

## A Study of Epidermal Patterns of the Leaf Blades on Korean Sedges, *Eriophorum*, *Fuirena*, *Kobresia*, *Rhynchospora* and *Scirpus*(6)

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### 韓國產 沙草科 植物 잎의 表皮型에 對하여(6)

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#### Abstract

Author has studied and reported on taxonomy of Korean sedges, using gross morphology, anatomy and epidermal patterns of the leaf blades(1969, 1971, 1973, 1974).

This paper is the 6th report of epidermal patterns of leaf blade on sedges and includes 5 genera, *Eriophorum*, *Fuirena*, *Kobresia*, *Rhynchospora* and *Scirpus*. The author proposed to find epidermal patterns of leaf blades as an important taxonomic characteristic of sedges classification. The result of this study, the elements of leaf epidermis, subsidal cells, silica body, cell wall of long cell, prickles, and arrangement of the elements are considered to be significant characteristics for the identification and classification of sedge.

#### Introduction

Since 1969, I have reported epidermal patterns of the leaf blades on Korean sedges (1969, 1971, 1973, 1974) and found them to be very useful characteristics for the identification and classification of sedges.

This study of sedges used 5 genera, *Eriophorum*, *Fuirena*, *Kobresia*, *Rhynchospora* and *Scirpus*, and proposed to find the epidermal patterns of leaf blades as an important taxonomic characteristics for the species level.

#### Materials

The materials for the study mainly consisted of dry leaf blades preserved in the herbarium of

Ewha Womans University. Some fresh materials were also collected by the author and Professor Yong No Lee from different localities in Korea.

The widest portions of the leaf blades of the basal leaves were used for peeling of epidermis.

These sedges included 5 genera and 12 species are as follows:

Specimen number	Species	Locality
1293	<i>Eriophorum gracile</i> Koch. subsp. <i>coreana</i> (Palla) T. Koyama	Daekwanryong, Kangwondo
2053	<i>Fuirena ciliaris</i> (L.) Roxb.	Isl. Chejudo
2041	<i>Kobresia bellardii</i> (All.) Degland	Daekwanryong, Kangwondo
1097	<i>Rhynchospora chinensis</i> Nees & Meyer	Isl. Chuchado, Chejudo

1625	<i>R. faberi</i> C. B. Clarke	Mt. Achasan, Seoul
422	<i>Scirpus fluviatilis</i> (Torr.) A. Gray	Hyolli, Kyonggido
394	<i>S. fuirenooides</i> Maxim. subsp. <i>jaluanus</i> T. Koyama	Songhyunri, Kyonggido
1180	<i>S. maritimus</i> Linne	Kuncha, Kyonggido
1630	<i>S. mitsukurianus</i> Makino	Ilyong, Kyonggido
427	<i>S. radicans</i> Schk.	Lake Changcha, Seoul
435	<i>S. triquetus</i> Linne	Lake Changcha, Seoul
1125	<i>S. wichurai</i> Böckl. subsp. <i>asiaticus</i> (Beetle) T. Koyama	Mt. Chirisan, Chonnamdo

### Method

The leaves were softened by boiling in water for about thirty minutes. The leaves were peeled with a razor blade and Observation was made under the microscope with 100X-magnification.

### Observation

1293 *Eriophorum gracile* Koch. subsp. *coreana* (palla) T. Koyama

Subsidal cell high dome shaped. Stomata 31-34-38 microns long, 19-21-23 microns wide. The stomata scattered at the intercostal zone. Long cell 63-76-88 microns long, 13-15-19 microns wide, the cell wall slightly sinuous. Silica body A2-shaped.

2053 *Fuirena ciliaris* (L.) Roxb.

Subsidal low dome shaped. Stomata 45-55-66 microns long, 25-28-31 microns wide. The stomata scattered at the intercostal zone. Long cell 100-136-166 microns long and 27-35-41 microns wide, the cell wall sinuous. The prickles present at the both leaf blades. Silica body A4-shaped.

