

Asexually propagated species

Some crop plants propagate by asexual means i.e. by stem or root cuttings or by other means. Such species are known as asexually propagated species or vegetatively propagated species. Such species are found in both self and cross pollinated groups. Generally asexually propagated species are highly heterozygous and have broad genetic base, wide adaptability and more flexibility.

Methods of breeding Asexually propagated species

1. Plant introduction
2. Clonal selection
3. Mass selection (rarely used)
4. Heterosis breeding
5. Mutation breeding
6. Polyploidy breeding
7. Distant hybridization
8. Transgenic breeding

BREEDING POPULATIONS

The genetic constitution of plants is determined by mode of pollination. Self pollination leads to homozygosity and cross pollination results in heterozygosity to exploit homozygosity in self pollinated crops and heterozygosity in cross pollinated species, because inbreeders have advantage of homozygosity and outbreeders have advantage of heterozygosity. Based on genetic constitution, breeding populations are of four types viz.,

1. Homogenous
2. Heterogenous
3. Homozygous
4. Heterozygous

1. Homogenous population

Genetically similar plants constitute homogenous populations. Examples of homogeneous populations are pure lines, inbred lines, F_1 hybrid between two pure line or inbred lines and progeny of a clone. Pure lines and inbred lines generally have narrow adoption.

2. Heterogenous populations

Genetically dissimilar plants constitute heterogenous populations. Examples are land races, mass selected populations, composites, synthetics and multilines. Heterogenous populations have wide adaptability and stable performance under different environments.

3. Homozygous populations

Individuals with like alleles at the corresponding loci are know as homozygous. Such individuals do not segregate on selfing. Thus non-segregating genotypes constitute homozygous populations. Examples are pure lines, inbred lines and mass selected populations in self pollinated plants. Thus pure lines and inbred lines are homozygous and homogeneous and mass selected varieties of self pollinated crops and multi lines are homozygous and heterogenous, because they are mixtures of several pure lines.

4. Heterozygous populations

Individuals with unlike alleles at the corresponding loci are referred to as heterozygous. Such individuals segregate into various types on selfing. This includes F₁ hybrids, composites and synthetics. Thus F₁ hybrids are heterozygous but homogeneous and composites and synthetics are heterozygous and heterogenous population. Such populations have greater buffering capacity to environmental fluctuations.

Different types of genetic populations in plant breeding

population	Brief description / definition	Examples
Homogeneous	Genetically similar population	Purelines, inbred line, F ₁ hybrids progeny of a clone
Heterogeneous	Genetically dissimilar population	Land races, composites synthetics and multilines.
Homozygous	Non-segregating populations	Purelines, inbred lines mass selected autogamous varieties and multilines
Heterozygous	Populations segregate on selfing	F ₁ hybrids, composites, synthetics and a clone
COMBINATIONS Homogeneous and Homozygous	Genetically similar and non segregating populations	Purelines and inbred lines
Homogeneous and heterozygous	Genetically similar but segregating on selfing	F ₁ hybrids between inbred lines and progeny of a clone
Heterogeneous and homozygous	Genetically dissimilar but non segregating populations	Multilines and mass selected varieties in autogamous species

Heterogeneous and Heterozyous	Genetically dissimilar segregating populations	and	Composites and synthetics
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