

Hypoxis aurea Lour. (Hypoxidaceae): a Rare Species from Jeju Island which is Rediscovered Seventy Years after its First Collection in Korea

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Abstract - We described and illustrated a rare species in Korea, *Hypoxis aurea* Lour. (Hypoxidaceae) which was rediscovered about 70 years after its first collection from Jeju island in Korea. The members of the family Hypoxidaceae R. Br. are distinguished from the plants of Amaryllidaceae J. St-Hill. by having grass-like leaves, an invisible stem which is modified into a corm or a rhizome, trimerous, and radially symmetric flowers with an inferior ovary developing into a capsule on scapes. *Hypoxis aurea* Lour. is readily distinguishable from *Curculigo orchinoides* Gsertn. in Japan by beakless ovary and capsular fruit. The number of somatic chromosome is $2n = 54$.

Key words - *Hypoxis aurea*, Hypoxidaceae, Rediscovered species, Somatic chromosomes

Introduction

Although the family Apoxidaceae, consists of 9 genera and approximately 100 species, is distributed all over the world, only one species (*Hypoxis aurea* Lour.) had been collected from Korea in 1935 (Lee, 1985) and it is considered not growing in Korea so far (Ohwi, 1984; Nordal, 1998; Zhanhe and Meerow, 2000). It is known that 2 genera and 2 species are growing in Japan and 2 genera and 8 species in China (Zhanhe and Meerow, 2000; Sadake, 2002). This family has been treated as a tribe of the family Amaryllidaceae (Pax and Hoffmann, 1930; Ohwi, 1984; Zhanhe and Meerow, 2000). Since Hutchinson (1934) restricted the family Amaryllidaceae to bulbous plants with umbellate inflorescence, the tribe Hypoxideae were separated and recircumscribed as a family Hypoxidaceae (Hutchinson, 1959). Various morphological characteristics (Huber, 1969) and analysis data of *rbcL* (Rudall *et al.*, 1997) supported that it is an independent family (Lawrence, 1963; Takhtajan, 1969, Dahlgren, 1985; Watson and Dallwitz, 1992; Rudall *et al.* 1997; Nordal, 1998; APG system, 2003). We describe the specimen of *Hypoxis aurea* Lour. (Hypoxidaceae) that is collected in the southern slope (300~500m above sea level) of Mt. Halla in Jeju Island.

Materials and Methods

Genus *Hypoxis* were collected from *Cryptomeria japonica* plantations and *Pinus thunbergii* forests of a parasitic cone of Mt. Halla, Jeju Island. Some characteristics of their external morphology were illustrated (Fig. 1). Chromosomal characters were recorded by observation of chromosome number and size. Actively growing root tips were sampled when they were about 1cm in length. They were pretreated for 24hours at 4°C, and then fixed in acetic acid-ethanol (1:3, v/v). The fixed root tips were hydrolyzed in 1N HCl for 3-5 minutes at 60°C. The slides were prepared using a drop of 1% aceto-carmin solution after Feulgen staining. The stained root tips were observed under a light microscope (Fig. 2). Voucher specimens of these plant materials were deposited at Warm-Temperate Forest Research Center Herbarium.

Descriptions

Hypoxidaceae R. Br. in Flinders, Voy. Terra Austr. 2: 576 1814, nom. cons.

Perennial herbs with a tuberose rhizome or a corm; Leaves basal, with a more or less sheathing base, sessile or with a distinct pseudopetiole, lamina entire, linear to lanceolate, pubescent with simple and compound hairs, sometimes glabrous, the lamina parallel-veined, often V-shaped in cross-section; Inflorescences on

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hairy scapes, arising from leaf axils, spicate to corymbose or umbel-like, sometimes sessile, hermaphroditic, rarely unisexual, actinomorphic; Tepals 6, rarely 4, 2 whorled, mostly persistent, subequal, free or joined to form a tube, most often yellow to orange, or white or rarely red; Stamens 3, or 4, or 6, usually isomerous with the perianth, or reduced in number relative to the adjacent perianth. filaments short to almost lacking, arising from the base of perianth segments or from the mouth of the perianth tube, anthers elongate, dorsifixed, or basifixed, dehiscent introrsely or latrorsely by longitudinal slits, tetrasporangiate; Ovary inferior, usually (2?)3, rarely 1 locular; Style 1, short with 3(6) stigmas either as free lobes or as grooves along the style. stylar canal present. stigmas dry type; Ovules often numerous, sometimes only few; Fruits a capsule, or a berry, fleshy, or non-fleshy, and indehiscent or irregularly dehiscent, often beaked; Seeds with a thick phytomelan crust, globose to ellipsoid, a more or less prominent funiculus, testa most often black, sometimes brownish, smooth to papillate or verrucose; endosperm copious.

