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|  |  | **BREEDING CROSS-POLLINATED AND**  **CLONALLY PROPAGATED CROPS**  Breeding procedures in crop plants are designed to exploit the reproductive structure of the particular species. Thus, the breeding procedures used with cross-pollinated crops will differ from those used with self-pollinated crops. Furthermore, procedures may differ with different species of cross-pollinated crop plants because the species differ in the structure of the reproductive system. Most species of commonly cultivated cross-pollinated crops are seed propagated. Other species, potato and sugarcane for example, that reproduce sexually in their native habitat with normal cross-pollination are propagated asexually as clones when cultivated. |  |  |
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|  | ***BREEDING CROSS-POLLINATED VERSUS SELF-POLLINATED CROPS*** |  |
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|  | *In the breeding of self-pollinated crops, the homozygous nature of the individual plant is exploited*. *With selection focused on plants in self-pollinated crops, characters with Qualitative Inheritance tend to receive major attention*. |  |
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|  | ***In the breeding of cross-pollinated species, The Heterozygous Nature of the individual plant is exploited***. In a population of a cross-pollinated species, open-pollinated corn, red clover, or perennial ryegrass are typical examples,. As a consequence of natural cross-pollination, the genes are reshuffled each generation and regrouped into new genetic combinations. So almost never would two plants be found with identical genotypes. Under natural environmental influences, cross-pollinated populations are relatively fluid, in which genes favoring adaptation and increased seed production tend to increase at the expense of genes unfavorable for adaptation or fitness to reproduce. In a breeding population, the shift toward more adapted genotypes may be accelerated by selection, and by environmental stresses to which the breeding population is subjected. |  |
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|  | ***In cross-pollinated crops the focus of the breeder is on population improvement instead of individual plants, and more emphasis is given to Quantitative Inheritance in breeding systems than in self-pollinated crops*.** Due to the extensive heterozygosity in cross-pollinated crops, there is an abundance of phenotypic variation; hence, cultivars of cross-pollinated crops are less uniform than cultivars in self-pollinated crops. Genetic variability for qualitatively inherited characters may be drastically reduced by rigid selection, but genetic variability in quantitatively expressed characters continues to be present, due to inability of the breeder to select accurately for individual gene effects and to the influence of the genotype × environment interactions. |  |
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|  | ***PROGENY TEST VS COMBINING ABILITY TEST*** |  |
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|  | In a self-pollinated crop, in which individual plants tend to be homozygous, the genotype is reproduced in the progeny rather precisely and may be evaluated by progeny tests. In a cross-pollinated crop, individual plants are heterozygous and field grown plants will largely be pollinated by pollen from other heterozygous plants growing in the vicinity. Under these conditions, or even if self-fertilized, the genotype of a heterozygous plant is not faithfully reproduced in its progeny. Thus growing a progeny test of an open-pollinated plant does not provide information comparable to that obtained from growing a progeny test of a self-pollinated plant. A more suitable test would be provided if the plant had been pollinated with a heterogeneous collection of pollen (gametes) of known origin. Performance could then be compared among progenies of plants pollinated with the same source of pollen |  |
| .A more precise comparison could be made by pollinating the plants with pollen from an inbred (homozygous) line. A test comparing progeny performance of plants or strains pollinated with a known tester line is called a ***Testcross*** and evaluates the ***Combining Ability*** of the mother plants or strains with the common tester line.  The average or overall performance of a plant or genetic strain in a series of crosses with different tester lines is a measure of its ***General Combining Ability***,  whereas the performance of a plant or genetic strain in a specific combination in comparison with the performance of other cross combinations is a measure of its ***Specific Combining Ability***. | | | |  |