COTTON Innovate

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New Year Celebrations at CICR

CICR welcomed the New Year with bliss and cultural program was organized at CICR, Nagpur in a groove among the teakwood trees. All the staff members participated in the celebrations. Dr. K. R. Kranthi, Director, CICR, presided over the function and Dr. C. D. Mayee, former ASRB chairman was the chief guest. Director, CICR and the chief guest extended New Year wishes to the CICR family. All the staff members joined in the celebrations. Head, CICR, RS, Sirsa extended the best wishes to each and everyone for a happy and prosperous new year-2015. He also discussed about the developmental activities to be undertaken at the regional station as the EFC approval of 12th plan has been received. In order to bring awareness among ICAR employees and general public about the cotton Mission, Human Chain Formation was done at the end of the program.






LITERATURE SCAN

Stomatal Role - Genesis of Cellular and molecular insights

Plants have evolved stomata-cellular structures in the plant epidermis structures which provide protection from the adverse conditions and harmful UV rays, permitting gas exchange for photosynthesis and transpiration to trigger water movement from the soil to the above ground plant. A stoma consists of a microscopic pore, surrounded by a pair of guard cells, which open and close upon sensing environmental signals such as drought, light and CO2 concentrations. Torii (2008) has traced cellular processes of stomatal development with emphasis on *Arabidopsis*, the model plant.

Arabidopsis stomata are typically found in complexes known as "anisocytic complexes" with three subsidiary cells generated through stereotypical cell division pattern(Esau,1977) . Stomatal development rises embryonically with the asymmetric divisions of populations of protodermal cells termed as meristemoid mother cells (MMC). This asymmetric cell division evolves into daughter cells with distinct fate. The larger daughter cell differentiates into an epidermal pavement cell known as meristemoid , possesses stem cell like characteristics as it continues to divide asymmetrically to renew itself into distinctly three rounds. The repeated asymmetric division of meristemoids is hereafter referred to as amplifying asymmetric division. There is an increase in the number of cells which are termed as Stomatal Lineage Ground Cells (SLGC). They are also referred to as subsidiary cells.or pavement cells in literature. Stomata are separated by at least one cell obeying the postulated 'one cell spacing rule". Proper spacing of guard cells ensures critical physiological functioning of stomata. Since these guard cells must exchange water and ions (e.g.K^+ and Cl^-) with surrounding subsidiary cells in order to open and close. It adopts the rule mentioned above to avoid stomatal cluster formation indicating the presence of cell-cell communication. Plants adjust stomatal density as per environmental fluctuations viz., light, humidity, drought, ozone level and atmospheric CO_2 concentrations. Stomatal patterning at the molecular level has revealed the role of some specific genes injvolved in signal transduction. They are TOO MANY MOUTHS (TMM), STOMATAL DENSITY and DISTRIBUTION(SOD), YDA (YDA). Three ERECTA family genes viz., ERECTA LIKE 1 (ERL1) and ERECTA LIKE 2 (ERL 2). Loss of functions of these genes express clustered stomata, pleiotropic, disrupted embryo patterning, severe dwarfism, deviated floral patterning , male and female sterility. Two genes KNOLL and KEULE express abnormal morphology; cyd 1, the cytokinesis defective mutant forms abnormal guard cells. Recent discoveries of specific kinases viz., At MPK3/6 and AtMPK4/5 acting as non redundant negative regulators of stomatal differentiation. has thrown new sights in stress – induced signaling pathways. The discovery of HIC (HIGH CARBON-DI-OXIDE GENE) expression under elevated CO2 level with expression of high stomatal density (app.40% increase.) has been quite vital to understand the role of stomata in this environmental cue. HIC is expressed specifically in developing guard cells . Two more epicuticular genes viz., CER 1 and CER 2 were found to confer increase in stomatal density under ambient Co2 levels. Unlike HIC gene they affect wax composition in the entire epidermis , including pavement cells.

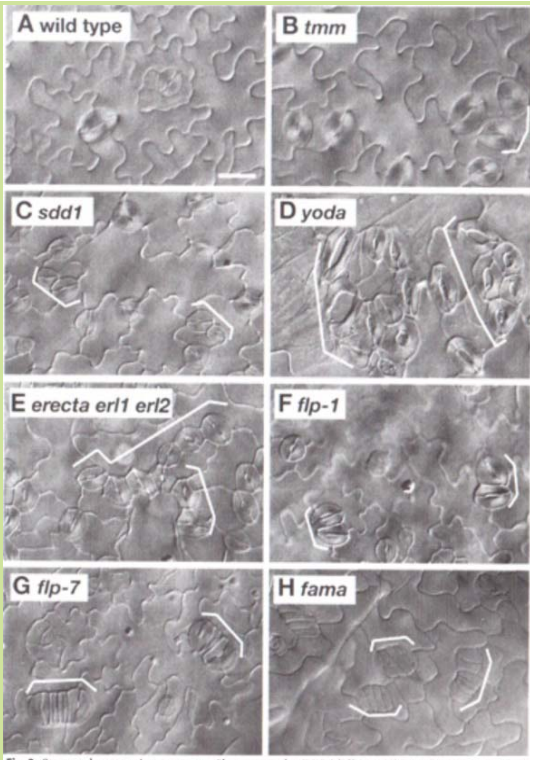

Fig. 2 Stomatal patterning mutants. Shown are the DIC (differential interference contrast) microscopy images of the abaxial rosette leaf epidermis of: **A** wild type; **B** *tmm*; **C** *sdd1*; **D** *yoda*; **E** *erecta erl1 erl2*; **F** *flp-1*; **G** *flp-7*; and **H** *fama*. Images are taken under the same magnification. A *scale bar* = 20 μm

Again the discovery of loss of mutations in the genes SPEECHLESS (SPCH) and MUTE and FAMA in different steps of stomatal differentiation have led to the understanding of the lineage of stomtal differentiation processes. They are directed by the sequential actions of the three " key switch" Bhlh genes : SPCH at initiation (from meristemoids to GMCs) , MUTE at precursor differentiation (from meristemoids to GMC) and FAMA at terminal differentiation (from GMCs to guard cells). The findings infer a parallel relationship between stomatal cell-type differentiation and muscle –and neuron cell-type differentiation in animals.

Literature Source

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Contributed by: Dr. T.R.Loknathan, Principal Scientist, Crop Improvement Division, CICR Nagpur.

Produced and Published by : Dr. K. R. Kranthi, Director, CICR, Nagpur
Chief Editor : Dr. Nandini Gokte-Narkhedkar
Editors : Dr. J. Annie Sheeba, Dr. Vishlesh Nagrare, Dr. J. Amudha, Dr. M. Saravanan
Media Support & Layout design : Mr. M. Sabesh
Production Support : Mr. Sanjay Kushwaha

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Central Institute for Cotton Research
Post Bag No. 2, Shankar Nagar PO, Nagpur 440010
Phone : 07103-275536 Fax : 07103-275529; email: cicrnagpur@gmail.com