

What is the Cytoplasmic Male Sterility ?

(actually resulting from a cytoplasm * nucleus interaction)

1) Observation:

Male sterile plant
(ex: found in a wild ecotype)
No viable pollen

*

Male fertile plant
(ex: inbred selected from a cultivated
population)



100 % male sterile progeny

2) Genetic hypothesis:

Cytoplasmic
genotype

Cms rf rf

Nuclear
genotype

*

N rf rf



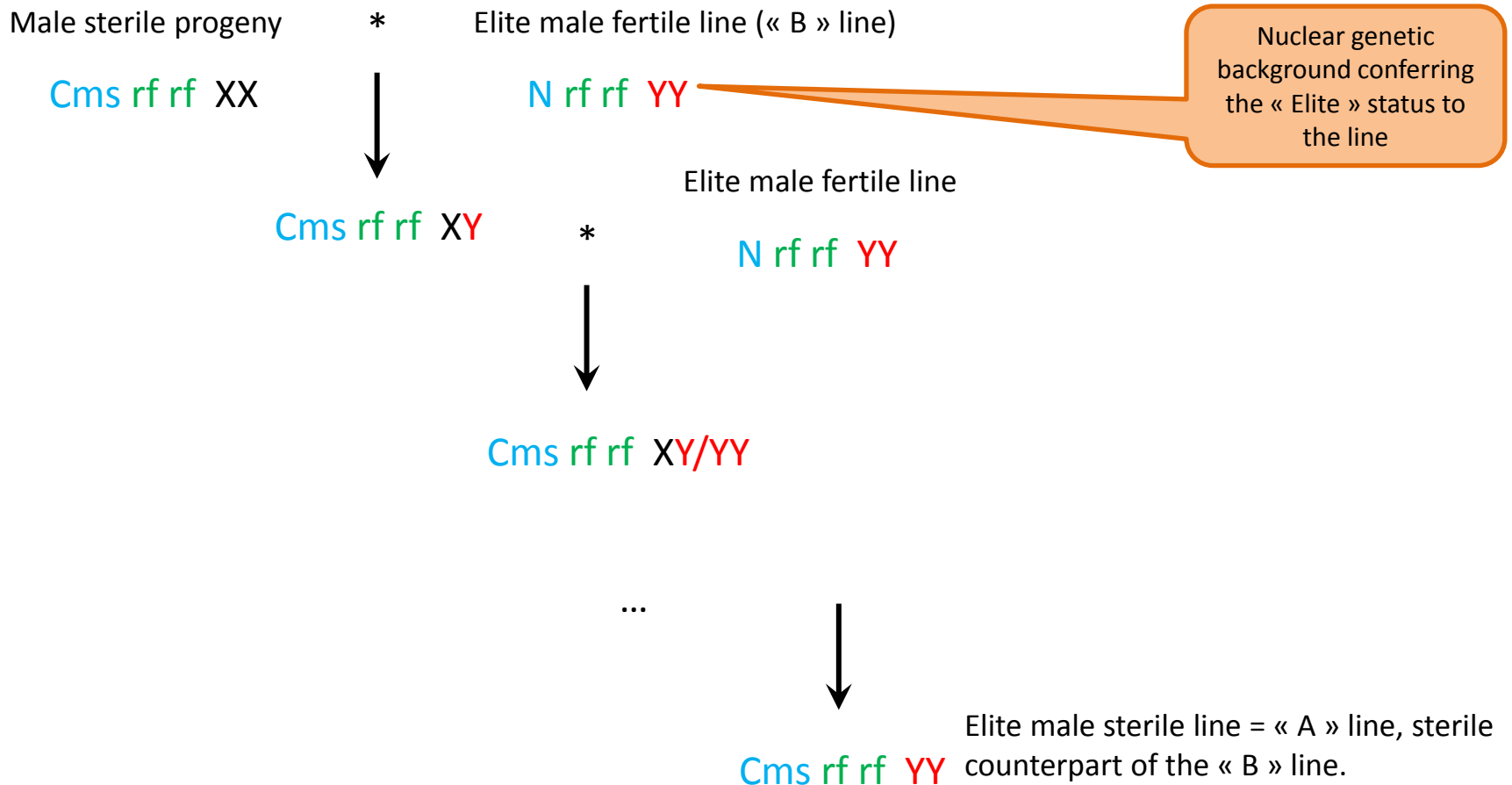
Cms rf rf

This line is
MAINTAINING the
cytoplasmic sterility:
« Maintainer » line
(called « B » type)

