Analysis Of Genetic Diversity Of Wild Barley (*Hordeum spontanenum C.Koch*) Populations In Northern Jordan (Ajloun area) Using DNA-Based Markers (AFLP and RAPD)

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Abstract

The assay of genetic variability is of great value in genetic resources conservation and plant breeding, the genetic information is essential for plant breeders to determine the best crosses between different genotypes.

Genetic diversity among and within five *Hordeum spontaneum* C. Koch accessions was investigated using morphological and polymerase chain reaction based markers (random amplified polymorphic DNA (RAPD) and amplified fragment length polymorphism (AFLP)) analysis. Fifty Samples representing five accessions of *H. spontaneum* C. Koch from Northern Jordan (Ajloun area) were included in this study and were evaluated for nine quantitative characters and subjected to RAPD and AFLP molecular markers analysis. Considerable morphological and genetic variations were revealed in *H. spontaneum* C. Koch in Northern Jordan (Ajloun area). The number of roots was the character showing the highest variability (Coefficient of variation ~ 48%). Also the plant height showed the highest variability between the sampled populations of *H. spontaneum* C. Koch as indicated by their "f" values (F=31.19). In morphological assay, unique interesting character was observed in one of individual plants which belong to Wadi Rayan accession (named Rayan 4), that is, the plant has two

spikes instead of one as is not the usual case in the rest of the collections. This character is not documented to be observed in barley.

In RAPD assay, out of a total of 288 amplification products (0.2 to 4 kilo basepairs) using twenty-seven primers, 90 (31.3%) were polymorphic and 198 products were shared among all genotypes (not polymorphic). The AFLP assay showed that out of a total of the 300 amplification products of (0.1 to 4 kilo basepairs) scored using six primer combinations, 155 (51.7%) were polymorphic (AFLPs) and 154 products were common among all genotypes. It is clear that AFLP detected the highest polymorphism.

The RAPD and AFLP products resulted in the same dendrogram. Two major clusters resulted: One cluster included accession of Wadi Rayan accession (Rayan 4) by itself and the second cluster included the rest of the four accessions (Zubya, Barkash, Wadi Baun and Samtah). This second cluster was subdivided into two further subclusters (Samtah subcluster and the other subcluster included W. baun, Zubya and Brakash).

Based on RAPD and AFLP data, the resulted dendrograms showed also that the individual plant of W. Rayan (Rayan 4) was represented as a cluster by itself in the dendrogram in both RAPD and AFLP analysis. The results indicated that strong genetic variation was detected in Rayan 4 that was obviously different from the other studied accession (it showed 2%

similarity in both RAPD and AFLP assay) that could reflect different genetic background, Samtah accession showed 56% similarity (in RAPD) and 40% similarity (in AFLP) which indicated a significant variation but it was less than Rayan 4. The results indicated that species *H. spontaneum* C. Koch in the investigated area (Ajloun area) has considerable amount of genetic variation and RAPD and AFLP were efficient methods for discriminating and studying genetic diversity in *H. spontaneum* C. Koch germplasm.

دراسة التباين الوراثي لنبات الشعير البري (*Hordeum spontaneum* C. Koch) في شمال الأردن (منطقة عجلون) باستخدام تقنيات تحديد البصمة الوراثية (*AFLP and RAPD*)

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الخلاصـــة

دراسة التباين الوراثي لنبات الشعير البري
(*Hordeum spontaneum* C. Koch) في شمال الأردن (منطقة عجلون)
باستخدام تقنيات تحديد البصمة الوراثية(*AFLP and RAPD*)

أن دراســة التبايــن الوراثي له قيمة كبيرة في حفظ الأنواع وإنتاج السلالات الجديدة في مجال الإنتاج النباتي.

شــملت هذه الدراسة خمسين عينة من الشعير البري، جمعت من مناطق مختلفة في شمال الأردن (منطقة عجلون). ثم قيمت هذه العينات من خلال تسعة صفات كمية على المستوى الشكلي للنــباتات ومــن خلال عمليات استخدام تقنيات البصمات الوراثية (RAPD&AFLP) وعمليات الفصل الكهربائي لجميع العينات من خلال استخدام وعزل المادة الوراثية منها (DNA).

دلــت نتائج هذه الدراسة على وجود تباين في الشعير البري في منطقة عجلون في شمال الأردن ســواء أكــان ذلــك علــى المســتوى الشكلي أو على مستوى التباين الوراثي، وأن تقنية البصمات الوراثية قادرة على دراسة وتحديد التباين الوراثي بشكل دقيق في هذا النبات.