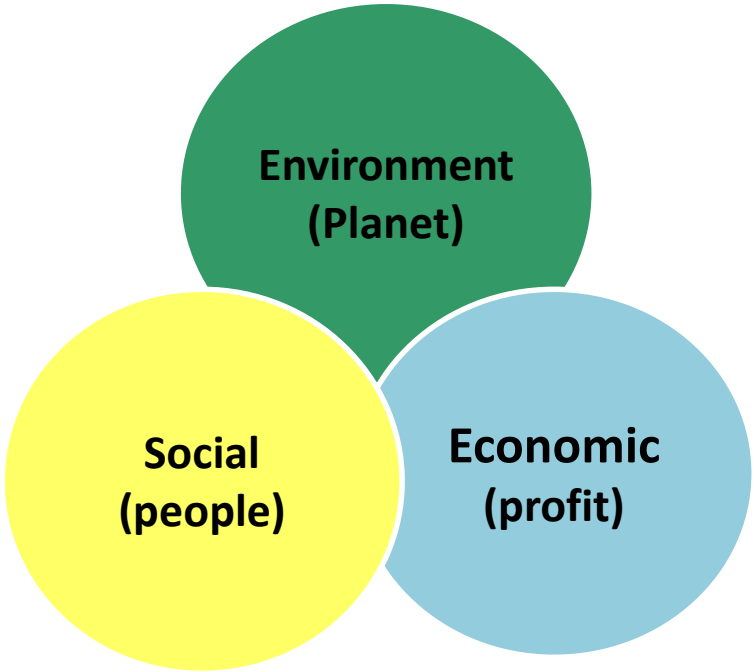
A presentation on

INTRODUCTION TO PLANT BREEDING

Presented by,
Anshuman Tiwari

Agriculture Sustainability Goals



PLANT BREEDING

Art and science of improving genetic makeup of crop plants for human welfare.