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3) How to develop a male sterile line from elite germplasm ? Backcrossing

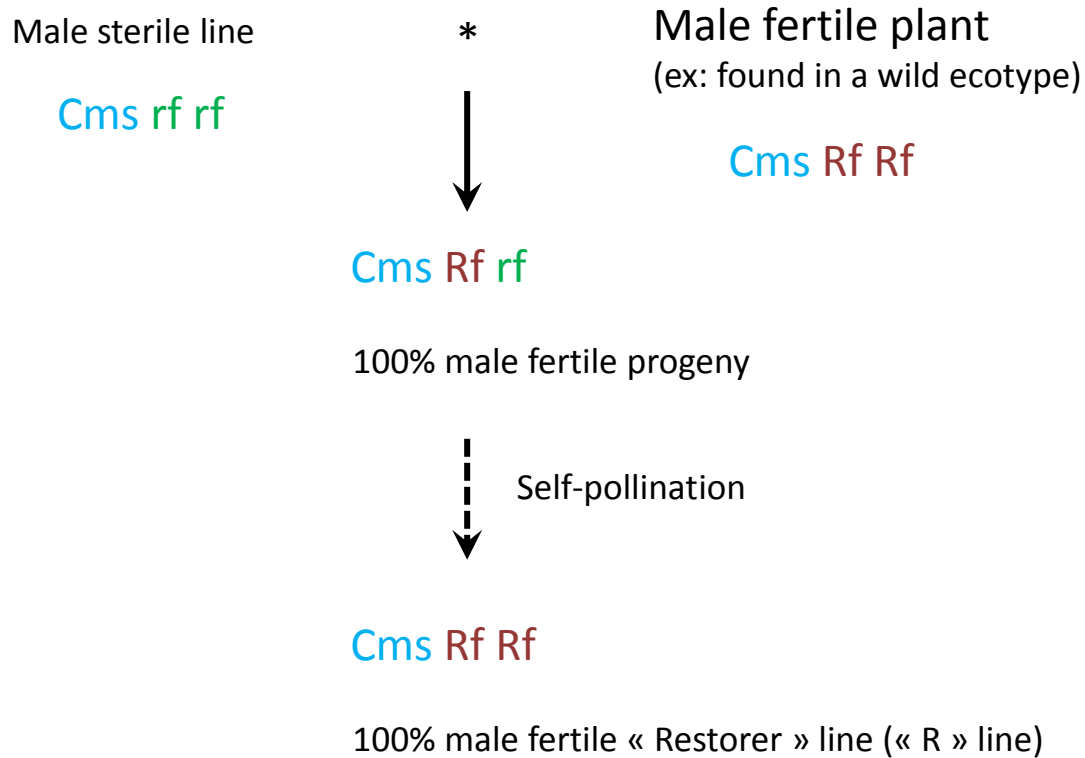


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3) How to develop a male fertile cultivated hybrid ?

➤ Looking for a line able to restore the male fertility:



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3) How to develop a male fertile cultivated hybrid ?

➤ Producing hybrid seeds using the « CMS » system



Male sterile (« A »)
Elite line

Cms rf rf XX

*



Male fertile
Restorer (« R ») Elite line

Cms Rf Rf YY



Cms Rf rf XY
100% male fertile hybrid



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4) Molecular mechanisms involved in cytoplasmic (mitochondrial) male sterility and fertility restoration:

While several chimeric rearrangements in the mitochondrial genome may result in CMS in disrupting pollen production, all the known Rf genes are belonging to the PPR (pentatricopeptide repeat) protein family.

More info:

[Schnable P.S. & Wise R.P., 1998](#), The molecular basis of the cytoplasmic male sterility and fertility restoration, *Trends in Plant Science*

[Caruso C.M. et al., 2012](#), The evolutionary ecology of cytonuclear interactions in angiosperms, *Trends in Plant Science*