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THE ROLE OF ta-siRNAs IN MAIZE PLANT DEVELOPMENT

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Plants produce a variety of small RNAs (sRNAs), including microRNAs (miRNAs), small interfering RNAs (siRNAs) and *trans*-acting siRNAs (ta-siRNAs). Members of these classes act as endogenous regulators of gene activity and target the expression of different genes**.** Ta-siRNAs arise from specific *TAS* loci and in *Arabidopsis* different TAS gene families have been characterized, among them the *TAS3* family, whose products target the *AUXIN RESPONSE FACTORs* (*ARFs*) genes.

The ta-siRNAs biosynthesis starts with the transcription of the *TAS* genes, whose transcripts are processed by miRNA. The cleavage products are bound by a SUPPRESSOR OF GENE SILENCING (SGS3), converted into dsRNA by an RNA-DEPENDENT RNA POLYMERASE (RDR6) and subsequently processed by the DICER-LIKE4 (DCL4) into the 21 base-pair siRNAs. The 21 base-pair siRNAs guide the cleavage of target transcripts. For the *TAS3* ta-siRNAs, the miRNA-directed cleavage of the target transcripts is mediated by a specialized ARGONAUTE, AGO7.

ta-siRNAs belonging to the TAS3 family play a crucial role in plant development. In *Arabidopsis* they are involved in the juvenile-to-adult vegetative phase change, in the development of lateral roots and in the establishment of the leaf polarity.

In maize the *leafbladeless1* and *raggedseedling2* genes have been identified as the orthologues of *SGS3* and *AGO7* respectively. In this species, as well as in rice, this pathway is also involved in the meristem maintenance and formation. For a deeper comprehension of the role exerted by ta-siRNAs in the maize plant development we are performing a functional study of the *shootmeristemless1* (*sml1*) gene, whose product corresponds to the *Arabidopsis* DCL4. Depending on the genetic background, mutations in the *sml1* gene cause the complete deletion of the apical portion of the shoot and of the shoot meristem or lead to the formation of plants with several developmental abnormalities.

Our analysis is focused at different processes, such as the formation of seminal and lateral roots, the establishment of leaf polarity, the transition from juvenile to adult leaf and the organization of leaf epidermis. Data will be presented on the comparison between wild-type and mutant tissues at different developmental stages.