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التوثيق الالكتروني والميكروفيلم



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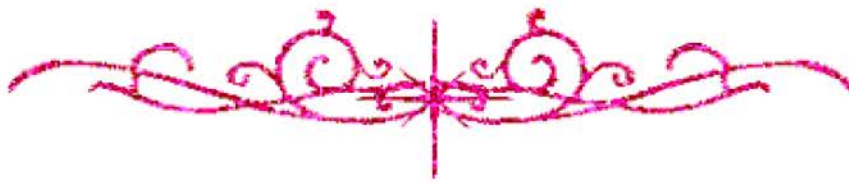


A decorative flourish in red ink, consisting of a central vertical line with symmetrical, flowing, scroll-like patterns on either side.

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بالرسالة صفحات

لم ترد بالأصل



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B15446

GENETIC STUDIES ON EGYPTIAN COTTON USING MOLECULAR MARKERS

Thesis

Submitted for partial fulfillment of the requirements for
M.Sc. in Botany-Microbiology

By

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B.Sc. 1994

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I dedicate this modest thesis to

*my parents,
my unique brother,
and to
my dear sisters.*

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NOTE

Beside the work carried out in the thesis the author has attended and passed successfully the following postgraduate courses:

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2. Soil Microbiology.
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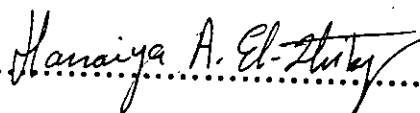
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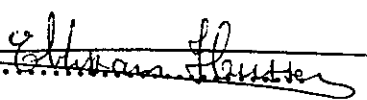
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**This thesis has not previously been submitted
for a degree at this or any other University**

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ABSTRACT

The genetic variability and relationships among 12 Egyptian cotton varieties (*G. barbadense*) and one *G. hirsutum* off-type genotype (Hindi) were estimated using 49 RAPD, 14 ISSR, 8 SSR and 6 AFLP primers/primer combinations. The level of polymorphism among all genotypes as revealed by RAPD, ISSR, SSR and AFLP was 30.4%, 53%, 68%, and 56.3%, respectively. While, the variability levels among the 12 Egyptian genotypes were 24.9%, 44.4%, 58.9%, and 43.1%, respectively. The topology of the dendrograms derived from different marker types was unique with evident similarities. All dendrograms clearly discriminate between the Hindi off-type genotype belonging to *G. hirsutum* and the Egyptian genotypes belonging to *G. barbadense*. Both RAPD and AFLP clusters separated the variety G45 from all the other *G. barbadense* varieties. The reshuffling in the position of the remaining *G. barbadense* varieties in the different dendrograms revealed that they share common genetic background. Variety-specific DNA markers characterized different genotypes and therefore, were used to generate unique fingerprint for each genotype. The RAPD, ISSR, SSR and AFLP revealed 26, 16, 2, and 70 variety-specific DNA markers, respectively. The Hindi off-type was characterized by the highest number of putative species-unique DNA markers (101) followed by G45, which was characterized by 38 variety-specific markers. Comparison of the applied DNA marker techniques reflected the superiority of AFLP over other types. AFLP showed the highest multiplex ratio (71.3%), effective multiplex ratio (241), sum effective number of alleles (150.9), expected heterozygosity (0.19) and marker index (45.79). Four new microsatellite sequences were identified by cloning, in *E. coli* (JM109) host, and sequencing of microsatellite enriched ISSR-PCR products. These new motifs were perfect simple dinucleotide repeats [(AG)₁₈ and (TC)₁₇] and imperfect simple dinucleotide repeats [(GA)₁₆CNACA(GA)₂ and (TC)₁₀TA(TC)₆TA].

Key words:

DNA markers, RAPD, AFLP, Microsatellite, Inter Simple Sequence Repeats (ISSR), Simple Sequence Repeats (SSR), Cotton, *G. barbadense*, *G. hirsutum*, *E. coli* (JM109), Genetic relationships, Variety-specific DNA markers, Cluster Analysis, Sum Effective Number of Alleles (SENA), Expected heterozygosity for polymorphic loci ($H_{(av)P}$), Marker Index (MI), Effective multiplex ratio (E).

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