Korean name: No-ran-byeol-su-seon-gwa (노란별수선과) nom. nov.

Hypoxis L. Syst. Nat., ed. 10, 2: 986 (1759); Nel, Bot. Jahrb. Syst. 51: 234 (1914), rev. Trop. Afr. spp.; Brackett, Rhodora 69: 120, 151 (1923), rev. Amer. spp.; Nordal *et al.*, Nord. J. Bot. 5: 15

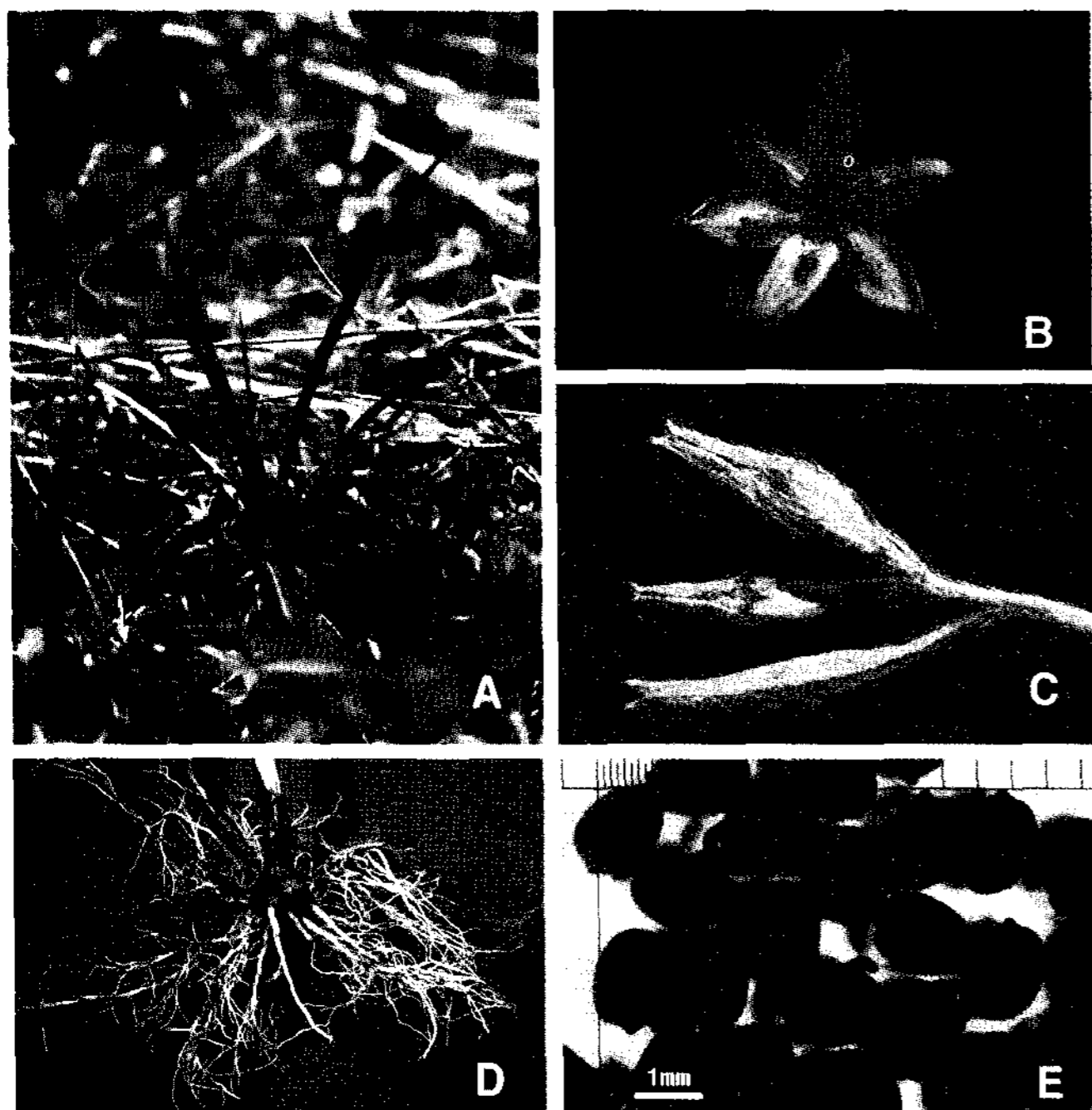


Fig. 1. *Hypoxis aurea* Lour. (A: habit, B: flower, C: capsule, D: roots, E: seeds).

