STUDIES ON DISTRIBUTION AND LOCATION OF PHYTASE IN DIFFERENT SEEDS AND CEREAL GRAINS

By

EFFAT MAHDY SAYED AHMED RIZK

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Approval Sheet

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By

EFFAT MAHDY SAYED AHMED RIZK

B.Sc. (Food Science & Technology) Faculty of Agriculture, Ain Shams University, 1986

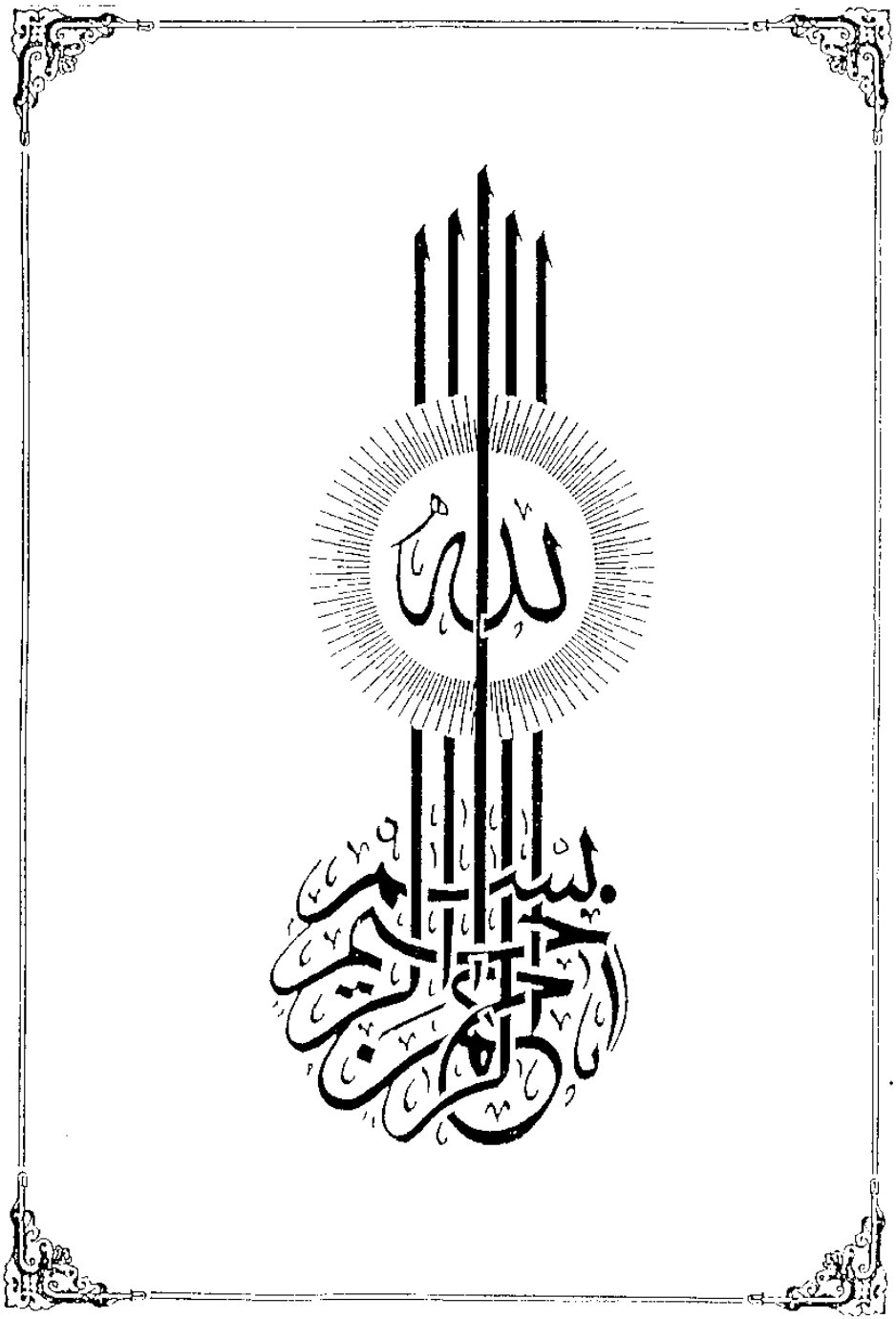
This thesis for M.Sc. degree has been approved by :