2041 *Kobresia bellardii* (All.) Degland

Subsidal cell dome shaped. Stomata 45-50-53 microns long, 28-31-34 microns wide. The several rows of stomata present at the intercostal zone. Long cell 75-126-164 microns long 25-33-39 microns wide, the cell wall very sinuous. Silica body not confirmed.

1097 *Rhynchospora chinensis* Nees & Meyer

Subsidal cell crescentiform shaped. Stomata 38-41-44 microns long, 25-28-31 microns wide. The stomata rows alternate with few rows of long cell at the intercostal zone. Long cell 97-118-139 microns long, 17-21-22 microns wide, the cell wall shallowly wavy. Silica body A2-shaped. Papillae present only at the adaxial surface of leaf blade.

1625 *R. faberi* C. B. Clarke

Subsidal cell dome shaped. Stomata 28-31-34 microns long, 14-16-19 microns wide. The stomata scattered at the intercostal zone. Long cell 70-99-144 microns long and 13-15-17 microns wide, the cell wall deeply wavy. Silica body A4-shaped.

422 *Scirpus fluviatilis* (Torr.) A. Gray

Subsidal cell dome shaped. Stomata 27-30-33 microns long and 15-19-21 microns wide. The stomata scattered at the intercostal zone. Long cell 52-60-71 microns long and 8-12-15 microns wide. The cell wall slightly sinuous. The stomata rarely present at the adaxial surface. Silica body A2-shaped.

394 *Scirpus fuirenooides* Maxim. subsp. *jaluanus* T. Koyama

Subsidal cell dome shaped. Stomata 31-34-36 microns long and 16-18-19 microns wide. Five rows of stomata present at the intercostal zone. Long cell 63-87-110 microns long and 11-15-22 microns wide, the cell wall very sinuous. The stomata rarely present at the adaxial surface of leaf blade. Silica body A1-shaped.

1180 *S. maritimus* Linné

Subsidal cell dome shaped. Stomata 31-34-36 microns long and 14-18-22 microns wide. The stomata scattered at the intercostal zone. Long cell 50-62-78 microns long and 13-15-19 microns wide, the cell wall shallowly wavy. Silica body A2-shaped.

1630 *S. mitsukurianus* Makino

Subsidal cell dome shaped. Stomata 33-37-42 microns long and 17-18-21 microns wide. The stomata scattered at the intercostal zone. Long cell 63-80-92 microns long and 13-17-21 microns wide. The cell wall very sinuous. Silica body A2-shaped.

427 *S. radicans* Schkuhr

Subsidal cell dome shaped. Stomata 31-35-35 microns long and 17-20-22 microns wide. Five or nine rows of stomata present at the intercostal zone. Long cell 53-72-113 microns long and 9-14-17 microns wide, the cell wall deeply wavy. Silica body A2-shaped.

435 *S. triqueter* Linné

Subsidal cell dome shaped. Stomata 33-36-41 microns long and 19-24-28 microns wide. One or two rows of stomata present at the intercostal zone. Long cell 53-67-88 microns long and 13-15-19

microns wide, the cell wall shallowly wavy. Five or six long cell rows present at the intercostal zone. Silical body A2-shaped.

1225 *S. wichurai* Böcklr subsp. *asiaticus* (Beetle) T. Koyama

Subsidal cell dome shaped Stomata 31-38-41 microns long and 23-26-28 microns wide. Several rows stomata present at the intercostal zone. Long cell 56-70-73 microns long and 19-20-23 microns wide, the cell wall very sinuous. Silica body A2-shaped.