ART

Human imagination, skill, experience etc

SCIENCE

Require knowledge of subject, experimental procedure and sequential knowledge

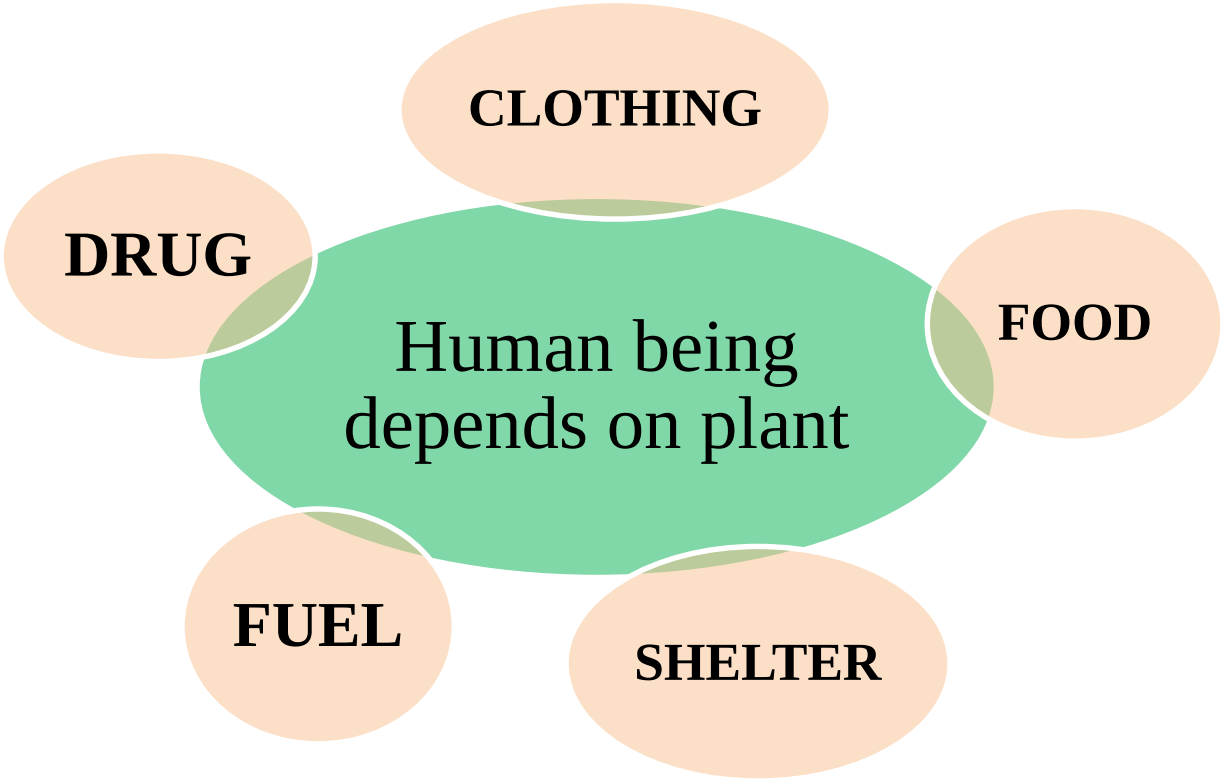
NEED FOR IMPROVING CROP PLANTS