Prof. Dr. MOHAMED MAHMOD YOUSSEF
Prof. of Food Science and Technology, Faculty of Agriculture, Alex. University

Prof. Dr. MAGDA H. ALLAM
Prof. of Food Science and Technology, Faculty of Agriculture, Ain Shams Univ.

Prof. Dr. MOHAMED A. ABD ALLAH
Prof. of Food Science and Technology, Caculty of Agriculture, Ain Shams Univ.

Date of examination: 12/1/1992.



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Under the Supervision of: Prof. Dr. Mohamed A. Abd Allah
Professor of Food Science,
Faculty of Agriculture, Ain Shams University.

Dr. Magdy Gomaha El Shemy
Associate Prof., Food Science,
Faculty of Agriculture, Ain Shams University.

ABSTRACT

Phytase was extracted from whole wheat and its fractions (bran, germ, flour, semolina): barley, triticale, chickpea, lentil, cowpea, whole sunflower seeds and their cotyledons and hulls using 2% $CaCl_2$ and partially purified by ammonium sulfate followed by dialysis in distilled water. The enzyme showed an optimum pH of 5.2 which extracted from whole wheat grain, flour, barley, chickpea, cowpea and whole sunflower seeds, 5.3 for enzyme extracted from germ, semolina and sunflower cotyledon , 5.1 for sunflower hulls, 5.4 for triticale, 5.5 for lentil and 5.0 for wheat bran. A temperature of 55°C was the optimum temperature required for the activity of the phytase extracted from whole wheat grain, germ, flour, semolina, lentil and whole sunflower seeds, 60°C for sunflower cotyledon and 50 C for wheat bran, triticale, barley, chickpea, cowpea and sunflower hulls. The phytase w was partially inhibited at high substrate concentration, with an optimum substrate concentration at 2.0 mM for (whole wheat grain), 2.5 mM for (wheat bran) 3.0 mM for sunflower cotyledon), 3.5 mM for (germ), 0.5 mM for semolina, barley, cowpea and lentil, 1.5 mM for whole sunflower seeds and sunflower hulls 0.75 mM for wheat flour, 1.0 mM for triticale, and 0.25 mM for chickpea. The corresponding Km values were 0.35, 0.62, 0.87, 0.16, 0.16, 0.28, 0.25, 0.15, 0.32, 0.26, 0.64, 0.69 and 0.32 mM, while Vmax were 0.25, 0.29, 0.26, 0.29, 0.34, 0.48, 0.31, 0.33, 0.42, 0.38, 0.28, 0.16 and 0.28. µmole/Pi liberated/min. The activation energy required for inhibiting one

mole of the phytase enzyme was calculated to be· 36312, 26398, 30945, 29488, 31773, 30866, 27325, 41484, 48098, 35419, 39099, 60428, and 28622 cal/mole in the following samples whole wheat grain, bran, germ, flour, semolina, barley, triticale, chick-pea, lentil, cowpea, whole sunflower seeds, sunflower cotyledon and sunflower hulls respectively. The corresponding values of activation energy required for the hydrolysis of phytic acid were 10968, 14167, 13253, 9597, 12796, 10968, 12339, 12110, 10054, 15081, 8683, 6855, 12202 cal/mole.

Addition of wheat bran phytase and lentil phytase extracts with different volumes ranging from (5-30 ml) to dough made from 72% and 87.5% flour extraction reduced or minimized the phytic acid content of the dough at the end of its fermentation process.

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