Arbeitstagung 2018, Lebensmittelchemische Gesellschaft, Regionalverband Südwest,
06.-07. März 2018, Gießen

β-ODAP and IP_6 quantification & degradation from *Lathyrus sativus* L. seed upon fermentation by supplementing *Aspergillus niger* phytase

Buta, Meseret Bekele[1], Ralf Greiner[2], Clemens Posten[3], Astrid Beinhauer[2], Shimelis Admassu[1]

1Addis Ababa Institute of Technology, School of Chemical and Bioengineering, Department of Food Engineering, P.O.B: 1176, Addis Ababa, Ethiopia.

2Max Rubner-Institut, Federal Research Institute of Nutrition and Food, Department of Food Technology and Bioprocess Engineering, Haid_und_Neu_Str.9, 76131, Karlsruhe, Germany.

3Karlsruhe Institute of Technology (KIT), Institute of Process Engineering in Life Sciences III Bioprocess Engineering, Fritz-Haber-Weg 2, 76131 Karlsruhe, Germany.

ABSTRACT

The presence of an endogenous neurotoxic non-protein amino acid, β-N-oxalyl-L-α,β-diaminopropionic acid (β-ODAP) in grass pea (*Lathyrus sativus* L.) is major limitation which affects utilization of the seed for human consumption, though highly nutritious. Furthermore, phytate (IP_6) a well-known antinutrient is present in concentration capable of hindering bioavailability of micronutrients. In this paper, β-ODAP content was assayed by the *o*-phthalaldehyde method from twenty-nine accessions of varieties in Ethiopia and a variety from Germany. IP_6 was also quantified combining AOAC procedure with HPLC ion-pair chromatography. A sample was selected to observe the effect of fermentation on the reduction of β-ODAP and IP_6 with supplementation of *Aspergillus niger* phytase. The level of β-ODAP found in twenty-nine accessions was categorized as high_(18_acces.), intermediate_(9_acces.) and low_(2_acces.) with the values from 300.5-436.3_mg/100_g, 197.8-295.9_mg/100_g and 42.0-160.2_mg/100_g respectively. The content in the German variety was determined to be 116.0_mg/100_g. *Aspergillus niger* was supplemented after knowing intrinsic content of phytase activity in raw grass pea seed (257.7_U/_kg) and the activity of the *Aspergillus niger* itself (220.0-_U/_g). Thus, dough supplemented with 1000.0_U/ml, 500.0_U/ml of *Aspergillus niger*; fresh yeast and sour dough fermented for 12hrs was evaluated. A significant reduction of both compounds was observed in all four fermentations. β-ODAP: 42.6%, 39.0%, 35.7% and 12.4% respectively. Phytate degradation was also observed with respective percentage reduction of 87.0%, 90.5%, 24.2% and 13.3% from the initial value. From these results, it can be concluded that the level of β-ODAP varies widely among genotypes and location-environments. Moreover, supplementation of *Aspergillus niger* speeds-up degradation of β-ODAP and IP_6 during fermentation.

KEY WORDS: *Lathyrus sativus* L., β-ODAP, IP_6, *Aspergillus niger*, fermentation