

**ASSESSMENT OF THE DIFFERENT BIOTECHNOLOGICAL
TECHNIQUES TO SUPPRESS THE ADVERSE EFFECT
OF SOME ANTINUTRITIONAL
COMPONENTS**

By
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B.Sc. Agric. Sc. (Food Technology), Cairo University, 2003

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ABSTRACT

Rasha Kamal Mohamed: Assessment of the Different Biotechnological Techniques to Suppress the Adverse Effect of Some Antinutritional Components. Unpublished M. Sc. Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2010.

Soy bean, mung bean, kidney bean and jojoba seeds were investigated for their content of antinutritional factors (ANFs), including trypsin inhibitors, phytic acid, total phenolic compounds as well as cyanogenic glucosides in jojoba seeds. The effects of some physical treatments (e.g. soaking, dehulling and different cooking e.g. boiling, autoclaving, microwave cooking methods) and biotechnological treatments (e.g. germination and fermentation with lactic acid bacteria or *Rhizopus oligosporus*) individually and in combination on reducing ANFs were studied. Soybean contained the highest trypsin inhibitor activity (58.13mg/g) and phytic acid (35.01 mg/g) among all investigated seeds, while mung bean showed the highest value of total phenolic compounds (396.31mg/100g). Jojoba seeds contained (16.67mg/g) simmondsin. All treatments applied caused significant decreases in antinutritional factors of the tested seeds. Soaking of the seeds for different periods could lower the level of ANFs below the control value. Longer the periods of soaking caused greater losses in ANFs. Boiling caused greater losses in trypsin inhibitor activity. After 60 min. of boiling TIA was drastically decreased (4–10% residual activity) in tested seeds while the most effective treatment caused a complete inactivation of trypsin inhibitor activity for all tested seeds was after boiling for 90 min. and after autoclaving at 121°C for 10 min. Fermentation and germination individually and in combination with dehulling and cooking processes caused significant ($p < 0.05$) decreases in phytic acid content individual. The highest reduction in phenolic compounds was achieved in 72, 48 and 120 h. of germination (66.8, 45.0 and 60.8 %) for soybean, mung bean and kidney bean respectively, the same pattern was observed in trypsin inhibitor activity

for the same samples. Among the four tested strains *L. bulgaricus* and *L. acidophilus* were clearly the most effective strains for decreasing phytic acid and total phenolic content respectively, during fermentation of different legume seeds. However, *L. casei* was able to reduce simmondsin content by 18.42 % after 72 h. fermentation at 37° C. Solid - state fermentation of different seeds showed that good tempeh cake can be produced from soybean and kidney bean when inoculated with 3.22×10^5 spores/ 100 g samples. Soy and kidney beans tempeh contained significantly less amounts of ANFs than raw beans .However, fermentation with *R. oligosporus* reduced phytic acid and total phenolic by 70.0 and 92.0 % for jojoba seeds.

Key Words: Antinutritional factors, Legumes, Trypsin inhibitor, Phytic acid, Total phenolic compounds, Soaking, Dehulling, Cooking, Germination, Fermentation, Tempeh , Lactic acid bacteria.

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