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Molecular Characterisation of Apomixis in *Cenchrus ciliaris* and its Implication for Improvement

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Abstract

Livestock production is a key element in addressing sustainable development goals, and forage grasses play an important role in enhancing the contribution of livestock. Despite playing this key role, the contribution of grasses to sustainable livestock production is limited by the lack of enough true-to-type seed to support forage production. Buffel grass is an important polymorphic forage grass grown worldwide for its forage quality and agronomic characteristics including high biomass yield, drought tolerance and adaptability to a wide range of soil conditions and agro-ecologies. In apomictic species like buffel grass, breeding efforts are also hindered by the lack of information on the reproductive behaviours of the existing germplasm. Thus, generating information of the reproductive behaviour of buffel grass in the collection held in the International Livestock Research Institute (ILRI) Genebank would be useful for improvement and utilisation of this forage. Here we report on the characterisation of the reproductive nature of the buffel grass collection using molecular markers linked to the apomixis sequence genomic region (ASGR). The results showed the amplification of genomic DNA sequence linked to ASGR in most of the accessions held in the collection. Amplification of genomic regions linked to both apomictic and sexual reproduction modes was observed in seven accessions in the collection. No accession was identified with a purely sexual mode of reproduction. Overall, the results show that most of the accessions in the collection are obligate apomictic lines while a few are facultative apomictic lines. The identified facultative lines could be used to develop sexual crosses which could be used to enhance the improvement of this forage and thereby its contribution to improved livelihoods for millions of households in low and middle income countries that are dependent on livestock production.

Keywords: Apomixis, *Cenchrus ciliaris*, characterisation, improvement