

It is extracted,  
because this plant  
has



**ASSIGN  
BUSTER**

It is found only in those species of animals which develop parthenogenetically like aphids. Polyploidy is of two types, viz. (1) autopolyploidy, and (2) allopolyploidy. Types of polyploid Definition/brief description 1.

Autopolyploid – Multiplication of the same genome (a) Autotriploidy – Three copies of the same genome (3x) (b) Autotetraploidy – Four copies of the same genome (4x) (c) Autopentaploidy – Five copies of the same genome (5x) (d) Autohexaploidy – Six copies of the same genome (6x) 2.

Allopolyploid – A condition in which complete genomes of two or more species combine together (a) Allotetraploidy – Two copies each of two distinct genomes ( $2 \times 1 + 2 \times 2$ ) (b) Allohexaploidy – Two copies each of three distinct genomes ( $2 \times 1 + 2 \times 2 + 2 \times 3$ ) (c) Allooctaploidy – Two copies each of four distinct genomes ( $2 \times 1 + 2 \times 2 + 2 \times 3 + 2 \times 4$ ) Induction of polyploidy:

Polyploidy is mainly induced by treatment with a chemical known as colchicine. This is an alkaloid which is obtained from the seeds of a plant known as *Colchicum autumnale*, which belongs to the family Liliaceae.

Colchicine does not affect *Colchicum* from which it is extracted, because this plant has an anticolchicine substance. Colchicine is applied in a very low concentration, because high concentration is highly toxic to the cells. For effective induction of polyploidy, usually concentrations of 0.01 to 0.5% are used in different plant species.

The colchicine induced polyploidy is known as colchipoity. In plants colchicine is applied to growing tips, meristematic cells, seeds and axillary buds in aqueous solution or mixed with lanolin. The duration of treatment varies from 24 hours to 96 hours depending upon the species of plants.

Effects of polyploidy: Polyploidy has marked effects on the morphology of plants. The distinct features of autopolyploids are increase in general vigour and size of various plant parts. Such features are generally referred to as gigantism.

Autopolyploids have the following important features: 1. Stems are thicker and stouter. 2.

Leaves are fleshy, thicker, larger and deeper green in colour. 3. Roots are stronger and longer. 4. Flowers, pollens and seeds are larger than diploids. 5.

Maturity duration is longer and growth rate is slower than diploids. 6. Water contents are higher than diploids etc. Applications in crop improvement:

Polyploidy plays an important role in crop improvement. The autopolyploidy and allopolyploidy are useful in several ways. However, allopolyploidy has wider applications than autopolyploidy. Applications of autopolyploidy and allopolyploidy in crop improvement are briefly presented below:

Autotetraploids have been developed in forage crops like berseem, alfalfa and rye; vegetable like radish, turnip and cabbage; and fruits like grapes.

Allopolyploidy: Allopolyploidy is useful in four principal ways, viz. (1) In tracing the origin of natural allopolyploids, (2) In creating new species, (3) In interspecific gene transfer, and (4) As a bridging species. Limitations of

Polyploidy: Polyploidy has several limitations. Some important limitations of polyploidy in crop improvement are briefly presented below: 1. Limited use:

The single species polyploidy has limited applications. It is generally useful in those crop species which propagate asexually like banana, potato, sugarcane, grapes etc. 2.

Difficulty in maintenance: The maintenance of monoploids and triploids is not possible in case of sexually propagating crop species. 3. Undesirable characters: In bispecies or multispecies polyploids characters are contributed by each of the parental species. These characters may be sometimes undesirable as in case of Raphanobrassica.

4. Some other defects: Induced polyploids have several defects such as low fertility, genetic instability, low growth rate, late maturity, etc. 5. Chances of developing new species through allopolyploidy are extremely low.