GENETIC STUDIES ON EGYPTIAN LANDRACES USING MOLECULAR MARKERS

A Thesis
Submitted for Faculty of Science
Ain Shams University

In Partial Fulfillment
of the Requirements for Degree of
Master of Science in Botany (Genetics)

By

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2013

”قالوا سبحانك لا علم لنا

إلا ما علمتنا إنك أنت

العليم الحكيم“

سـورة البقـرة

الآية (٣٢)

Supervision Sheet

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DEDICATION

I dedicate this work with my heartfelt thanks to my father, mother and sister for their patience and help.

Sara Aly

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Sara Aly

ABSTRACT

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Genetic Studies on Egyptian Landraces Using Molecular Markers
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Genetic relationships between eighteen genotypes, including 12 Egyptian landraces, 2 Egyptian cultivars, 3 Egyptian breeding lines and a French variety, of white lupin (*Lupinus albus* L.) were studied using 12 ISSR primers and 4 AFLP primer combinations. These molecular markers revealed high levels of polymorphism among the lupin accessions, 94.6% for AFLP and 59.5 % for ISSR. A total of 180 AFLP peaks were scored as positive unique markers "PUMs", while 26 peaks were recorded as negative unique markers "NUMs". However, 18 unique ISSR markers were detected, including 9 positive and 9 negative unique markers. Results showed that AFLP as well as ISSR are powerful tools for genetic fingerprints development and characterization of genetic relationship among genotypes of lupin. Beyond this identification, efforts are made to construct a molecular database that can be used to make a reference collection of Egypt lupin germplasm by comparing the molecular pattern of each identified accession with samples from different areas. The estimated similarities produced from combined data for both markers among the 18 lupin genotypes ranged from 53.3 to 80.5. Cluster analysis was presented as a dendrogram based on similarity estimates using the un-weighted pair-group method with arithmetic average (UPGMA). AFLP exhibited significantly higher multiplex ratio, number of observed alleles, effective multiplex ratio, polymorphic information content and marker index when compared to those of ISSR. The use of AFLPs and ISSRs allowed for the genetic analysis spanning the lupin genome. It is thus clear that these PCR based molecular markers reveal the high genetic variations found among accessions which make them useful tools for the breeder to decrease the time of breeding program.

Key words: white lupin (*Lupinus albus* L.), Genetic relationships, ISSR, AFLP, molecular markers.

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