



Morphological Characteristics and Genetic Identification of *Rheum tanguticum* Maximowize ex Balf

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Abstract

Rheum tanguticum Maximowicz ex Balf is a perennial herbaceous plant belonging to the Polygonaceae family. It is listed as one of the origin plants of Rhubarb along with *Rheum palmatum* Linne and *Rheum officinale* Baillon in the Korean Pharmacopoeia. As a plant that does not grow naturally in Korea, it is classified as *Rheum palmatum* var. *tanguticum* Maxim(Chinese rhubarb) in the National Standard Plant List of the Korea National Arboretum. Therefore, in this study, morphological characteristics and genetic analysis were performed to identify the species of Chinese rhubarb collected in Gansu Province, China. In 2018, In 2018, we collected *Rheum tanguticum* seeds from Gansu Province, China, and planted them after sowing. After developing the seedlings in the field, we observed the morphological characteristics of 18 surviving individuals at the 3rd year. All individuals appeared in early April, and only one individual had flower buds formed in early May. Flowers bloom from May to June. The compound raceme forms panicles at the ends of branches and main stems, and white flowers with peduncles are whorl in the inflorescence. There are 5 lobes of perianth and they are arranged in one row, there are no petals, 6-8 stamens, and 3 styles. The leaf shape is palmate heart-shaped, the veins are palmately lobate, and the leaf blades are severely engraved. The front side of the leaf is dark green and the back side is light green. The petiole color is green or green-purple, and it changes to dark purple in autumn. In the case of the root, the slow root develops in the main root and is enlarged and multiple. The root color is dark golden. Genetic identification showed 98% homology with *Rheum tanguticum* as a result of ITS analysis.

Results

Material : *Rheum tanguticum* Maximowicz ex Balf(Three-years-old)

Table 1. Morphological characteristics of *Rheum tanguticum* radical leaf.

No.	Emergence Date (mm/dd)	A day of flower bud (mm/dd)	Flowering Date (mm/dd)	Radical Leaf							
				Leaf Number (cm)	Leaf Length (cm)	Leaf width (cm)	Petiole length (cm)	Petiole color (cm)	Leaf color (cm)	Leaf Base	Petiole
RTS18CG1	4/8			21	45	54	35	Violet	Deep green	Not overlap	Rough
RTS18CG2	4/8			45	61	70	45	Green	Deep green	Not overlap	Rough
RTS18CG3	4/8			40	42	50	41	Green-Violet	Deep green	Not overlap	Rough
RTS18CG4	4/8			10	42	41	24	Green-Violet	Deep green	Not overlap	Rough
RTS18CG5	4/8			69	40	55	39	Green	Deep green	Not overlap	Rough
RTS18CG7	4/8			48	59	50	50	Green	Deep green	Not overlap	Rough
RTS18CG8	4/8			60	49	52	36	Green	Deep green	Not overlap	Rough
RTS18CG9	4/8			34	57	67	45	Green	Deep green	Not overlap	Rough
RTS18CG10	4/8			33	37	36	34	Green	Deep green	Not overlap	Rough
RTS18CG12	4/8			9	39	55	30	Green-Violet	Middle green	Not overlap	Middle
RTS18CG14	4/8			33	68	81	59	Green	Deep green	Not overlap	Middle
RTS18CG16	4/8			31	41	43	46	Green	Deep green	Not overlap	Rough
RTS18CG16	4/8	5/11	5/12	22	54	58	42	Green-Violet	Deep green	Not overlap	Rough
RTS18CG18	4/8			39	47	50	54	Green-Violet	Deep green	Not overlap	Smooth
RTS18CG19	4/8			45	43	47	45	Green	Deep green	Not overlap	Middle
RTS18CG20	4/8			63	51	61	45	Green	Middle green	Not overlap	Middle
RTS18CG23	4/8			23	41	43	47	Green-Violet	Deep green	Not overlap	Rough
RTS18CG25	4/8			22	55	66	45	Green-Violet	Deep green	Not overlap	Rough

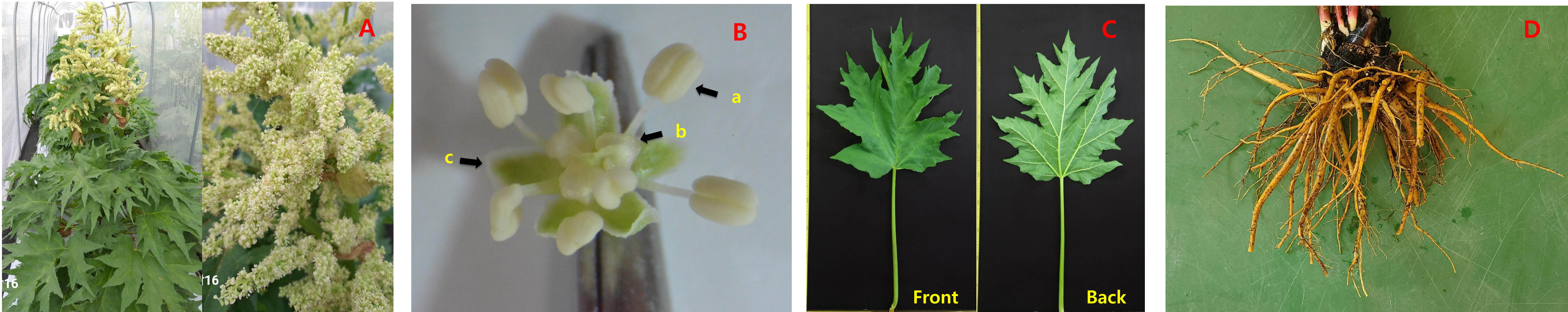


Fig 1. Morphological characteristics of *Rheum tanguticum* (A) Flowering, (B) Flower characters(a:stamen, b:style, c:perianth), (C) Leaf shape, (D) Root shape)