1. Increasing Population

2. Decreasing agricultural land

3. Unpredictable environment

ROLE OF PLANT BREEDING



FIELDS OF PLANT BREEDING

GERMPLASM

- Collection
- Conservation
- Evaluation
- Documentation

BREEDING TECHNIQUE

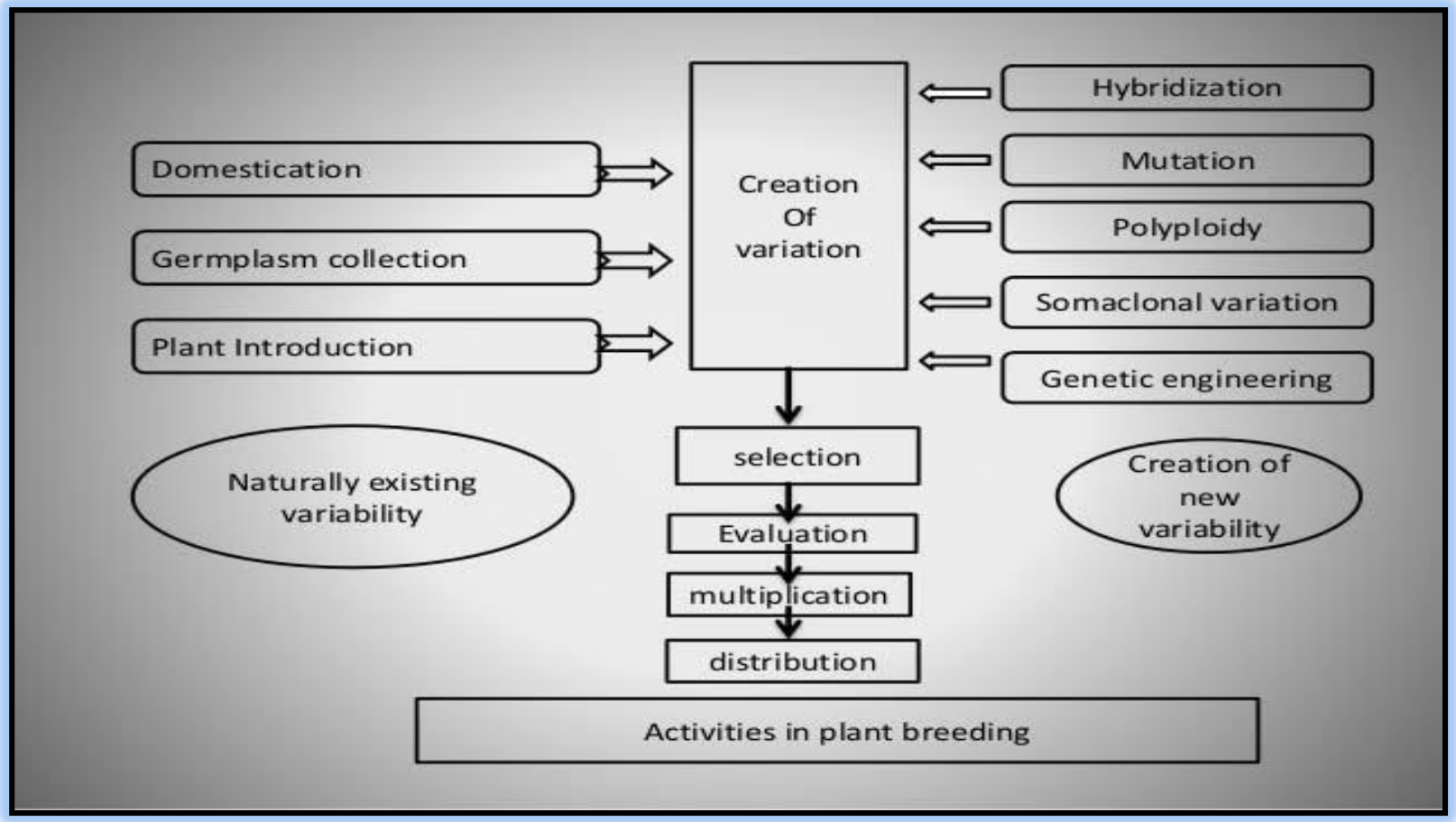
- General methods
- Special methods

SEED PRODUCTION

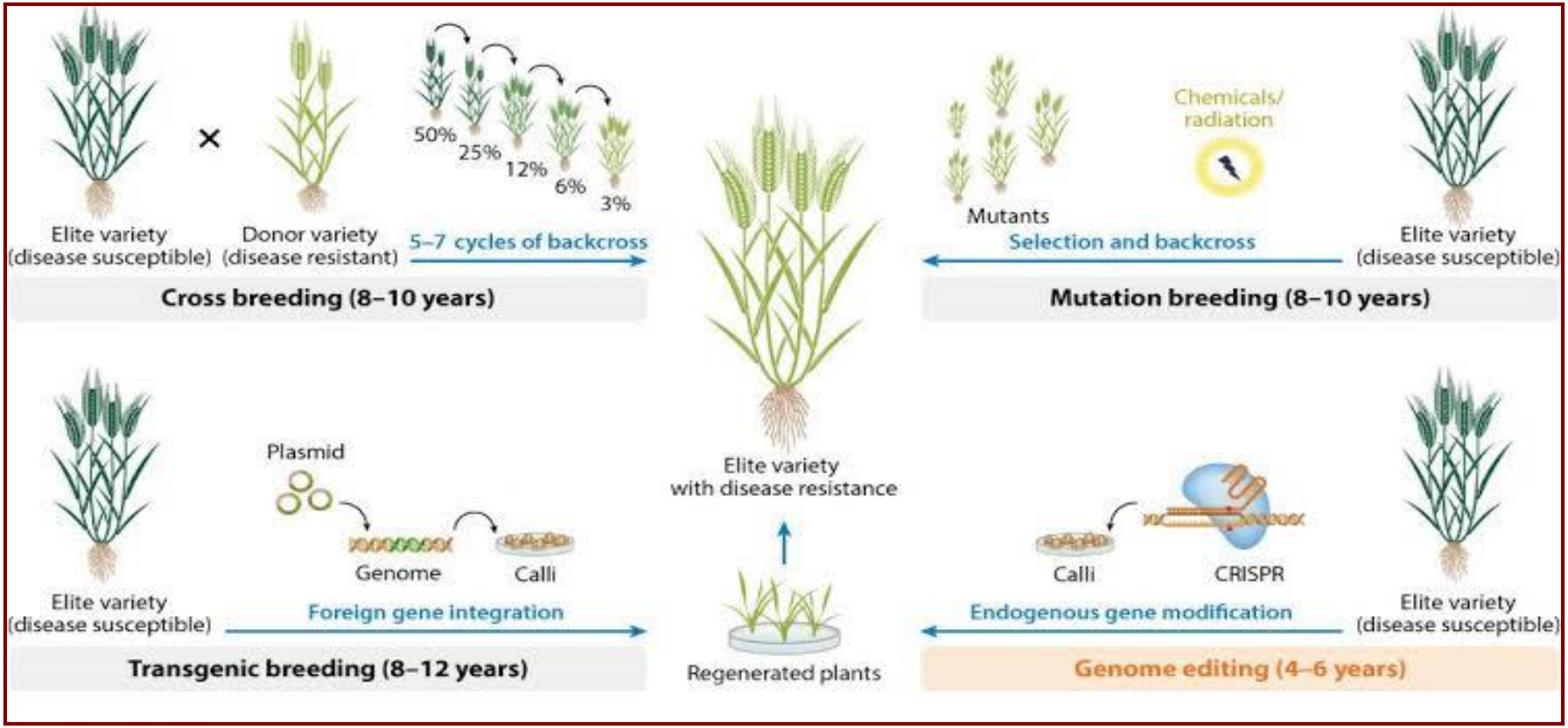
- Include principles and method of improved seed production