(1985), rev. E Afr. spp.

Small to medium-sized herbs; Rhizomes tuberose, scaly or covered with fibers, roots stout, arranged in an equatorial zone on the rhizome; Leaves radical, linear, distinctly nerved, pubescent along abaxial midrib and leaf margin, sometimes also on the lamina; Flowers in clusters, racemes or solitary, hermaphrodite, perianth segments free, ovate, patent, yellow adaxially, persistent, stamens uniseriate, exposed, with short subulate to filiform filaments from the base of the perianth segments, anthers basifixed, more or less sagittate, versatile or not, latrorse dehiscence, theca fused or free apically. ovary inferior, trilocular. style short, columnar; Fruit capsular.

Korean name: No-ran-byeol-su-seon-sok (노란별수선속) nom. nov.

Hypoxis aurea Lour., Fl. Cochinch. 1: 200. 1790 (Fig. 1, 2)

Plants 5~50cm tall. Rhizomes tuberous, globose to cylindrical, fleshy, covered with fibers, with a lot of adventitious roots. Leaves up to 12, linear, V-shaped in cross-section, 5~50cm long, 2~6mm wide, distinctly nerved, base membranous, apex narrowly acute, yellowish brown pilose. Scapes 1~4, filiform, 2.5~10cm high, arising from the base of the leaves, 1-3-flowered, ciliate; bracts 2, linear, setaceous. Perianth segments 6, oblong to elliptic-lanceolate, 6~8mm long, yellow, free, persistent. Stamens 6, at the base of the perianth, shorter than the perianth segments; anthers sagittate. Style columnar with 3 stigmas. Fruit capsular, oblong, 6~12mm, 3-valved; seeds numerous, subglobose, finely tuberculate, black. about 1.2mm across, densely muricate with subrounded mammillae, the



Fig. 2. Somatic metaphase chromosome of *Hypoxis aurea* Lour ($2n = 54$).

appendage short, Somatic chromosomes number $2n = 54$, chromosome size $1.5\sim 7.8\mu\text{m}$ (Fig. 2).

Specimens examined: Harye-ri, Namwon-eup, Seogwipo-si, Prov. Jeju-do, Korea. (348m a.s.l.), 21 June 2006, M.-O. Moon 1761 (CNUH); 23 June 2007, M.-O. Moon 9653 (WTFRC); Harye-ri, Namwon-eup, Seogwipo-si (466 m a.s.l), 18 July 2007, C.-S. Kim & J. Kim 24476 (WTFRC).

Habitat: Margins or gaps of *Cryptomeria japonica* plantations and *Pinus thunbergii* forests, moist grassy slopes from 200 to 500m above sea level.

Korean name: No-ran-byeol-su-seon (노란별수선) nom. nov.

Discussion

Hypoxis aurea Lour. was collected from *Cryptomeria japonica* and *Pinus thunbergii* forest located on the southern slope (300~500m above sea level) of Mt. Halla in Jeju Island. *Hypoxis aurea* Lour. are growing in margins and gaps of the forest bathed in enough sunshine where is mostly occupied by *Miscanthus sinensis*. Distinctive morphological characteristics are described by observing dried specimen (Fig. 1). The family Hypoxidaceae has grass-like leaves, an invisible stem which modified into a corm or a rhizome, and radially symmetric flowers on scapes and inferior ovules developing to capsules, which makes it distinguishable from the family Amaryllidaceae (Nordal, 1998). Among these characteristics, this specimen has different characteristics in terms of beakless ovary and capsular fruits otherwise; other characteristics are similar to those of *Curculigo orchioides* Gaertn growing in Japan. In addition, it was found that it has distinctive karyotypes. The number of chromosomes is $2n = 54$ which is different from those of the *Hypoxis* from South Africa ($2n = 16, 32, 36$ and 72) reported by Wilsenach (1967) and Wilsenach and Papenfuss (1967), agreed to the result of Mehra and Schdeva (1976). The size of chromosomes ranges from 1.5 to $7.8\mu\text{m}$ and the difference between the shortest and longest is significant ($6.3\mu\text{m}$). This taxon has yet been reported ever since one individual was collected in Jeju in May 1935 (Lee, 1985). We confirmed the natural habitats of *Hypoxis aurea* in this study. Consequently, a species will be added to Korean flora. Because the species is distributed in limited ranges in nature, further monitoring on the natural habitat is required.

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