid and synthetic varieties.

The recurrent selection schemes are of four different types, each suited for a specific purpose :

1. Simple Recurrent Selection

2. Recurrent Selection for General Combining Ability (RSGCA)
3. Recurrent Selection for Specific Combining Ability (RSSCA)
4. Reciprocal Recurrent Selection (RRS)

1. Simple Recurrent Selection

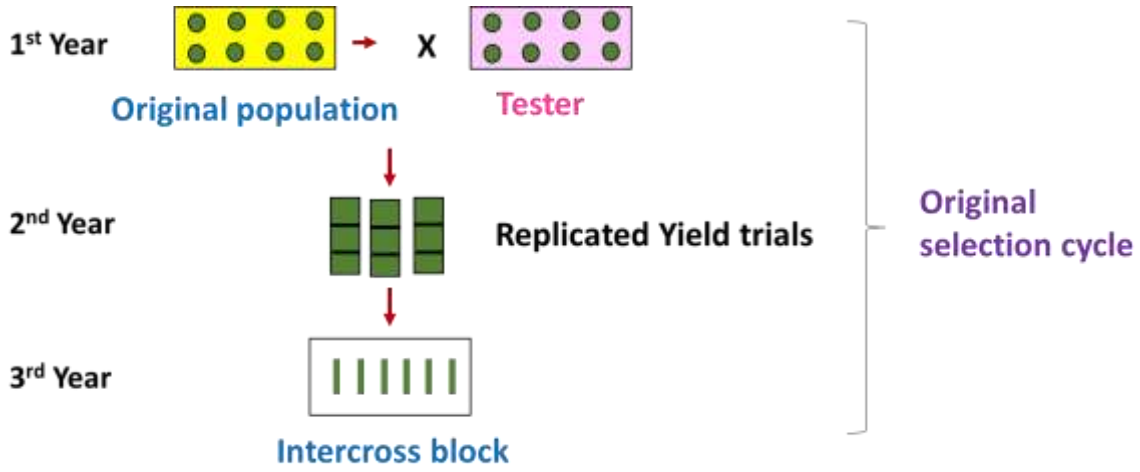


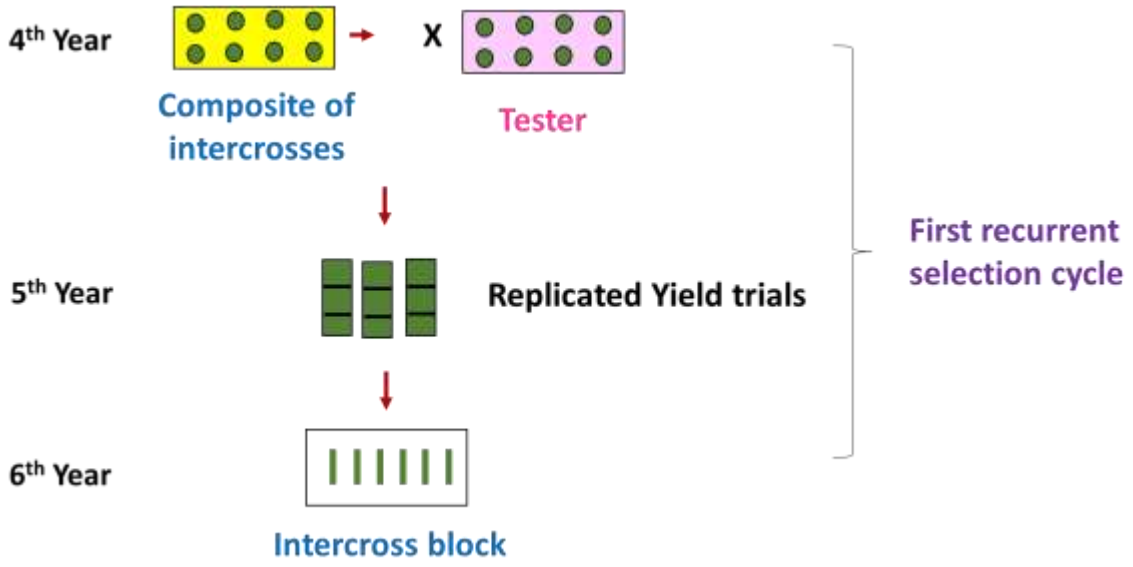
2. Recurrent Selection for General Combining Ability (RSGCA)

The progeny for progeny testing are obtained by crossing the selected plants to a tester strain with a broad genetic base.

A tester strain is the common parent mated to a number of lines, strains or plants.

Procedure for Recurrent Selection for General Combining Ability (RSGCA)





3. Recurrent Selection for Specific Combining Ability (RSSCA)

The objective of RSSCA is to isolate from a population such lines that will combine well with a given inbred.

It is assumed that a large part of heterosis is the result of nonadditive gene action, i.e. dominance and epistasis. This part of heterosis will, therefore, depend on specific gene combinations and is designated as specific combining ability (SCA).

The procedure remains the same as that of RSGCA, only difference is the use of an inbred as a tester in place of an open pollinated variety.

4. Reciprocal Recurrent Selection (RRS)

The objective of RSS is to improve two different populations in their ability to combine well with each other.

In the scheme, each of the two populations serve as testers for the plants selected from the other population.

Procedure for Reciprocal Recurrent Selection (RSS)