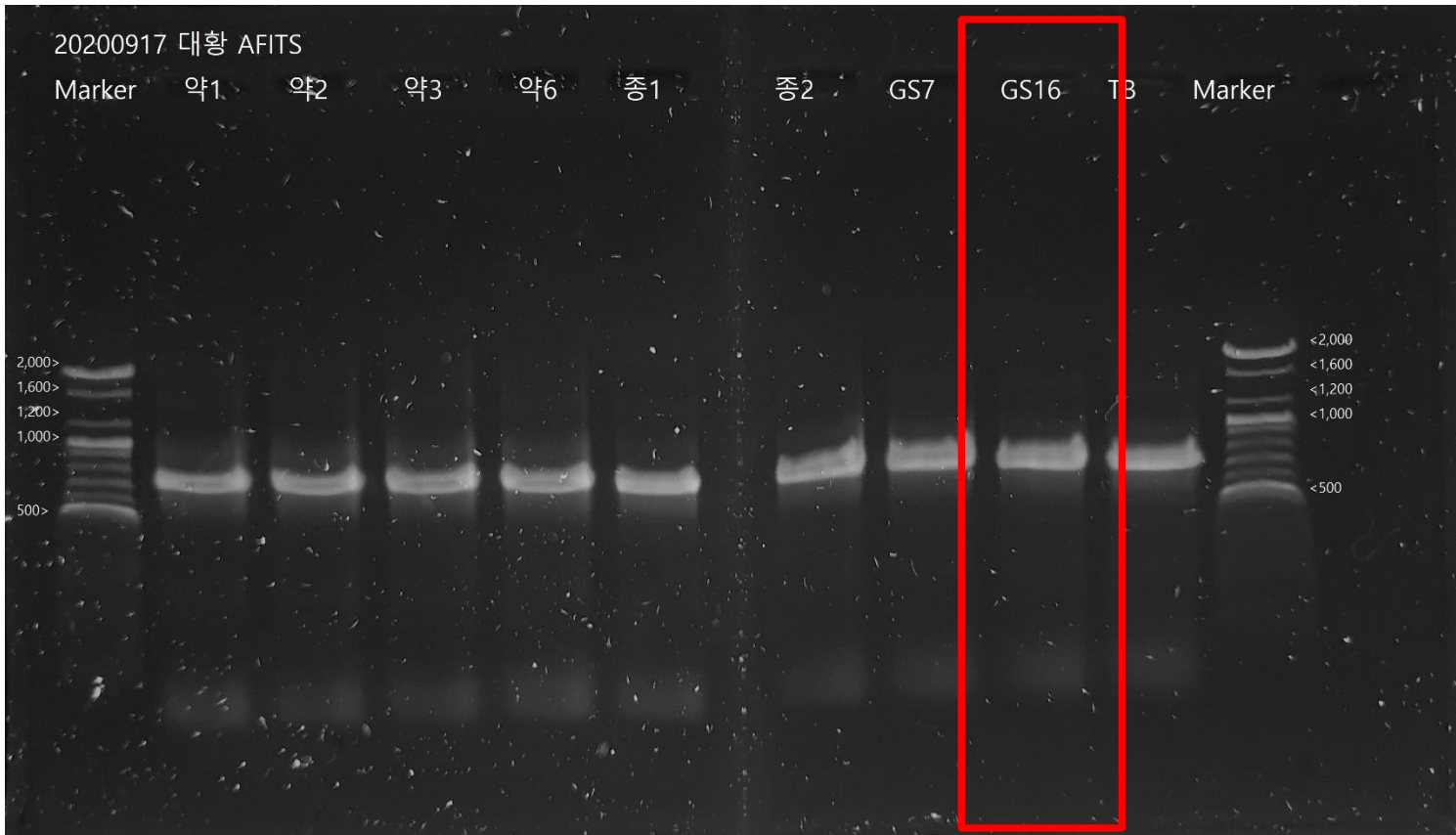


Fig. 2. PCR products of ITS region of *Rheum tanguticum*.

Table 2. Identification of *Rheum tanguticum* by genetically.

Sample	Primer	Length	Sequence	Identification	Homology(%)
GS16 (RTS18CG16)	AFITS	568 bp	TGTCGAAACCTGCGCGAGCAGACACCCGCGAACCCTCTCTAACCCGCCGCCGGG GGGTGGAGATGGCTCTTCTGAGCCCCGCCCTCCCGGCGCGGCCAACCAAA CCCCGGCGTGATTGCGCCAAGGACTATGAACAAGAGCGCTCCCGCGCGCCCCG CGCGCGTGCACGTCGCGTCTTTCTACCTAACAGAAGCACTCTGGCAACGGATATC TCGGCTCTCGCATCGATGAAGAAGCTAGCGAAATGCGATACTTGGTGTGAATTGCAGA ATCCCGTGAACCATCGAGTCTTTGAACGCAAGTTGCGCCCCAAGCCTTCTGGCCGAGG GCAGTCTGTCTGGGCGTCACGCACCGCGTCGCCCGCCCCCTCCGGGGGCGAGGG GCGGAGACTGGCCCCCGTGCGCCCGGCGCGCGCCGCTAAACGCAGGCCCG CGGCCGCGAGAAGCCGCGACGATTGGTGGTGTACCAGCGGCCCGTCCCGCGAAGC ATCGCGTCGCGTCTCGCGCGGCCACCGTGAGCGCCAAAGGCCCGACACCGT	Rheum Tanguticum	99

Conclusions

In the future, when *Rheum tanguticum* is introduced, it is intended to be used as basic data for species classification based on morphological characteristics.

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