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EFFECT OF PRETREATMENTS, SEED CONDITIONS AND FERMENTATION TIME ON AMINO ACID PROFILE AND ANTI-NUTRIENT CONTENTS OF SOYBEANS, CHICKPEAS AND GROUNDNUTS

NURUL AKMAL BINTI TAIB

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ABSTRACT

Soybeans, chickpeas and groundnuts are known to have high nutrient content but they also contain anti-nutritional factors that prevent full absorption of nutrients into our body. The aim of this study was to evaluate the changes in amino acid composition, tannin, phytic acid and trypsin inhibitor of the three selected legumes when subjected to different pretreatment conditions. The effects of fermentation time and initial seed conditions prior to fermentation were also analysed. AccQ•Tag method using HPLC was used to monitor the amino acid profile and spectrometric method was used to analysed the anti-nutrients compound. The results obtained for the raw legumes showed that soybeans has the highest amount of total amino acids (34.64 g/100g) followed by chickpeas (25.65 g/100g) and lastly groundnuts (23.20 g/100g). Similarly, tannin and trypsin inhibitor were found significantly higher in soybeans, followed by chickpeas and groundnuts. However for phytic acid, soybeans showed the highest content followed by groundnuts and lastly chickpeas. Pretreatment conditions were found to affect the total amino acids and anti-nutrient contents. For soybeans, the amount of total amino acids was found to increase by 8.7% after soaking, reduce by 4.3% after steaming and was not affected by de-hulling. For chickpeas, total amino acids was increase after soaking by 4.1% but was decrease after steaming and de-hulling by 8% and 2.8% respectively. However for groundnuts, both soaking and de-hulling increases total amino acids by 6.9% and 4.7% respectively while steaming reduces by 8%. The effect of pretreatments on tannin content showed similar results for all three legumes. Both de-hulling and steaming showed no significant difference in reducing tannin content compared to soaking. For phytic acid and trypsin inhibitor, significantly greater reduction of both anti-nutrients was shown by steaming compared to de-hulling and soaking. The effect of fermentation time was monitored at 18, 24 and 30 hrs after the legumes were inoculated with *Rhizopus oligosporus* spores. All legumes studied showed that 24 hrs of fermentation time gave the highest total amino acids content. However for anti-nutrients compound, decreasing trend was observed with the increase of fermentation time for all tempeh legumes. The effect of initial legume conditions (whole seed, split with hull attached and de-hulled split seed) was observed at 24 hrs of fermentation time. Legume with de-hulled split seed condition showed greater amount of total amino acids followed by split with hull attached and lastly whole seed condition. For tannin content, no significant difference was observed between initial seed conditions of de-hulled split seed and seed with hull attached for soybean and chickpea tempeh. Similarly for phytic acid content, no significant difference was observed between initial seed conditions of de-hulled split seed and seed with hull attached for chickpea tempeh. For trypsin inhibitor, the initial seed conditions of chickpeas and groundnuts prior to fermentation were significant in reduction of the anti-nutrients. This study showed that the optimum fermentation time of 24 hrs is the best time to consumed tempeh and the common practice of hull removal during tempeh production can be considered as unnecessary because it does not greatly improve the amino acids content and reduces the anti-nutrients present in the tempeh produced.

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