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Effects of Processing Methods on Physico-Chemical Properties of Bio-Fortified Common Beans (*Phaseolus vulgaris* L.).

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Abstract

Common beans (*Phaseolus vulgaris* L.) play an important role in the daily diet for people in developing countries. Being highly nutritious, it has the potential to improve the dietary quality and long-term health of those who consume them regularly. Consumption of dry beans is limited due its high cooking time and the presence of anti-nutrients which interfere with the bioavailability of some essential nutrients. Oligosaccharides, including raffinose and stachyose are commonly found in dry beans and often results in flatulence in humans. The objective of this study was to determine the physico-chemical properties of two bio-fortified common bean varieties grown in DR Congo and how they are affected by different processing methods. The bean varieties (HM21-7 and Namulenga) were obtained from CIAT- HarvestPlus. Physical properties of the two varieties were determined. The effect of different soaking pre-treatments (distilled water and sodium carbonate) on the hardness of beans was also investigated. Further, the effect of soaking, cooking, dehulling, sprouting and their combinations on the chemical composition was investigated. HM21-7 was larger in size compared to Namulenga. The seed weight was 36.3 g and 32.8 g/100 seeds respectively for HM21-7 and Namulenga. The hydration and swelling coefficient of the two varieties were significantly ($P < 0.05$) influenced by the soaking solution. The appearance when soaked in sodium carbonate was darker than when distilled soaked in distilled for both the varieties. Soaking in sodium carbonate solution prior to cooking significantly ($P < 0.05$) reduced the hardness of the beans compared to the unsoaked cooked beans and beans soaked in distilled. Soaking and cooking significantly reduced the levels antinutrients in the beans. Sprouting showed the highest reduction of antinutrients level compared to other pre-treatments methods. The highest being after 3 to 5 days sprouting followed by cooking. The *in vitro* Protein Digestibility (IVPD) increased after all processing methods. Sprouting of pre-soaked seeds followed by cooking treatment provided flour of good quality that can be used to in different food formulation to add value food products. Namulenga variety is a good option for both processing and domestic use based on its short cooking time, low levels of anti- nutrients and its higher protein digestibility.

Keywords: Anti-nutrients, bio-fortified beans, *Phaseolus vulgaris*, physical properties, processing methods, protein digestibility

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