Origin of Polyploids

Mode of origin of polyploids are less well understood. Chromosome doubling implies a somatic event. Either in a zygote to produce a polyploidy individual or in an apical meristem to produce a chimera. These have generally been accepted as the common mode of origin of polyploids. Polyploids also arise through formation and sexual functioning of cytologically non-reduced female and male gametes.

Diploid parents occasionally produce tetraploid offsprings. These polyploids may result from chromosome doubling in the zygote or from cytologically non-reduced female and male gametes that combine to produce functional tetraploid zygotes. Both methods are extremely rare and which one of them operates in the development of a particular polyploidy is almost impossible to determine.

Role of polyploidy in evolution

Polyploidy has played an important role in evolution of new varieties and species in nature. Angiosperms and pteridophytes have very high number of polyploidy species in nature. More than 35% angiosperms are polyploids. According to Manton (1950) among all plant groups, ferns show highest degree of polyploidy. It is generally noted that with the increase in chromosome number, the adaptability and variability of a species increases progressively. Autopolyploidy has Limited contribution in the evolution of plant species. Some of our present day plants crops many forage grasses and several ornamental plants are polyploidy. for example potato (*solanum tuberosum)* 48(4n) 2n = 24; banana (*Musa paradisiaca*) ,tomato, coffee, groundnut etc. Allopolyploidy has played a vital role in evolution of species. A good number of Crop species seem to have evolved through allopolyploidy. This is evident from the widespread occurrence of allopolyploids in various genera of plants and their high adaptability in nature. It is estimated that one-third of the flowering plants are polyploids and a great majority of them are allopolyploids. The importance of allopolyploidy in evolution of species was first pointed out by Wing (1917).

Cytological studies in many species have made it possible to trace the evolutionary history of many allopolyploid species and their diploid parental species have been identified with some degree of certainty. The parental diploid species of allopolyploid is based primarily on the pairing between the chromosomes of that diploid species and allopolyploid species. When the chromosomes of a diploid species pair with some of the chromosomes of the allopolyploid species the homology between the chromosomes of the two species is established. This suggests that the diploid species may be one of the parent species of allopolyploid species. The identification of parental diploid species can also be made by involving the suspected parent species in hybridization and synthesizing and allopolyploid from interspecific hybrid and then comparing the synthetic allopolyploid with a naturally occurring allopolyploid. The synthetic allopolyploid does often resemble the natural allopolyploid species. This has been demonstrated in *Brassica* in which a synthetic allopolyploid developed from interspecific hybrid of cross between *Brassica oleracea* and *Brassica campestris* was found to resemble very closely with *Brassica napus* (turnip). Other methods for determining resemblance are biochemical techniques for example electrophoretic analysis of their protein and enzyme patterns and from chromosome banding patterns.