Development of Snack Foods Using Manitoba Grown Dry Beans

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Introduction

This report outlines the progress report on the first phase of project work on the development of snack foods using Manitoba grown dry beans which is divided into three phases. The first phase involves selecting popular varieties from dry bean market classes in April 2010. The goal was to objectively identify varieties with potential functional properties suitable for ingredient processing and prototype development into pulse based snacks.

Materials and Methods

For the experiment, there were nine identified market classes (Navy, Pinto, Black, Small red, Great Northern, Pink, Cranberry, Light kidney and White dark kidney) and a total of 112 varieties (dry field beans) obtained from Agriculture and Agri-Food Canada (AAFC), Morden. These samples were delivered following screening and evaluation for desired field quality characteristics by AAFC agronomists. A representative sample was obtained from 2009 harvest and supplied to the Food Development Centre (FDC), Portage La Prairie for further analysis.

All chemical, physical and functional tests such as moisture content, protein content, water binding capacity, and colour measurements were conducted on the flour samples at FDC. The nitrogen content was quantitatively measured by Dumas method and converted to crude protein (dry weight). The colour was measured by Chroma meter (model CR-400, Konica Minolta Sensing Inc.). Water binding capacity was done according to AACC method and the moisture was measured by rapid moisture analyzer, model IR 30 using infrared technology. Statistical analyses were performed on SPSS also known as Predictive Analytics Software (PASW) at FDC and SAS at AAFC.

Project Update

Beans (pulses) are well known for their balanced health components such as protein, fibre, fat, and starch as well as high levels of valuable minerals and anti-oxidants. The protein content, quality and functionality are important factors that influence bean selection for various applications. And like other pulse crops, the chemical composition, protein quality and functionality of dry beans are dependent on environmental conditions, agronomic traits and most importantly on the processing methods used to obtain or process the end product. The physico-chemical properties such as water binding capacity and emulsion capacity have been studied and linked to the improvement of quality attributes in product applications.

In commencing the project, popular market classes and corresponding varieties were obtained from AAFC. The materials came with agronomic information such as seed size, yield, and thousand seed weight. These samples were analyzed for functional, chemical and physical properties such as protein moisture, colour and water binding capacity. The information gathered was used to drive the work plan and research decisions in next phase of the project work.

A total of ten popular varieties from different market classes were selected based on their protein content and agronomic potentials. As was observed in phase one, a wide range of protein content existed within the sampled varieties. These variations may be related to environmental conditions. However, the functional properties were relatively similar in all the samples. Functional properties are suited for various processes and end product textural /sensorial qualities. The protein content will often contribute to the nutrient content in a developed product. Moreover, the available protein content and quality characteristics of the developed snack would determine the nutritional and sensory quality of the snack produced from the dry field bean varieties in the next phase.

The scope of product development will encompass several mutually dependent components and properties in order to utilize dry field beans to improve the protein content of snack foods and to address the health concerns of today's consumers. In the field, developments in dry field bean quality are characterized by industry targets such as yield, disease resistance or nutrient management. Is food product development, ingredients that deliver unique sensory attributes and functional characteristics are in demand by food processors and end users alike.

Conclusion and continuation:

Following the objective screening of 112 varieties of dry beans, and the information obtained from phase one study, a total of ten varieties were selected from various market classes for the second phase. Several dry bean samples have been milled and are currently being assessed in product development activities. The functional differences such as water binding capacity, swelling capacity and bulk density will be studied in relation to product applications. The concentrations of the bean flours (ingredients) in a blend will be evaluated in synergy with other ingredients. The challenges, quality and sensory effect of adding bean flour on the end product flavour and texture will be assessed. The results from these experiments will be transferred to the second phase and will be helpful in the development of a snack.