Key to epidermis of leaf blades on some sedges in Korea

- A. Stomata present only at the abaxial surface
    - B. Prickles present at the both leaf blades.....*Fuirena ciliaris* (L.) Roxb.
    - B. Prickles absent at the both leaf blades
      - C. Papillae present only at the adaxial surface.....*Rhynchospora chinensis* Nees & Meyer
      - C. Papillae absent
        - D. Subsidal cell high dome shaped.....*Eriophorum gracile* Koch. subsp. *coreana* (Palla) T. Koyama
        - D. Subsidal cell dome shaped
          - E. Cell wall deeply or shallowly wavy
            - F. Cell wall deeply wavy
              - G. Silica body A2-shaped, Stomata 31-35-39 microns long, 17-20-22 microns wide.....*Scirpus radicans* Schk.
              - G. Silica body A4-shaped, Stomata 28-31-34 microns long, 14-16-19 microns wide.....*Rhynchospora faberi* C.B. Clarke
            - F. Cell wall shallowly wavy
              - G. One or two rows of stomata present at the intercostal zone.....*Scirpus triqueter* Linné
              - G. The stomata scattered at the intercostal zone.....*Scirpus maritimus* Linné
          - E. Cell wall very sinuous
            - F. Several rows stomata present at the intercostal zone
              - G. Stomata 45-50-53 microns long and 28-31-34 microns wide.....*Kobresia bellardii* (All.) Degland
              - G. Stomata 31-38-41 microns long and 23-26-28 microns wide.....*Scirpus wichurai* Böcklr. subsp. *asiaticus* (Beetle) T. Koyama
    - F. The stomata scattered at the intercostal zone, Stomata 33-37-42 microns long and 17-18-22 microns wide.....*Scirpus mitsukurianus* Makino
- A. Stomata present at the both surfaces of leaf blade
  - B. Cell very sinuous, Silia body A1-shaped.....*Scirpus fuirenoides* Maxim. subsp. *jaluanus* T. Koyama
  - B. Cell wall slightly sinuous,† Silica body A2-shaped.....*Scirpus fluvistilis* (Torr.) A. Gray

### Conclusion

This report is a study of comparison of Korean sedges, 5 genera and 12 species, with epidermal patterns of leaf blades.

There are many characteristics on epidermal elements of leaves, subsidal cells of stomata, silica bodies, long cell walls, prickles and papillae.

Subsidal cells of stomata are classified as dome, high dome, low dome, and crescentiform shaped.

The author recognized that the shape of subsidal cell, and arrangement of stomata are significant characteristics among the taxa on the Korean sedges.

The subsidal cells of crescentiform shaped are present on the taxa of *Rhynchospora chinensis* Nees & Meyer, while the subsidal cells of *Eriophorum gracile* Koch. subsp. *coreana* (Palla) T. Koyama is very high dome shaped. Dome shaped subsidal cells are present on the *Fuirena ciliaris* (L.) Roxb., *Kobresia bellardii* (All.) Degland, *Rhynchospora faberi* C.B. Clarke and genus of *Scirpus*.

The stomata of *Fuirena ciliaris* (L.) Roxb. is very large and measured 45-56-66 microns long and 25-28-31 microns wide. The smallest stomata are 27-30-33 microns long and 15-19-21 microns wide, which presented epidermis of *Scirpus fluvialilis* (Torr.) A. Gray. The smallest long cells were present on the leaves of *Scirpus fluvialilis* (Torr.) A. Gray, while the largest ones occurred on *Fuirena ciliaris* (L.) Roxb.

The cell walls of long cells are variously wavy, deep, shallow, slightly or sometimes very sinuous. Silica bodies are characteristics as A1, A2 and A4 form. Species of *Fuirena ciliaris* (L.) Roxb. differ from other species. They present prickles on epidermis at intercostal zones of both leaf surfaces.

*Rhynchospora chinensis* Nees & Meyer has papillae on epidermis at fundamental tissue of adaxial surface.

Especially, two taxa of *Scirpus fuirenoides* Maxim. subsp. *jaluanus* T. Koyama and *Scirpus fluvialilis* (Torr.) A. Gray has stomata on both surfaces of the leaf blades.

