

Genetic diversity analysis of *Ceratoides* . (Tourn .) *Gagnebin* germplasm based on RAPD

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Introduction *Ceratoides*(Tourn .) *Gagnebin* is one of the most ancient genus in *Chenopodiaceae* . Several species have great agronomic potential as forage , especially in drought and cold conditions . *Ceratoides* is rightly considered as one of the most promising sources of calories and protein for the vast and expanding populations of arid and semi-arid region of the north temperature zone in winter . It is virtually the only species that can yield high protein food and feed under these conditions . In order to exploited this resources rationally , the RAPD technique were used (1) to determine the genetic diversity , (2) to evaluate the genetic relationship of the genetic resources , and (3) to identify *Ceratoides* genetic resources using RAPD markers .

Materials and methods 7 accessions , belonging to 4 species were used in the study . RAPD analysis was performed according to Williams et al . (1990) . RAPD bands/products were scored as present (1) or absent (0) from the photographs . The genetic similarity and genetic distance index were computed using Nei and Li's method (1979) . The genetic resources were grouped by cluster analysis using the UPGMA based on similarity coefficients to develop a dendrogram representing the genetic relationship .

Results and analysis Twenty-four primers were finally selected from the 100 screened according to their diversity and reproducibility , and were used for RAPD amplification of the 7 accessions *Ceratoides* . A total of 166 bands were amplified from the 7 *Ceratoides* genetic resources , with an average of 6 .91 bands per primer as well as 23 .71 bands per genetic resource . 83 .7% of the percentage of polymorphic loci (*P*) was found . This result suggested that the existence of abundant genetic diversity in *Ceratoides* genetic resources in China .

The genetic distance ranged from 0 .205 to 0 .397 , similarity coefficient ranged from 0 .603 to 0 .795 . *C .latens* desert ecotype and *C .lanata* process the minimal genetic similarity index . The 7 *Ceratoides* genetic resources could be grouped into two main groups , Group A contained *C .latens* Xinjiang ecotype , *C .arborescens* and *C .arborescens* Horqin ecotype , Group B included two genetic resources , i e . , *C .latens* Ningxia ecotype and *C .latens* Desert ecotype . *C .ewersmanniana* and *C .lanata* failed to be included in either A or B group .

All the seven *Ceratoides* genetic resources could be entirely identified by the 6 primers : S47 , S318 , S73 , S45 , S64 , S3 . Primer S64 produced different amplification bands in all the genetic resources , so S64 can be used to identified these 7 accessions *Ceratoides* independently .

Discussion Three accessions belonging to the same species *C .latens* , have not clustered into one group . This maybe suggested the influence of ecological conditions , such as soil and climate on the genetic differentiation of these resources . The genetic distance between *C .ewersmanniana* and *C .lanata* which originated in Northern American is smaller than that of between *C .ewersmanniana* and other two native species , this indicated that the gene flow among native species is fewer than that of *C .ewersmanniana* and *C .lanata* . Another reason , the cluster analysis , based on DNA markers , may not have completely collaborated the theoretical expectations owing to the limited number of markers used in the study which might not have covered the whole genome .

RAPD markers provide a quick and simple methodology for identification of plants at any developmental stage Conner and Wood (2001) used 42 RAPD markers to identify 43 pecan cultivars . In this investigation , all the seven genetic resources could be easily identified by the presence and absence of unique RAPD markers . Therefore , RAPD markers provided a practical and effective method not only to evaluate the genetic diversity and relationships , but also to identify *Ceratoides* genetic resources .

References

- Conner , P . J . , Wood B . W . , 2001 . Identification of pecan cultivars and their genetic relatedness as determined by randomly amplified polymorphic DNA analysis . *Journal of the American Society for Horticultural Science* 126(4) : 474-480 .
- Nei , M . , Li , W . H . , 1979 . Mathematical model for studying genetic variation in terms of restriction endonuclease . *Proceedings of the National Academy of Science USA* 76(10) : 5269-5273 .
- Williams , J . G . K . , Kubelik , A . R . , Livak , K . J . , Rafalski , J . A . , Tingey , S . V . , 1990 . DNA polymorphisms amplified by arbitrary primers are useful as genetic markers . *Nucleic Acids Research* 18(22) : 6531-6535 .