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ABSTRACT BOOK

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AAGB/FT-14: Identification of Genomic Regions and Candidate Genes for High Resveratrol Content in Groundnut

Madhvi Sharma[1], Arun K. Pandey[1], Khaja Mohinuddin[1], H.V. Veerendrakumar[1], Sunil S. Gangurde[1], Sandip K. Bera[2], Kuldeep Singh[1], Sean Mayes[1] and Manish K. Pandey[1]*

[1]Center of Excellence in Genomics & Systems Biology (CEGSB) and Center for Pre-Breeding Research (CPBR), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru-502324, Hyderabad, India
[2]ICAR-Indian Institute of Groundnut Research, Junagadh-362001, Gujarat, India

*Correspondence: manish.pandey@icrisat.org

Groundnut (*Arachis hypogaea* L.) is a vital oilseed legume grown mainly in Asia, Africa, and America which is a good source of amino acids and nutrients as well as some useful phytochemicals such as folic acid, tocopherol, flavonoids, and resveratrol. Resveratrol is a potent antioxidant that inhibits reactive oxygen species, offering potential medicinal benefits such as weight loss, anticancer, antimicrobial, anti-inflammatory, immunomodulatory, and cardioprotective effects. A mini-core collection of 184 accessions has been used in this study to identify genomic regions, candidate genes and superior haplotypes for high resveratrol content in groundnut. Phenotypic evaluations conducted over two consecutive seasons revealed these genotypes ICG8760, ICG11426, ICG76, ICG9905, and ICG7243 exhibiting high concentrations of resveratrol measuring 787.86 µg/kg, 1635.14 µg/kg, 2737.00 µg/kg, 2796.20 µg/kg, and 3134.71 µg/kg, respectively. A GWAS analysis with a 58K "Axiom_*Arachis*" SNP array identified 12 significant marker-trait associations (MTAs) across two growing seasons. Additionally, whole-genome re-sequencing (WGRS) revealed 21 MTAs in season 1 and 17 MTAs in season 2. Interestingly on chromosome Ah02/A02 and B02 consistent markers have been identified with both 58K and WGRS analysis. Candidate genes identified include *beta glucosidase 11, cytochrome C oxidase assembly protein COX15, Protein kinase family protein, Transcription factor EF1B, Zinc ion binding protein* involved in resveratrol biosynthetic pathway. Moreover, genetic analysis reveals substantial phenotypic variation in resveratrol content, with *beta-glucosidase 11*-related SNPs explaining up to 91.97% of the variation, suggesting key genetic contributors to resveratrol biosynthesis. The identified MTAs will enable the identification of genomic regions, candidate genes, and desirable haplotypes for introgressing genes responsible for high-resveratrol content into elite varieties, supporting advancements in groundnut breeding programs.

Keywords: Resveratrol, groundnut, GWAS, Mass spectrometry, Antioxidant, Candidate genes