The result of the study, epidermal patterns of leaf blades on sedges, seems to be very good characteristics for taxonomy of genera and species. (See key and pictures based on epidermal patterns of leaf blades)

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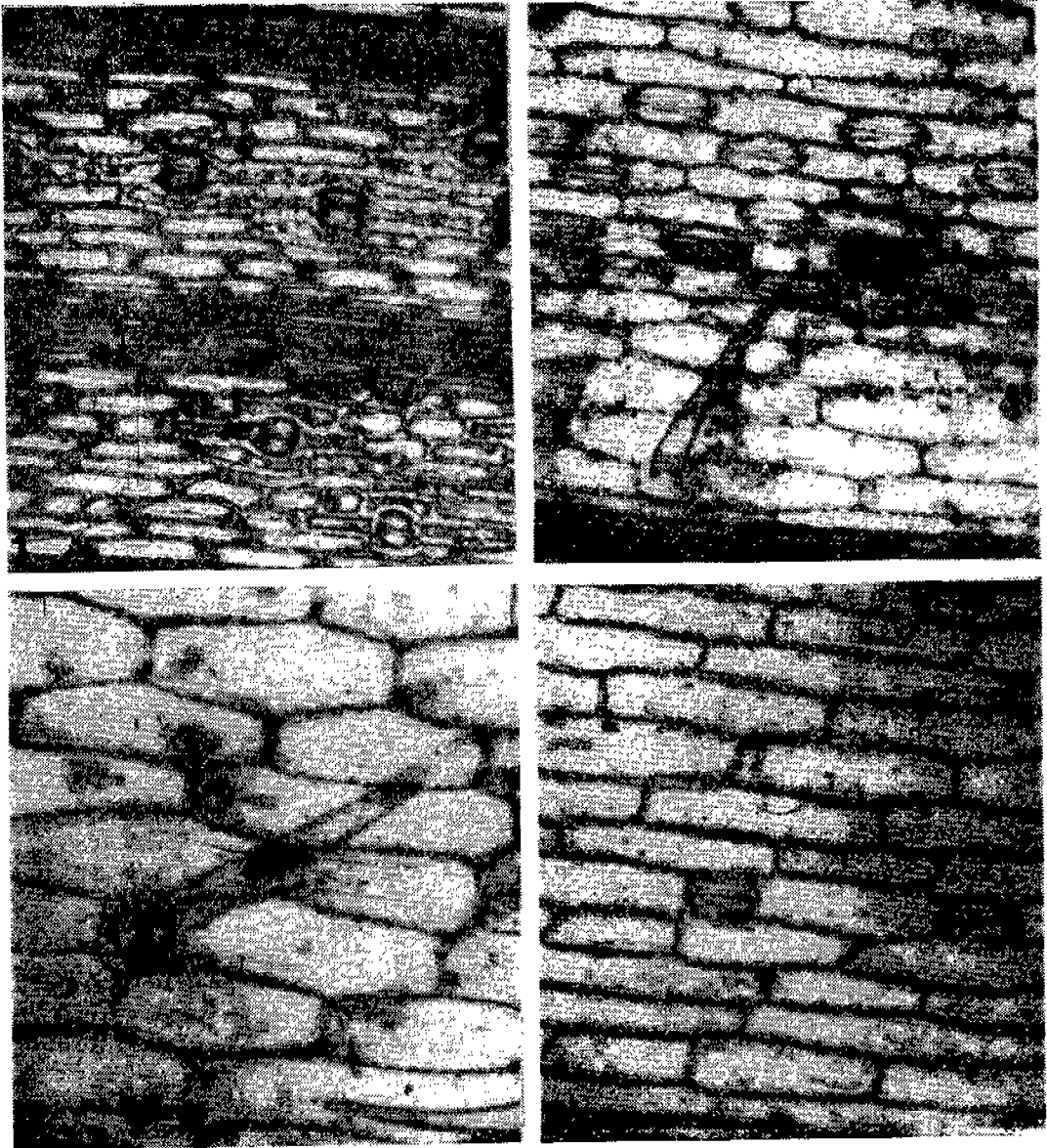


Plate 1. Epidermis of leaf blades (abaxial and adaxial)

1. *Eriophorum gracile* Koch. subsp. *coreana* (Palla) T. Koyama(ab.)
2. *Fuirena ciliaris* (L.) Roxb. (ab.)
3. *F. ciliaris* (L.) Roxb. (ad.)
4. *Kobresia bellardii* (All) Degland (X230)