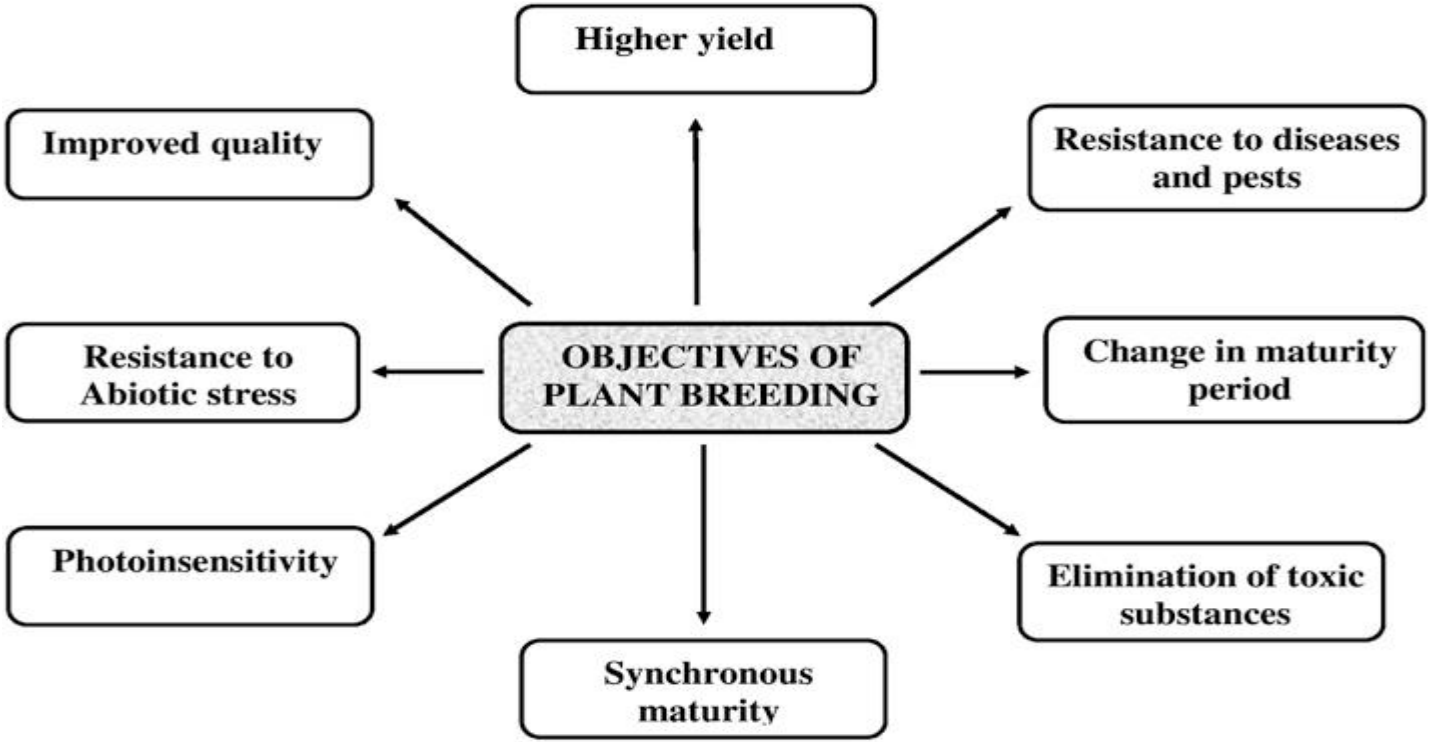
Phases of Plant Breeding

1. Domestication
2. Selection
3. Hybridization
4. Novel Genetic variation
3. Genetic Engineering


Domestication
Germplasm collection
Plant Introduction
Creation Of variation
Hybridization
Mutation
Polyploidy
Somaclonal variation
Genetic engineering
Naturally existing variability
selection
Evaluation
multiplication
distribution
Creation of new variability
Activities in plant breeding

