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Bora Rice: A Promising Pharmaceutical

Hemanta Kr. Sharma*

Department of Pharmaceutical Sciences, Dibrugarh University, Dibrugarh, Assam, India

***Corresponding author:** Dr. Hemanta Kr. Sharma, Department of Pharmaceutical Sciences, Dibrugarh University, Dibrugarh-786004, Assam, India, E-mail: hemantasharma123@yahoo.co.in

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Editorial

Rice belongs to the genus Oryza. The genus Oryza contains 25 recognized species, of which 23 are wild species and two; *O. sativa* and *O. glaberrima* are cultivated. *O. sativa* is the most widely grown of the two cultivated species. It is grown worldwide including in Asian, North and South American, European Union, Middle Eastern and African countries. However, *O. glaberrima* is grown solely in West African countries [1-3].

India has a long history of rice cultivation. Within the country, rice occupies one quarter of the total cropped area, contributes about 40 to 43% of total food grain production and continues to play a vital role in the national food and livelihood security system. Rice has many ecotypes or cultivars adapted to various environmental conditions. Rice as food, is a nutritious cereal crop, used mainly for human consumption. It is the main source of energy and is an important source of protein and provides substantial amount of the recommended nutrient intake of niacin. However, rice is very low in calcium, iron, thiamine and riboflavin and nearly devoid of beta-carotene [4]. In addition to the use as food, rice is also used traditionally for the treatment of various diseases and disorders. In this context, on the value of rice, the great sage Parashara in the Sanskrit (an ancient language of India, the language of the Vedas and of Hinduism) text Krishi-Parashara has aptly written in praise of this food grain: “Rice is vitality, rice is vigor too, and rice indeed is the means of fulfillment of all ends in life. All, Gods, demons, and human beings subsist on rice” [5]. Ayurvedic practitioners prescribe different types of rice for various ailments such as burn, piles, anemia, fracture, chest pain, fever, diarrhea, vomiting, metrorrhagia, stomach ulcer, aphrodisiac, snake bite, psoriasis, polio etc. [6].

Among the rice varieties, there are certain varieties which exhibit glutinous properties. There are about 41 traditional glutinous rice varieties, classed as Birain, Bora and Chokuwa group, in Assam, a state of North-East India. Shaptadvipa and Sarma [7] studied the extent of genetic diversity based on DNA polymorphism with RAPD technique with the seeds of 41 indigenous glutinous rice germplasm collected from two diverse agro-climatic zones prevailing in the Brahmaputra valley and the Barak sub-basin of North-East India.

Rice starch has been extensively studied by various workers. Starch is produced in plants and is a mixture of linear amylose (poly-α-1,4-D-glucopyranoside) and amylopectin (poly-α-1,4-D-glucopyranoside and α-1,6-D-glucopyranoside). Rice starch is composed of amylose and amylopectin. There are variations in the apparent amylose and amylopectin content in those glutinous rice varieties. Bora rice starch is mainly composed of amylopectin [8]. Amylopectin is a highly-branched molecule, consisting of three types of branch chains. A-chains are those linked to other chains (B- or C-) by their reducing ends through α-D-(1→6) linkages, but they are not branched themselves. B-chains are those linked to another B-chain or a C-chain, but B-chains are branched by A-chains or other B-chains at O-6 of a glucosyl unit. Each amylopectin molecule has only one C-chain, which carries the sole reducing end of the molecule. The digestive enzyme can act only on the branched portion of amylopectin. The hydrolytic reaction of amylopectin with β-amylase results only 50% of maltose formation indicating blocked sites in the structure of amylopectin [9]. The rice variety containing high amount of amylopectin (Bora rice) possesses adhesive properties and thus can be utilized alone or in combination with plant mucilage in suitable proportion for development of matrix type drug delivery system [10].

Bora rice has been used either as flour or the starch isolated from it for development of drug delivery devices. There are several reports on the use of Bora rice in the development of drug delivery systems. The rice flour in treated and untreated form was studied for use as directly compressible agent [11]. Earlier, Sachan and Bhattacharyya [12] studied the drug release from controlled release hydrogel beads prepared with Bora rice starch. Ahmad and Bhattacharyya [13] studied the possibility of the rice starch for use as plasma volume expander due to the resistance towards enzymatic hydrolysis and highlighted the therapeutic advantage for using it. Bhattacharyya et al. [14] evaluated the rice starch as plasma volume expander. Ramteke et al. [15] formulated a sustained release Chitosan-Bora rice microsphere for targeted delivery of drug to the colon. Ahmad et al. developed Bora rice starch based colon targeted matrix tablet [16], compression coated tablet [17], and bioadhesive microspheres [18,19] and carried out their in-vitro and in-vivo evaluations. Study has been carried out in the formulation of spray dried microspheres using Bora rice flour [20] and also in combination with plant mucilage [10] for development of controlled drug delivery system.

Thus, the unique property of Bora rice can be utilized for development of drug delivery devices. Similar traditional food can also be addressed for utilization as pharmaceuticals which would provide value addition to these natural materials and would also have impact in the economy of the respective region (s).

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