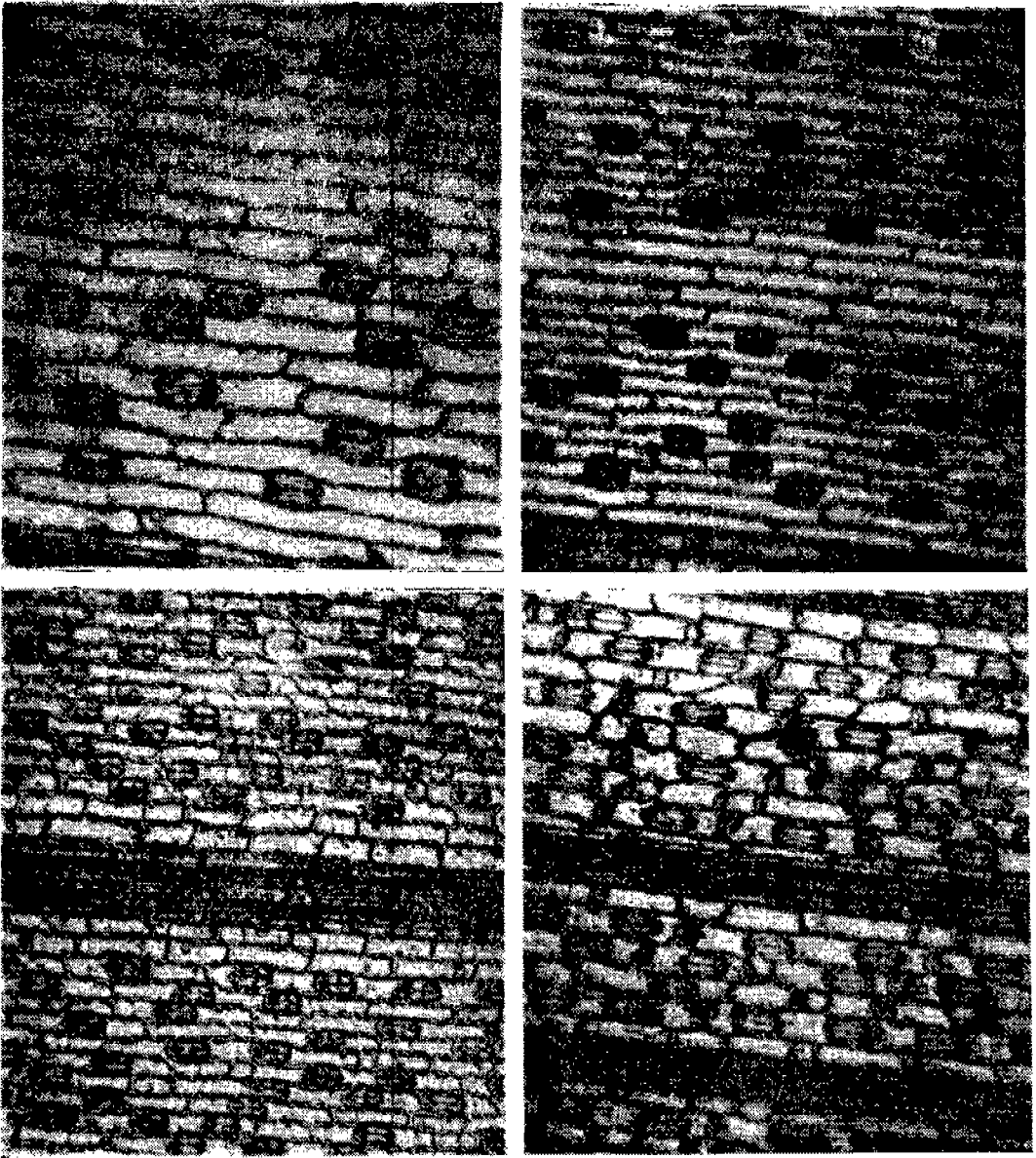


Plate 2 Epidermis of leaf blades (abaxial)

