ASSESSMENT OF SOME DURUM WHEAT LINES INDUCED BY GAMMA RADIATION UNDER DROUGHT CONDITIONS

BY

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B.Sc. Agric. Sci. (Biotechnology), Fac. Agric., Cairo Univ., 2002
M.Sc. Agric. Sci. (Plant Physiology), Fac. Agric., Cairo Univ., 2010

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APPROVAL SHEET

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Title of Thesis: Assessment of some Durum Wheat Lines Induced by Gamma Radiation under Drought Conditions.

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ABSTRACT

Grains of two durum wheat lines S3 and S4 in M5 generation derived from Sohag 3 which was irradiated with 350 Gy of gamma ray (2005/2006) were used as parents to make all possible crosses with the cultivar Benisuef 3 and other four durum wheat lines (S1, S2, B1 and B2) in the same generation which derived from irradiated Sohag 3 and Benisuef 3 with different gamma ray doses as an attempt to develop high productivity and drought tolerant durum wheat genotypes. Grains of durum wheat hybrids as well their consecutive parents were sown four years consecutively under normal (100% field capacity) and three years under drought conditions (75 and 50% field capacity). The results showed that there were new five genotypes H1, H3, H4, H5 and H10, each one characterized by different physiological, agronomical and genetically traits as compared to its parents under non-stress and drought conditions. Hybrid line H1 had superiority over the parent S3 under non-stress and drought conditions in grain yield/fed for about 11 and 42%, respectively. In addition to highly increased in GDH activity as well as in all chemical plant constituent. It was characterized by five positive and one negative unique RAPD and ISSR markers. The hybrid line H3 had superiority over its parents under drought conditions in spikes number/plant which led to high increase in grain yield/plant for about 9%. It was collectively characterized by four positive and two negative unique RAPD and ISSR marker. The hybrid line H4 had superiority over the parent S3 under non-stress and drought conditions in grain yield/fed for about 5.5 and 19%, respectively and in root length, number of branches, concentration of chlorophyll, mineral, organic constituents and. It was characterized by seven positive and three negative unique RAPD and ISSR markers. The hybrid line H5 had superiority over its parent S3 under drought conditions in the concentration of non-reducing and total sugar, free proline, grain weight/spike and 100 grain weight. Also, it was characterized by three positive and three negative unique RAPD and ISSR markers. The hybrid line H10 had superiority over the parent S4 under non-stress and drought conditions in grain yield/fed for about 15 and 25%, respectively. It was characterized by increasing in number of branches, chlorophyll concentrations, mineral and organic constituents and GDH activity. It was characterized by six positive and one negative unique ISSR markers. The putative lines S3 and S4 in M7 and M8 generations had superiority in grain yield/fed as compared to Sohag 3 under non-stress for about 45 and 34%, respectively and 75 and 34% under drought conditions, respectively. Also, S3 and S4 characterized by increasing in root length, number of branches, flag leaf area, grain weight/spike and number of spikes / m^2, minerals and organic components concentrations as well as GDH activity as compared to Sohag 3 under non-stress and drought conditions.

Key words: Durum wheat, drought, gamma ray, enzymes, proline, RAPD, ISSR

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CONTENTS

LISTT OF TABLES