

PAS 234:2021

Cereals and cereal products – Iron enriched bean and pearl millet grain – Specification



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Published by BSI Standards Limited 2021.

ISBN 978 0 539 17869 2

ICS 67.060

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Publication history

First published November 2021

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Foreword

This PAS was sponsored by the Commercialization of Biofortified Crops (CBC) Programme, which is a partnership between the Global Alliance for Improved Nutrition (GAIN) and HarvestPlus, with funding from Netherlands Ministry of Foreign Affairs and German Federal Ministry for Economic Cooperation and Development. Its development was facilitated by BSI Standards Limited and it was published under licence from The British Standards Institution. It came into effect on 30 November 2021.

Acknowledgement is given to HarvestPlus and Dr Tora Mitra Ganguli, as the technical authors, and the following organizations, which were involved in the development of this PAS as members of the steering group:

- Food Fortification Advisory Services (2FAS)
- Food and Markets Department, University of Greenwich
- Global Alliance for Improved Nutrition (Tanzania)
- HarvestPlus
- Julian Smith, Consultant
- Kenya Agricultural and Livestock Organization
- Kenya Ministry of Agriculture
- Michigan State University
- SmartFood
- United States Department of Agriculture
- Washington State University

Acknowledgement is also given to the members of a wider review panel who were consulted in the development of this PAS.

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Relationship with other publications

PAS 234 is published as one of three related publications:

- PAS 233, Zinc enriched wheat, maize and rice grain – Specification;
- PAS 235, Provitamin A carotenoids (PVAC) enriched maize grain, casava and sweet potato tubers – Specification¹⁾

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¹⁾ In preparation.

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The provisions of this PAS are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is “shall”.

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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0 Introduction

0.1 General

HarvestPlus leads and coordinates a global effort within the Consultative Group on International Agricultural Research (CGIAR) network to improve nutrition by promoting biofortified, nutrient enriched staple crops. This effort focuses on catalyzing the development, production, delivery and consumption of foods that are rich in essential micronutrients, including vitamin A, iron and zinc. In May 2018, HarvestPlus and GAIN launched a landmark partnership to accelerate progress towards improving access to biofortified seed, grain and foods via commercial channels with the Commercialisation of Biofortified Crops (CBC) programme.

The standards outlined in the PAS are meant to enable easier procurement of minimal (postharvest cleaning and removal of agricultural remains) or unprocessed beans and pearl millets at the wholegrain stage in the supply chain. Processing after this point, which may remove part of the grain and reduce micronutrient content, is not covered by this PAS. Further processing and promotion to consumers is not covered.

0.2 Iron

This PAS will focus on crops enriched with iron through biofortification technology. Iron deficiency is one of the most common micronutrient deficiencies in the world and a major contributor to anaemia, especially among young children and women of reproductive age. Nearly 42% of children under 5 years and 40% of pregnant women worldwide are anaemic. [1]. Iron is an essential micronutrient found most abundantly in the blood cells of the body. It is important for several functions in the body, including:

- a) cognitive processing;
- b) immune response competence;
- c) physical work endurance and efficiency; and
- d) red blood cell function in oxygen transport.

When consumed as part of usual daily meals, iron enriched bean and pearl millet could contribute 75 to 90 percent of daily bioavailable iron needs for women and young children.

NOTE 1 See *HarvestPlus publication, Estimated Average Requirements Provided by Biofortification [2]*.

Several factors determine the amount of iron absorbed by the body from iron enriched crops, such as average daily consumption, degree of processing, type of preparation and form of final food product, and the type of iron compound itself. Research has shown that total iron absorption (mg) from iron enriched foods is higher than that from conventional crops. This fact is further corroborated by the consistent findings that regular consumption of iron enriched crops has been shown to improve cognitive function and work performance of adolescents and young women.

NOTE 2 See *Bioavailability of iron, zinc, and provitamin A carotenoids in biofortified staple crops [3] and Food Biofortification — Reaping the Benefits of Science to Overcome Hidden Hunger — A paper in the series on The Need for Agricultural Innovation to Sustainably Feed the World by 2050 [4]*.

0.3 Rationale

Iron enriched grains and beans are visually indistinguishable from standard commercial grains and beans. To facilitate domestic, regional, and international procurement and trade of iron enriched bean and pearl millet, individuals and entities along the value chain need to have specific guidance in order to differentiate the iron content of iron enriched grains and beans. The requirements outlined in this PAS identify global standards for iron enriched crops and aim to aid the widespread adoption and scale-up of these commodities in local and global food systems.