- 5 *Rhynchospora chinensis* Nees & Meyer (ab.)
6. *R. faberi* C. B. Clarke (ab.)
- 7 *Scirpus fluvialis* (Torr.) A. Gray (ab.)
8. *S. maritimus* Linne (ab.) (X230)

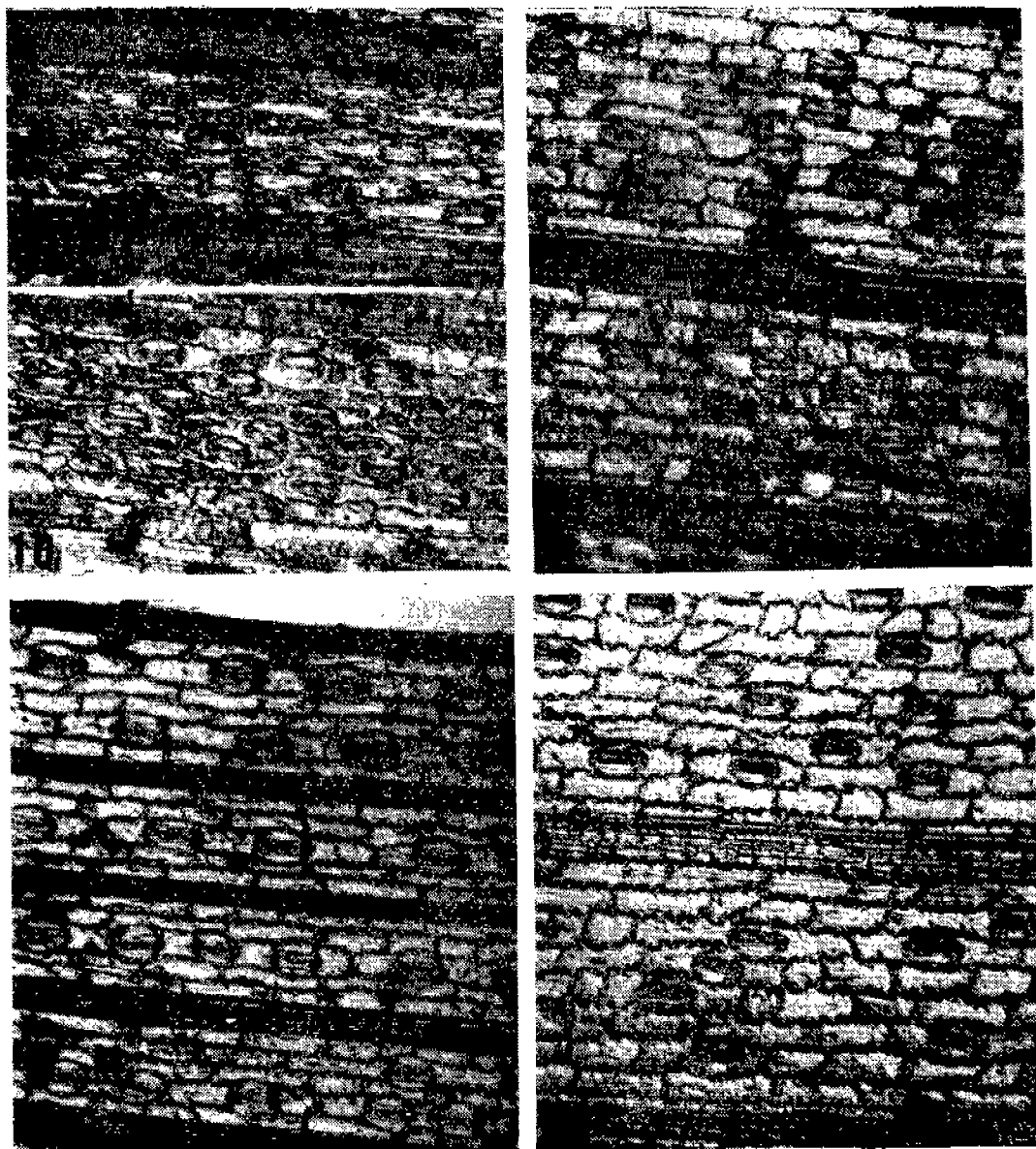


Plate 3 Epidermis of leaf blades (abaxial)

