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EVALUATION OF POLYMORPHISM INFORMATION OF GENETIC DIVERSITY IN BROOMRAPE FROM BULGARIA

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In this study, genomic polymorphism in 4 broomrape populations from different regions of Bulgaria was investigated through amplification by polymerase chain reaction of intersimple sequence repeat (ISSR) regions.

Out of 137 amplicons produced by 13 ISSR primers, 118 were found polymorphic (86.13%). The average was 10.54 fragments per primer. Moreover, ISSRs yielded 5 common and 14 specific bands. The fragment sizes ranged from 0.23 to 4 kb. This study demonstrated that 3'-anchored primers based on dinucleotide repeats with GA and AC motifs have higher polymorphism (96.43 and 100%, respectively) than primers with other di-, tri- or tetranucleotide repeats. In general, the highest number of polymorphic DNA fragments and high percentage of polymorphism were produced using primers $(AG)_8$YA, BC841, BC857, BC810, BC807, $(CTC)_4$RC and $(CA)_6$RG, thus demonstrating the potential of the primer system. The performance of ISSR markers used was evaluated by means of different parameters such as polymorphic information content (PIC), effective multiplex ratio (EMR), marker index (MI), Simpson's coefficient (h_J) and resolving power (RP). The PIC values for all primers varied from 0.16 to 0.35 with an average of 0.26. The highest PIC value was detected for primers $(GACA)_4$, BC857, $(AG)_8$YA (0.35, 0.33, 0.31, respectively) and lowest PIC index of 0.16 for two primers, namely, $(CA)_6$AC and BC835. The EMR values may be influenced by the fraction of polymorphic loci. The highest EMR was detected with the primers $(AG)_8$YA (17.05), BC841 (12.07), BC857 (12.00), $(CAG)_5$ (10.56) and the lowest was shown by the primer $(CA)_6$AC (0.67) with a mean EMR of 8.03 per primer. The usefulness of the system markers used was also determined by the calculation of MI for each primer. The highest MI was shown by the primers $(AG)_8$YA (5.35), BC857 (3.90), BC841 (3.40), $(CAG)_5$ (3.14) and the lowest in the primer $(CA)_6$AC (0.11) with a mean MI of 2.23 per primer. The discrimination potential of each primer was expressed by h_J, where the highest value was detected in BC810 (0.58) and the lowest value in $(CT)_8$TC (0.02). The average value of h_J for all primers (0.18) indicates that all samples are diverse and primers used are able to discriminate between all samples. The RP is the ability of a primer to differentiate between genotypes. The average RP was 8.48 per primer. The highest RP value was detected with the primer $(AG)_8$YA (15.04), BC841 (14.92), BC810 (14.63), $(CAG)_5$ (11.58), BC807 (10.04) and the lowest with the primer $(CA)_6$RG (1.33).

The moderate values of PIC, EMR, MI, h_J, RP parameters for the most ISSR primers could be attributed to the large genetic variability among the broomrape genotypes and/or highly informative ISSR markers used in this study.

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Keywords: broomrape populations, genomic polymorphism, ISSR analysis, informative markers.