

Genetic ID (Europe) AG

# CMS Fact Sheet

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## What is CMS?

CMS is the abbreviation for "cytoplasmic male sterility". A plant carrying this trait produces only sterile pollen. The genetic trait is inherited maternally and is encoded in the mitochondrial or chloroplast genome. The production of F1-hybrid seeds is facilitated by the usage of CMS varieties.

In some plants CMS is occurring naturally and can be transferred intra- or interspecifically by "classic" breeding techniques. For instance this is the case with some rye or carrot hybrids.

In many cases it is technically very difficult to transfer the CMS trait classically and the method of protoplast/cytoplast fusion is used instead. De-nucleated cells from CMS lines, e.g. Japanese radish or sunflower, are fused with cells of the target species (e.g. cauliflower or forcing chicory) under laboratory conditions. Many new cabbage hybrid varieties have been generated this way, such as cauliflower, broccoli, savoy, red and white cabbage etc. but also to an increasing extent forcing chicorée.

## Is there a labeling requirement for CMS hybrids?

According to 2001/18/EC CMS hybrids generated by proto-/cytoplast fusions are not considered as GMO (genetically modified organism) if the resulting plant could have been bred theoretically by "classic" methods as well.

**All currently available CMS hybrids are not GMOs according to this definition and are therefore not required to be labeled as such.**

## CMS hybrids and organic farming

From a legal point of view all of the currently commercialized CMS varieties are allowed for organic farming. However, the organic industry has a critical position towards CMS varieties generated by proto-/cytoplast fusions: the IFOAM considers these methods as genetic engineering techniques.

**German organic associations have banned CMS hybrids generated by proto-/cytoplast fusions.**

Some organic associations like Demeter, Bioland and Naturland publish negative lists with known CMS hybrids on a regular basis. Numerous cabbage and forcing chicory varieties are listed there.

## Detection Methods for CMS hybrids

The so called ogura cytoplasm is used primarily for the creation of cabbage CMS hybrids. For the generation of CMS varieties of forcing chicory a specific sunflower CMS cytoplasm is used. The genetic information in both cases is encoded in the mitochondrial DNA of the CMS cytoplasms. Genetic ID (Europe) AG has developed specific Real Time PCR based methods for the detection of ogura- and sunflower CMS DNA.
These detection systems can be used to identify CMS hybrids in cabbage and forcing chicory samples.

## Literature:

**„CMS"-Orientierungsliste 2013** www.bioland.de/fileadmin/bioland/file/bioland/qualitaet_richtlinien/CMS-Liste_2013.pdf

**OGURA, HIROSHI (1968)** Studies on the New Male-Sterility in Japanese Radish, with Special Reference to the Utilization of this Sterility towards the Practical Raising of Hybrid Seeds; Me. Fac. Agric. Kogoshima Univ. 6: 39-78

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