Micronutrient Biofortification in Rice through New Breeding Techniques (NBTs): Bangladesh Perspective

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Micronutrient deficiencies can cause serious health issues in developing countries such as most of the Asian and African countries, where millions of people are already suffering from inadequate micronutrient intake. In Bangladesh, micronutrient deficiency is found to be severe due to low income, food habits, and rice-based staple food consumption (rice has an insufficiency of different types of vitamins and minerals). To prevent micronutrient malnutrition, supplementation has been employed but failed to reach the goal so far. Agronomic and genetic biofortification has the potential to address micronutrient deficiencies. Biofortification in rice grain is a convenient and affordable way to supply the desired micronutrients. The development of micronutrient-rich popular rice cultivars through conventional breeding is currently being harnessed to increase their micronutrient contents. However, conventional breeding faces a lot of issues and to overcome these hurdles, genetic engineering and genome editing have emerged as promising tools of micronutrient biofortification in rice.. The authors conducted the research of relevant literature in order to explore the potential strategies, information, and requirements for this review. The sources, functions, and requirements of iron, zinc, vitamin-A, vitamin-B1, vitamin-B9, and betanin in rice and their biofortification through conventional breeding, genetic engineering,

and genome editing including their promises and hindrances, have been highlighted in this study. New breeding techniques are timely alternatives for developing nutrient-rich rice cultivars to eliminate hidden hunger and poverty in Bangladesh.

Keywords: Biofortification, genome editing, iron, zinc, micronutrient, rice, vitamin-a.