Methods of Plant Breeding

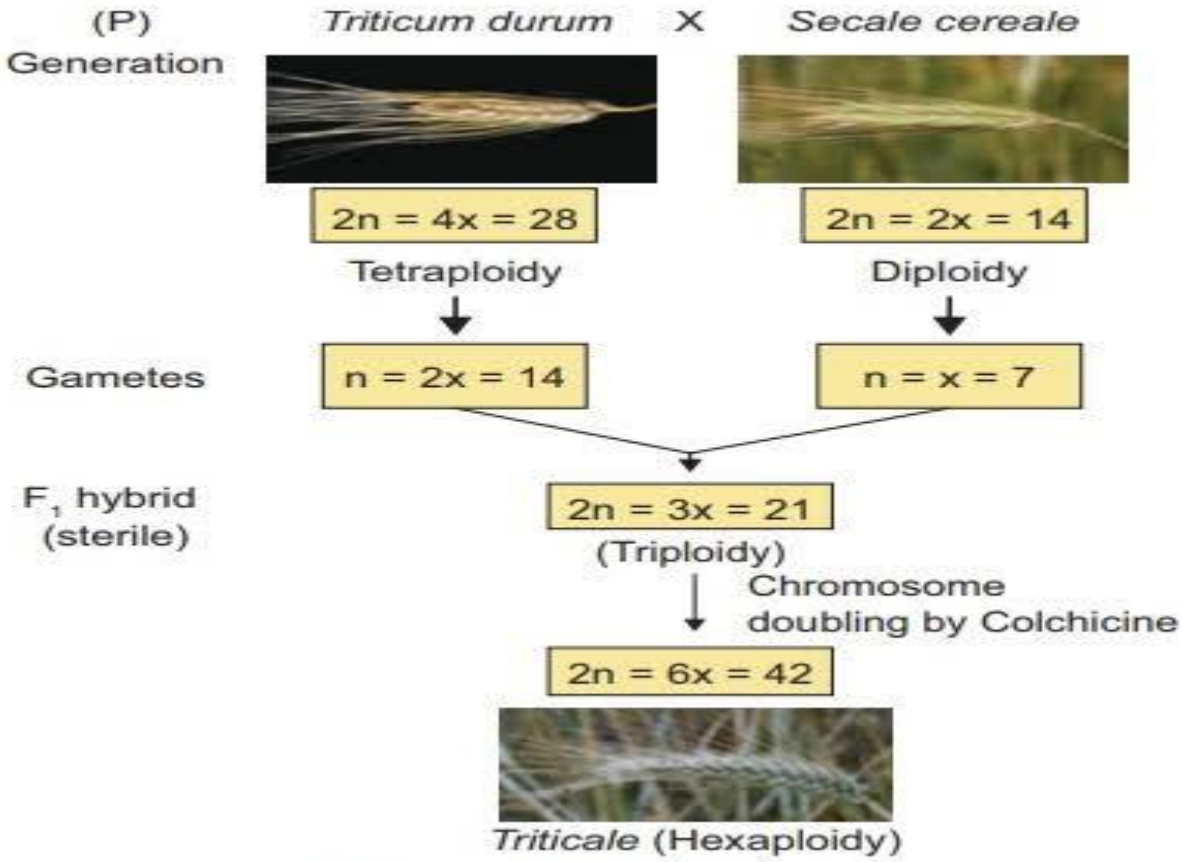



Higher yield
Improved quality
Resistance to diseases and pests
Resistance to Abiotic stress
OBJECTIVES OF PLANT BREEDING
Change in maturity period
Photoinsensitivity
Elimination of toxic substances
Synchronous maturity

