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Floral bud distortion: insights of peculiar floral malady prevailing in Indian soybean (*Glycine max* L.)

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Siphonogamy is a key event in reproductive course of plants which has been extensively studied in past years. Here, we described a peculiar, often harmful disorder in soybean leading to significant yield loss in India. To determine prevalence of floral bud distortion, extensive random survey was undertaken in soybean growing central India (kharif-2010, 2011). Incidence of the disorder was ranged from 2.0 to 11.6% and severity from 2.0 to 90.0%. The affected plants irrespective of genotypes were found to have either no or deformed pods, distorted flowers, and they remained green after maturity. Diagnosis of symptoms revealed presence of Tobacco streak virus (TSV), Groundnut bud necrosis virus (GBNV) and phytoplasma. Cytological studies showed reduced number of pollens with structural abnormality and sterility in symptomatic plants. Biochemical analysis showed significant increase in carbohydrate, protein along with chlorophyll content index in symptomatic plant. Molecular characterization, cDNA-decamere and cDNA-SCoT marker were exploited to determine differentially expressed genes in response to abnormality. Resulting differentially expressed-transcript derived fragments were characterized in-silico. While understanding gene expression networks by transcriptome sequencing (Illumina HiSeqTM2000), over 70 gene models were identified with highly differentiated expression exclusively in floral developmental stages. These experiments revealed alterations in expression of various genes associated with the abnormality. These genes are directly or indirectly involved in plant development

through various pathways like hormone regulation (Auxin Response Factor-9), plant morphology (Forkhead-associated), embryogenesis (isoaspartyl peptidase/L-asparaginase), and fertility restoration (pentatricopeptide repeat-containing). Amongst uncharacterized fragments in symptomatic plants, one down regulated which localized at cytosol and reported for carbohydrate degradation. Two were up regulated and localized at nuclear regions, showing relevance with serine protease inhibitor-7 (biotic stress protection) and another LEUNIG (transcriptional repressor subunit), is involved in regulation of floral homeotic genes responsible for pollen and ovule development.