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Diversity Analysis of *Physalis Peruviana* Collected from Different Locations in India

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Domestication of wild/weedy species which are nutritionally sound, environmentally well adapted and locally available may go a long way in alleviating malnutrition and ensuring food security with dietary diversity. *Physalis peruviana* L. is common weed found mostly in non-framing lands. *Physalis peruviana* is mainly known for its medicinal and nutritional values of fruits. The main aim of the study was to assess the nutritional potential of *P. peruviana* which can be utilized against malnutrition in India or elsewhere. Extensive surveys across the agro-climatic zones of India were conducted to collect the different accessions. Out of these, twenty accessions were used to analyse the morhpo-physiological, nutritional and molecular diversity. Vast variation in morphological and physiological traits as well as yield attributes was noticed. Considerable variation was evident in gas exchange parameters, shape, colour and size of fruits. Molecular diversity analysis using 42 RAPD primers revealed divergence among tested entries. Fruits are rich source of minerals, vitamins and β-carotene. In yield trial, selected accessions of *P. peruviana* yielded upto 10 t/ha fresh fruits which at a prevailing market price may prove very remunerative to the growers. An innovation has been made by double planting to shorten the duration of cultivation of *P. peruviana* by 40 days enabling the plants to complete their life cycle by the end of March. Cultivation of *P. peruviana* may prove a boon in providing good economic returns to growers, and at the same time, may also help in fighting against malnutrition especially against the deficiency of β-carotene.

Keywords: β-carotene, Malnutrition, Molecular diversity

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Harnessing Benefits of Finger Millet in Combating Micronutrient Malnutrition through Genetics and Genomic Approaches

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In developing countries, 80% deaths are attributed to continuous persistence micronutrient deficiency and associated infections and chronic diseases. Traditional crops harbouring health benefitting characteristics and micronutritional richness can deliver a low cost sustainable food-based solution for nutrition and health in such countries. Finger millet, one such traditional crop grown in most marginal areas of Africa and Asia, is a rich source of health benefitting micronutrients, phytochemicals, vitamins and several essential amino acids. The objective of this work is to use advances in genetics and genomics approaches for better understanding the genetic control of these health benefitting traits and to breed them effectively into other staple crops consumed on daily basis. A set of 190 genotypes incorporating a minicore collection of finger millet together with a number of elite breeding lines has been assembled to capture and characterise entire genetic variation associated with such traits in the crop germplasm. These genotypes have been extensively characterised for diversity in micronutrients (such as iron, zinc, calcium, magnesium, sodium, and potassium), protein and anti-nutrients (phytate and oxalate). Large-scale GBS performed on this association panel has generated 156,157 SNPs which are being used in genome-wide association studies. Our work has identified a number of genomic regions in finger millet associated with both the health benefitting traits as well as with other factors that affect their bioavailability. This work will significantly contribute in developing means of assessing how such genetic variations are distributed in other staple crops.

Keywords: Finger millet, Micronutrients, Health benefitting traits, Genotyping-by sequencing, Genome-wide association study