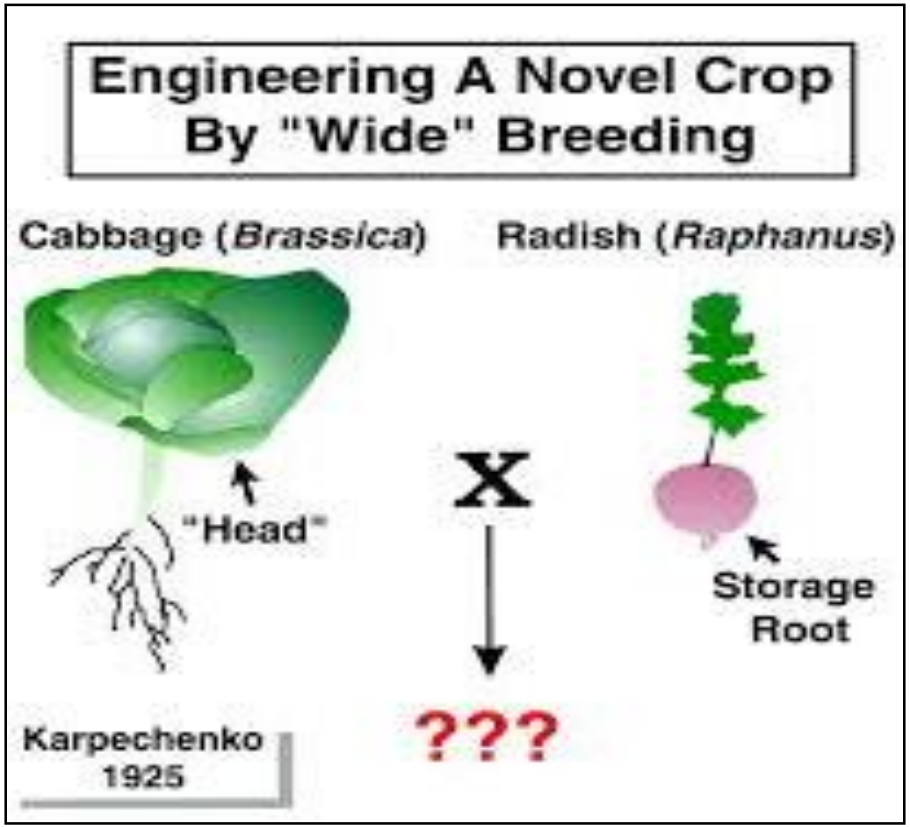
Landmarks in Hybridization

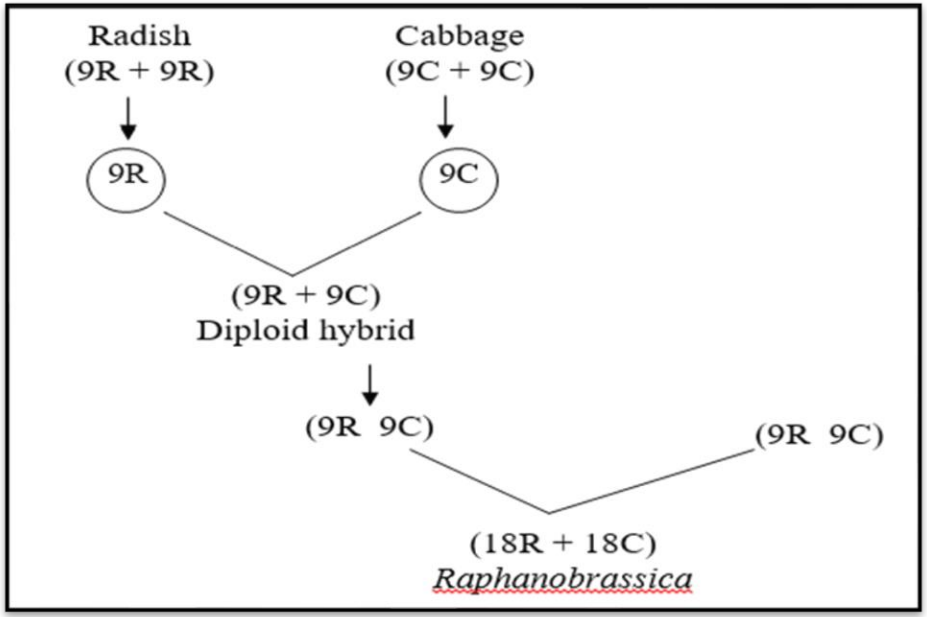
- **Thomas Fairchild.** First interspecific plant hybrid between sweet william and carnation.
- **T. A. Knight.** Artificial hybridization in fruit crop.
- **Rimpu.** Intergeneric cross between *bread wheat* and *rye*.
- **Karpchenko.** First develop intergeneric hybrid between radish and cabbage.
- **Yuan Long Ping.** Developed world's first rice hybrid.

