



Cytoplasmic male sterility in higher plants and its practical utilization. Study case: sunflower - *Helianthus annuus* L...

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Cytoplasmic male sterility (CMS) is a maternally inherited trait in higher plants which is characterised by the inability to produce functional pollen. Cytoplasmically inherited male sterility is assumed to result from incompatibility between nucleus and mitochondria. In certain genotypes CMS appears to be correlated with novel mitochondrial genes (in interspecific hybridization), whereas in other cases CMS is correlated with mutations in common mitochondrial genes. In both instances, rearrangements play a prominent role in the origin of this genes. Since the presence of specific nuclear genes can lead to restored pollen fertility, CMS systems provide a unique opportunity for molecular and genetic investigations of mitochondrial-nuclear interactions in higher plants. Correns in 1904 described the CMS phenomenon. More than 100 different species are cited as having CMS forms.

In sunflower, more than 50 CMS sources different by their origins have been described. Some theoretical informations are summarised on the organization of mitochondrial DNA investigating for 29 sources of CMS and a fertile line (normal cytoplasm) of *Helianthus annuus* L. by Southern hybridizations. Genetic similarity of the investigated cytoplasms varied between 0.3 and 1. Cluster analyses using the UPGMA method allowed to distinguish 10 mitochondrial (mt) types between 29 investigated cytoplasms. Some of the CMS sources are stable and available for using in the sunflower breeding programs as is the case of CMS- ANT1 identified at the Research Institute for Cereals and Industrial Crops Fundulea, in order to performe a new CMS- pollen fertility restoration system for hybrid production. A number of 14 valuable sunflower inbreds selected at Fundulea are in a breeding program to create CMS- ANT1 stable sterile lines and the Rf- ANT1 pollen fertility restoration lines, as well as the reliable production of hybrid seeds. The embryo culture method is used to accelerate generations development by backcross and selection.