

Sui Generis Development of Molecular Markers from Transcriptome of *Crotalaria juncea*, a Fabaceae Family Bast Fiber Crop

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ABSTRACT

Lack of genomic resources in sunn hemp (*Crotalaria juncea* L.), a leguminous bast fiber crop, is one of the major constraints for germplasm characterization and genetic analysis. We identified non-redundant sets of a variety of molecular markers from the *de novo* flower-bud transcriptome of sunn hemp. These molecular markers included 1683 simple sequence repeats, 4759 intron length polymorphism markers primarily from protein-coding genes, and 3309 single nucleotide polymorphism allele-specific markers. All of these marker resources have been integrated into a simple database for easy access. To evaluate marker efficiency and polymorphism information content of the sampled primers, a subset of SSR and intron length polymorphism markers were validated in sunn hemp germplasm accessions to obtain average PIC values of 0.26–0.32. The SSR genotyping profiles also aided in the genetic distance matrix-based clustering of sunn hemp germplasm accessions. The ability of these molecular markers to successfully amplify in cross-genera bast fiber crops further demonstrated their effectiveness in genotyping. Thus, the current study describes the identification of previously undisclosed endogenous molecular markers in sunn hemp, which have potential applications in genetic studies and breeding in sunn hemp for bast fiber improvement.

摘要

阳光大麻 (*Crotalaria juncea* L.) 是一种豆科韧皮纤维作物, 缺乏基因组资源是种质鉴定和遗传分析的主要制约因素之一。我们从太阳大麻的新花蕾转录组中鉴定了多种分子标记的非冗余组。这些分子标记包括1683个简单序列重复、4759个主要来自蛋白质编码基因的内含子长度多态性标记和3309个单核苷酸多态性等位基因特异性标记。所有这些标记资源都已集成到一个简单的数据库中, 便于访问。为了评估所选引物的标记效率和多态性信息含量, 在阳光大麻种质资源中验证了SSR和内含子长度多态性标记的子集, 以获得0.26–0.32的平均PIC值。SSR基因分型图谱也有助于基于遗传距离矩阵的向日葵种质资源聚类。这些分子标记在跨属韧皮纤维作物中成功扩增的能力进一步证明了它们在基因分型中的有效性。因此, 本研究描述了之前未公开的向日葵内源分子标记的鉴定, 这些标记在向日葵的遗传研究和育种中具有潜在的应用价值, 以改善韧皮纤维。

KEYWORDS

Bast fiber; molecular markers; intron length polymorphism; simple sequence repeat; single nucleotide polymorphism; sunn hemp

关键词

麻类纤维; 分子标记; 内含子长度多态性; 简单序列重复; 单核苷酸多态性; 太阳麻

Introduction

Sunn hemp (*Crotalaria juncea* L.; $2n = 2x = 16$; Fabaceae), also known as Indian hemp, is a rapid-growing, nitrogen-fixing annual plant. It originated in India and is primarily grown as a green manure, pasture, and cover crop that can also suppress soil-borne nematodes (Bhandari et al. 2016; Hinds et al. 2013; Mosjidis and Wang 2011). It enriches organic matter by sequestering carbon in

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