Evolution of Triticale

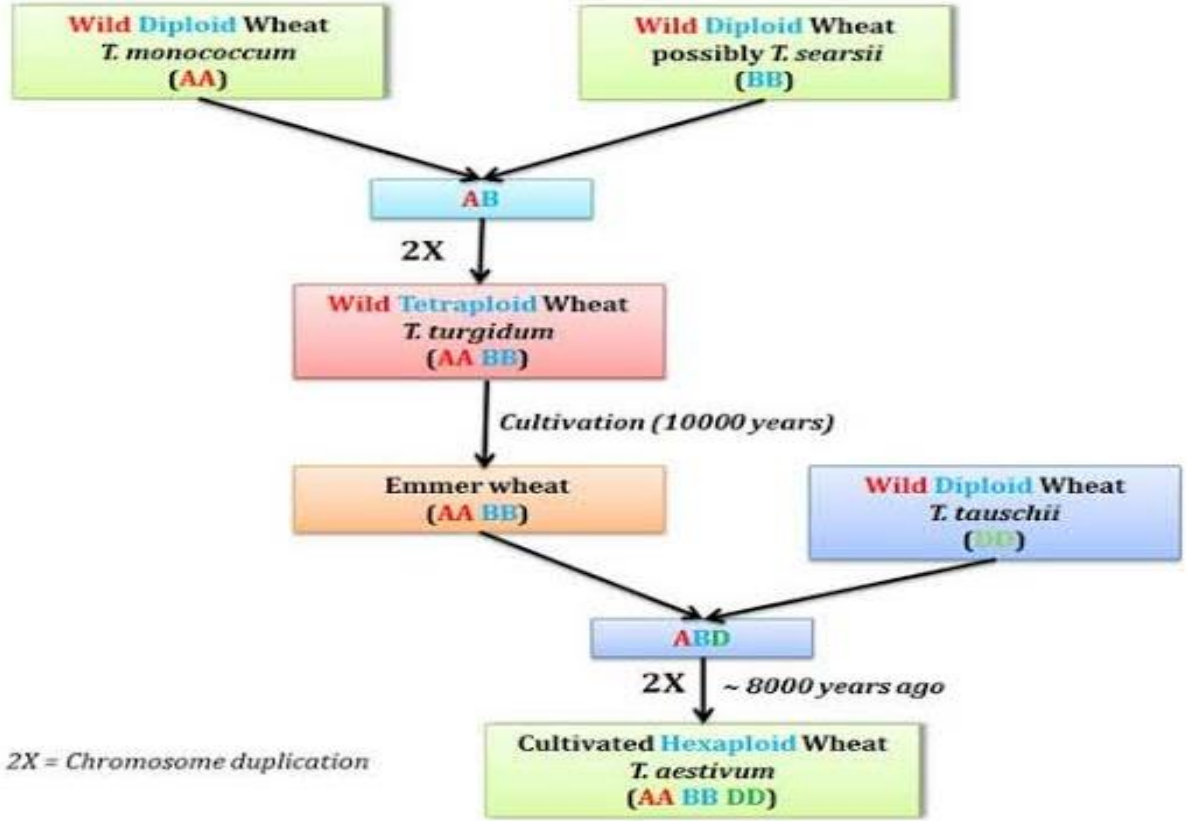


Evolution of Raphanobrassica





Evolution of Bread Wheat



Indian Plant Breeders

- **T. S. Venkatraman.** Eminent sugarcane breeder. Noblization of sugarcane
- **M. S. Swaminathan.** Develop high yielding varieties of wheat and rice. Father of green revolution .
- **Pushkarnath.** Famous potato breeder.
- **N. G. P. Rao.** Eminent sorghum breeder. Develop HYV of grain sorghum.
- **C. T. Patel.** Develop world's first cotton hybrid for commercial cultivation. Father of hybrid cotton

Important Achievements

1. Semidwarf wheat and rice varieties:

- **Norin-10** as a source of dwarfing gene in wheat
- *Kalyansona* & *sonalika* is section from these material.
- **Dee-geo-woo-gen** is source of dwarfing gene in rice.
- *TN-1* (Taiwan) & *IR-8* (Phillippines) now replaced by *Jaya* & *Ratna*.

2. Nobilization of Indian Canes:

- Thicker stem and higher sugar content.

3. Hybrid Millets:

- CSH-1 is first sorghum hybrid.
- HB -1 is first bajra hybrid.

4. Hybrid cotton:

- H4, Varalaxmi, Jayalaksmi etc.
- Recently released desi cotton varieties are G-cot. DH7 & G-cot. DH9

5. Marker assisted selection:

- Pusa Basmati-1 & Samba Mahsuri (BLB resistant)
- Swarna sub-1 (submergence tolerant).
- QPM-9 (quality protein Maize)

6. Transgenic varieties:

- Bt-cotton & Bikaneri Narma

7. Mutant varieties:

- Jagannath (rice), Aruna (Castar), Sonara-64 (Wheat)

Undesirable Effects

Genetic Erosion	• Reduction in genetic diversity.
Narrow genetic base	• Possesses poor adaptability.
Undesirable combinations	• Got non beneficial products.
Susceptibility to Pest	• More prone to pest and diseases.

Future Aspects

1. **Genetic manipulation** of crop plants.
2. **Evolution** of crop plants.
3. Approaches to **advance breeding technique.**
4. Development of **desired trait** in crop.

THANK YOU