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Poster Abstract – A.14

AUXIN ROADS AND PLANT ARCHITECTURE: ZmPIN1 PROTEIN LOCALIZATION STUDIES IN MAIZE

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Modifications in plant architecture have been crucial to the domestication of wild species. For example the domestication of maize from the wild grass teosinte was accompanied by major morphological modifications in both vegetative and reproductive structures. In particular the architecture of the shoot system affects the plant's light harvesting potential, the synchrony of flowering and seed set, and finally the reproductive success.

The plant hormone auxin regulates a wide variety of processes, including embryogenesis, all type of organogenesis, vascular tissue differentiation, root meristem maintenance, root elongation, apical dominance and tropic growth responses to environmental stimuli. In particular polar auxin transport (PAT) is implied in lateral organ initiation at the SAM, where it determines the position of flowers and leaves around the inflorescence stem. This transport is established and maintained by the member of two gene families: the *PIN* and *AUX/LAX* families. It has been shown that the polar localization of PIN auxin efflux carriers correlates with the direction of auxin transport and with the local accumulation of auxin in adjacent cells, suggesting that PIN polarity drives the direction of intercellular auxin flow. In addition the polar localization of PIN auxin efflux carriers changes in response to developmental and external cues in order to channel auxin flow in a regulated manner for organized growth.

In *Arabidopsis thaliana* several genes regulating the polar targeting of PIN proteins have been identified: AtPIN1 basal localization is mediated by the GNOM ADP ribosylation factor/ guanine nucleotide exchange factor (ARF/GEF) that functions in endosomal vesicle formation, while PINOID, a serine/threonine protein kinase, controls the polarity of PIN localization by direct phosphorylation of specific PIN residues. Furthermore, PIN protein sequence itself contribute to the control of polar PIN polarization thank to the presence of sequence-specific signals. Auxin itself also modulates the expression of subcellular localization of PIN proteins, contributing to a complex pattern of feedback regulation.

During our studies on the role of maize *PIN1* orthologous genes during endosperm and embryo development we observed different ZmPIN1 proteins localization pattern in different tissues. ZmPIN1 proteins mark, without any evident polarization, all the cell plasma-membrane of the endosperm transfer cell layer, while, in the embryo-surrounding region, ZmPIN1 proteins are exclusively localized in cytoplasmatic endo-vesicle. On the contrary, ZmPIN1 proteins are polarly localized in the embryonic root, hypocotyl and at the level of the SAM where a new leaf primordium is formed. To better understand the mechanisms underlying plasma-membrane insertion of ZmPIN1 proteins we analyzed the cell membrane targeting ZmPIN1::GFP fusion constructs in homologous and heterologous systems by maize and tobacco protoplast transient transformation and tobacco leaf agroinfiltration. In addition a maize ZmPIN1a::YFP reporter line is

under investigation. Preliminary results let us hypothesize that the three ZmPIN1 proteins may have different plasma-membrane insertion ability and may be subjected to different regulation pathways, in order to allow specific pattern of tissues and organ differentiation.