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## Complete Chloroplast Genome assembly and Annotation of Milk Thistle (*Silybum marianum*) and Phylogenetic Analysis

Hwajin Jung<sup>1</sup>, Yedomon Ange Bovys Zoclanclounon<sup>1</sup>, Jeongwoo Lee<sup>1</sup>, Taeho Lee<sup>1</sup>, Jeonggu Kim<sup>1</sup>, Guhwang Park<sup>1</sup>, Keunpyo Lee<sup>1</sup>, Kwanghoon An<sup>2</sup>, Jeehyoung Shim<sup>2</sup>, Joonghyoun Chin<sup>3</sup>, Suyoung Hong<sup>1\*</sup>

<sup>1</sup>Genomics Division, National Institute of Agricultural Sciences, RDA, 370 Nongsaengmyeong-ro, Jeonju-si, Jeollabuk-do, 54874, Republic of Korea

<sup>2</sup>EL&I, Co, Ltd., 17, Jangdoek-ri Namyang-eup, Gyeonggi-do, Hwaseong, 18281, Republic of Korea

<sup>3</sup>Department of Integrative Biological Sciences and Industry, Sejong University, 209 Neungdong-ro, Seoul, 05006, Republic of Korea

### [Abstract]

*Silybum marianum* is an annual or biennial plant from the *Asteraceae* family. It can grow in low-nutrient soil and drought conditions, making it easy to cultivate. From the seed, a specialized plant metabolite called silymarin (flavonolignan complex) is produced and is known to alleviate the liver from hepatitis and toxins damages. To infer the phylogenetic placement of a Korean milk thistle, we conducted a chloroplast assembly and annotation following by a comparison with existing Chinese reference genome (NC\_028027). The chloroplast genome structure was highly similar with an assembly size of 152,642 bp, an 153,202 bp for Korean and Chinese milk thistle respectively. Moreover, there were similarities at the gene level, coding sequence (n = 82), transfer RNA (n = 31) and ribosomal RNA (n = 4). From all coding sequences gene set, the phylogenetic tree inference placed the Korean cultivar into the milk thistle clade; corroborating the expected tree. Moreover, an investigation the tree based only on the *ycf1* gene confirmed the same tree; suggesting that *ycf1* gene is a potential marker for DNA barcoding and population diversity study in milk thistle genus. Overall, the provided data represents a valuable resource for population genomics and species-centered determination since several species have been reported in the *Silybum* genus.

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\*Corresponding author: Tel. +82- 63-238-4563 E-mail. suyoung@korea.kr