Post-translational mechanism is associated with sex determination in sugar beet plant

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Sugar beet (*Beta vulgaris* L.) is usually hermaphrodite, whereas pollen sterile plants are also often observed. They are considered as functional females and have been utilized in the production of F1 hybrids that are expected to express hybrid vigor, a plant breeding procedure known as hybrid breeding. For commercial production of F1 hybrid seeds, female has been used as seed parent because they cannot self-pollinate. Almost all the sugar beet varieties are F1 hybrids, therefore it is important to investigate the mechanism of sex determination in sugar beet.

Pollen sterility is caused by sterilizing factor in mitochondria while it is repressed by nuclear *restorer-of-fertility* (*Rf*) gene. Genetic research on *Rf* revealed that *Rf* encodes uncharacterized gene resembling OMA1, whose product is suspected to bind with target protein according to a study in yeast. We thought that such binding activity, if any, may be associated with the mechanism of suppression of feminization factor by *Rf*.

Immunoprecipitation using anti-RF antibody revealed that RF protein binds to preSATP6, a protein unique to sterility-inducing mitochondria. Analysis of mitochondrial protein complex of sugar beet plant and transgenic suspension cells using blue-native polyacrylamide gel electrophoresis showed that the higher-order structure of preSATP6 complex was altered by *Rf* but not by recessive *rf* which cannot restore male fertility. Thus, post-translational regulation is associated with fertility restoration in sugar beet, and certain structure of preSATP6 complex may be essential for pollen sterility. The question how preSATP6 complex lead to male sterility should be investigated.