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Micronutrient biofortification in crop plants to alleviate its malnutrition in India

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The vitamin A, iodine, iron (Fe), and zinc (Zn) deficiencies affect over half of the world's population, mainly in south and south east Asia and Africa. The Fe deficiency affects preschool children, impair physical and mental growth, however, Zn deficiency hamper growth and development destroying immune systems and in infants diarrhoea and pneumonia. These are mainly due to intake of food crops deficient in these micronutrients grown on deficient soil. In crop plants, deficiency of Zn has been noticed in 50% soils and Fe deficiency is most common on calcareous and alkaline soils in India. Progress has been made to control micronutrient deficiencies through supplementation and food fortification, but need food based solutions.

Biofortification is the process of enriching the nutrient content of staple crops and current strategies are mineral fertilization, breeding and transgenic approaches. Micronutrient concentration and genetic diversity has been explored in many crops. The leafy vegetables having higher bioavailable Fe and other micronutrients are better option. The high Zn containing wheat, rice, sorghum, groundnut and many other crop cultivars have been identified. The groundnut with its high-energy, protein and minerals has unique consumption, right from raw and fortification with cereals as it is a good source of Fe and Zn. From more than 100 groundnut cultivars, the high Zn (>60 ppm) and Fe (>100 ppm) densities in their seed have been identified. Interestingely the foliar application of zinc sulphate and iron sulphate further increase the Zn and Fe contents in seed suggests that, making full use of these fertilizers can provide an immediate and effective option to increase grain Zn and Fe and productivity in most of the crops and combat the Zn and Fe malnutrition in rural India.

Biography

Amrit Lal Singh, did his education from BHU Varanasi, joined ICAR in 1985 as an ARS in Plant Physiology, promoted to Senior and Principal Scientists and Director, Directorate of Groundnut Research, PB 5, Junagadh-362001. He is a pioneer in "Mineral nutrition and stress tolerance and micronutrient bio-fortification in crops" and extended his unstinted services on sustainable food and nutritional security of India for 33 years. Dr Singh is life member of more than a dozen of scientific societies including ISPP, SPPB, SBB, ISSS, ISGPB, ISOR, ISCA and published more than 200 research papers, covering 25 book chapters/reviews, seven books. He is Fellow of ISPP, New Delhi and ISOR, Hyderabad, and recipients of AAAS Junior (1990) and J.J. Chinoy Gold medal (2011) of ISPP and S.N. Ranade Award (2000) IMT, Pune. Dr Singh is widely travelled in India, visited China, Japan, Tanzania, Turkey and USA and worked as referee of the AAB, UK, Australian J Crop Science, JPN, USA, JPNSS, Germany. he is editor of "Recent Advances in Crop Physiology" and served as a Vice-President (2012) of ISPP.

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