# Characterization of quality, bioactive and anti-nutritional compounds of pulses prepared with various cooking conditions and grown in different environments in Saskatchewan

**Dr. Elsayed Abdelaal**
Agriculture and Agri-Food Canada – Guelph Food Research Centre

| SPG Contributions | Project Status | Duration/Timeline of Project (Year to Year) | Total Project Cost |
|---|---|---|---|
| $195,080.40 | Completed | August 2015 – September 2018 | $195,081.40 |

## Project Description

To evaluate cooking quality of selected Saskatchewan pulses obtained from various environments; to identify optimal cooking time for each pulse (bean, pea, lentil), method (traditional, pressure, slow and microwave cooking) and cooking solution (water, acid, sweet and salt); to investigate impact of cooking on starch nutritional fractions (RDS, SDS and RS) and to determine differences between pulses based on their contents of starch nutritional fractions and anti-nutritional compounds; to assess anti-nutritional compounds (raffinose oligosaccharides and protease inhibitors) in cooked pulses to identify the best processing conditions; to assess health-enhancing or bioactive compounds (e.g. phenolic acids as potent antioixdants andcarotenoids) in cooked pulses to determine their potential health effects; to determine if cooking in various solutions using different cooking methods would save the amount of energy required for optimal cooking quality.

## Outcome

o A flour viscosity method using a small sample size (4 g versus 40 g) was developed and could hold a promise in testing early generations of pulses in breeding.

o Pasting peak viscosity of pulse flours also showed significant differences among pulse crops and cultivars. Peak viscosity was in the order lentils > peas > faba beans.

o Starch nutritional fractions (e.g. RDS, SDS and RS) significantly varied among pulses with cooking methods having a considerable impact on starch digestibility. Slow cooking resulted in the lowest concentration of RDS, while SDS was very high and the residual starch was higher than that of the raw material.

o Slow cooking of faba beans, peas and lentils in salt solution or water was more effective compared to the other methods in reducing flatus oligo-sugars and trypsin inhibitor without compromising quality of cooked pulses.

o Parboiling of pulses for 2 minutes prior to slow cooking as a pre-treatment resulted in improved quality of cooked pulses. This finding has not been reported before and would be used as a new approach in pulse processing.

o Phenolic acids and antioxidant properties were also different among pulses and influenced by cooking methods.

o In general, the results demonstrated that cooking conditions (cooking method and cooking solution) could significantly affect the nutritional quality of the cooked pulses to different extents."

## Research Objective

**OBJECTIVE 1**
To evaluate cooking quality of selected Saskatchewan pulses obtained from various environments.

**OBJECTIVE 4**
To assess anti-nutritional compounds (raffinose oligosaccharides and protease inhibitors) in cooked pulses to identify the best processing conditions.

**OBJECTIVE 2**
To identify optimal cooking time for each pulse (bean, pea, lentil), method (traditional, pressure, slow and microwave cooking) and cooking solution (water, acid, sweet and salt).

**OBJECTIVE 5**
To assess health-enhancing or bioactive compounds (e.g. phenolic acids as potent antioixdants andcarotenoids) in cooked pulses to determine their potential health effects.

**OBJECTIVE 3**
To investigate impact of cooking on starch nutritional fractions (RDS, SDS and RS) and to determine differences between pulses based on their contents of starch nutritional fractions and anti-nutritional compounds.

**OBJECTIVE 6**
To determine if cooking in various solutions using different cooking methods would save the amount of energy required for optimal cooking quality.