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Downregulation of tobacco ADP-glucose pyrophosphorylase gene *NtAGP* arrests the expansion growth of corolla lobes and leads to phenotypic changes in petal limbs

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ADP-glucose pyrophosphorylase (AGPase) genes have been extensively demonstrated to play a pivotal role in starch biosynthesis in various starch-accumulating tissues. Its role, however, in flower development has never been determined. In this study, we characterized the role of *AGPase* in the growth of floral organ, especially petal. A tobacco *AGPase* cDNA (*NtAGP*) was isolated from a cDNA library constructed with flower bud. *NtAGP* was highly expressed throughout flower bud development, from young bud (<1cm) to open flower. Its expression was high in sepal, moderate in carpel and stamen, and low in petal. Genomic Southern analysis revealed that *NtAGP* is encoded by two independent loci. In vivo targeting experiment with tobacco protoplasts showed that *NtAGP* was localized to chloroplast. To determine the function of *NtAGP* in flower development, we generated antisense transgenic tobacco plants. *NtAGP*-antisense plants produced flowers with abnormal petal limbs in that expansion growth of corolla tips was terminated earlier, resulting in petal limbs of distinctive corolla lobes. Microscopic observation of the limb region identified that cell expansion was limited in *NtAGP*-antisense plants, but cell numbers remained unaltered. In *NtAGP*-antisense plants, mRNA levels of *NtAGP*, AGPase activity and starch content were lowered in sepal tissues, consequently, sucrose, glucose and fructose content was significantly reduced in petal limbs. Sucrose feeding to flower buds of *NtAGP*-antisense plants restored the expansion growth between corolla lobes, leading to petal limbs of wild type. These results suggest that *NtAGP* plays an important role in morphogenesis of petal limbs in tobacco through synthesis of starch in sepal, the main carbohydrate source for expansion growth of petal.

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**Mapping of new complementary recessive genes
for hybrid breakdown in rice**

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