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ZmPIN1 GENES, POLAR AUXIN TRANSPORT AND ORGAN DIFFERENTIATION IN MAIZE

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The Shoot Apical Meristem (SAM) produces organs in a stereotypic fashion, following a highly regular pattern. This process, called phyllotaxis, has been shown to involve auxin, which is actively transported from cell to cell by influx (AUX/LAX proteins) and efflux membrane carriers (PIN proteins). Current hypotheses propose that in the L1 layer, at the meristem surface, PIN proteins create patterns of auxin gradients that, in turn, create patterns of gene expression and morphogenesis. These hypotheses are entirely based on work in *Arabidopsis thaliana*. Although several homologs were cloned in monocots only one, *OsPIN1,* has been functionally characterized in *Oryza sativa*. So far, there are no published studies concerning the role of auxin transporters and auxin fluxes in patterning of monocotyledonous species.

We identified three novel putative orthologs of *AtPIN1* in maize and analyzed their expression pattern during vegetative and reproductive development. Our results indicate a diversification of the expression domains of the three genes and a splice variant detectable in maize tissues is still currently under investigation. The transcripts localization analyzed by *in situ* hybridization was complemented by immunolocalization assays using an AtPIN1 antibody, which identified polarly localized proteins in maize tissues, confirming the conserved nature of auxin transport-driven patterning. Interestingly ZmPIN1 proteins are almost exclusively localized in the inner meristematic cells of SAM, tassel and ear. In contrast to, or in complement of what was shown in Arabidopsis, these results point at the importance of internally located cells in auxin transport during primordia and axillary meristems formation in maize. Our results suggest the fascinating possibility that, in both Arabidopsis and maize, only part of the PIN patterns has been revealed so far and that both internal and surface cell layers play a role in auxin distribution. In this case unknown ZmPINs may be L1-specific; alternatively, monocotyledonous and dicotyledonous species could have developed different strategies to redistribute auxin. To evaluate these hypotheses we are using the *ZmPIN1* sequences to complement the Arabidopsis *pin1* mutant.

The ZmPIN1 proteins localization pattern was also analyzed in the *barren inflorescence2* maize mutant. In severe alleles of *bif2* the tassel and ear present altered ZmPIN1 expression and localization patterns. This suggests that BIF2 is important for PIN proteins distribution and could play a role in the establishment of polar auxin fluxes in the maize inflorescence, indirectly modulating the process of axillary meristem formation and development of reproductive organs. Other maize mutants are under investigation to assess the interactions and the hierarchical relationships between ZmPIN1 and genes controlling meristem patterning. Auxin transport and accumulation are analyzed using an anti-IAA antibody.