9. *Scirpus fuirenooides* Maxim. subsp. *jaluanus* T. Koyama (ab.)
10. *S. mitsukurianus* Makino (ab.)
11. *S. radicans* Schk. (ab.)
12. *S. triqueter* Linne (ab.)
13. *S. wichurai* Böckl. subsp. *asiaticus* (Beetle) T. Koyama (ab.) (X230)

## 學 會 消 息

1974年度 春季學術大會

- 期間 : 1974年 5月 18日—19日(2日間)
- 場所 : 林業試驗場中部支場(光陵)
- 參加人員 : 86名

### 研究論文發表要旨

#### ① 韓半島의 潛在植物圖에 關하여

(中央大 文理大·任良宰)

韓半島의 植生圖는 아직 밝혀진 바 없다. 筆者는 韓半島의 森林帶가 氣候, 特別 溫量指數에 依하여 區分됨에 着眼하여 溫量指數의 水平 및 垂直 分布에 依據하여 潛在植生圖를 作成하였다.

먼저 100萬分之1地形圖(中央地圖文化社刊)에 따라 標高 100m마다 溫量指數를 計算하여 水平 및 垂直을 一元化해서 韓半島全域의 溫量指數의 有意한 等指線(外國의 例로 보아)으로써 潛在植生圖로 삼았다.

氣象資料는 148箇所(測候所와 簡易測候所)의 資料를 利用하였다. 韓半島 全域을 45km×45km의 mesh에 걸쳐 본 즉, 대개 그 속에 1~2箇의 測候所가 들어가거나 北部 高原地帶에서는 하나도 들어가지 않는 곳이 있었다. 2箇 以上이 있는 곳에서는 2箇의 平均値로, 없는 곳에서 隣接値의 값을 使用했고, 區間사이의 隔差가 생기는 곳에서는 適當히 線을 이었다. 各地의 上空面의 氣溫은 逸減率 0.55°C/100m로 算出한 理論値에 依했다. 또 같은 方法으로 寒冷指數의 等指線分布圖를

作成하여 潛在植生의 判讀에 參考로 하였다.

上記 두 地圖는 既往의 森林帶(Uyeki)나 앞으로 만들 顯生植生圖의 判讀에 도움이 될 것으로 본다.

#### ② 光陵의 數種 봄꽃에 對하여

(建國大 文理大·李一球)

1970年 3月부터 1973年 9月까지의 光陵의 落葉樹林下에 自生하는 下床植物인 多年生草本 *Erythronium japonicum*, *Symplocarpus renifolius*, *Adonis amurensis* var. *ramosa*, *Corydalis turtchaninovii* var. *genuina*, *Primula sieboldii* forma *spontanea*, *Anemone raddeana*, *Gages lutea*, *Heloniopsis japonica*, *Hylomecon japonicum*, *Convallaria majalis* var. *keiskei* 등 10種 植物의 生活形과 生態를 繼續적인 觀察에 의해서 밝혔다. 그 結果는 다음과 같다.

(1) 供試植物의 生活形의 正確한 開花期를 밝혔다.

(2) 供試植物의 地上部가 樹林下에서 6~7月에는 대개 枯死銷沈하는데 이와 더불어 5~6월에 地中에는 새로운 越冬芽를 形成하고 6~7月에는 休眠에 들어 잠을 밝혔다.

(3) 林冠을 形成하는 落葉樹林의 日射의 生長이 充分히 되기 前 즉 4~5月中에 이들 供試植物은 林床에서 當年의 物質生産을 完了하고 上層植物에 의해서 林床의 光照度가 20%以下로 低下되었을 때는 地中에서 休眠을 하게 되는데 이것은 今西(1949年)가 말하는 habitat segregation(棲分) 또는 Ashby (1960年)가 말하는 ecological niche에 該當되는 現象인 것이다.

본학회지의 발간비 일부는 과학기술처 보조금에 의한 것임