The vascular plants flora of *Cornus officinalis* farmland in Gurye which is designated as National Agricultural and Rural Heritage

Jin Won Kim[1], Choong Hyeon Oh[2]

[1] **Graduate School, Department of Biological and Environmental Science, Dongguk University**

[2] **Department of Biological and Environmental Science, Dongguk University**

Contents

1. Background

- **With the increase in interest and awareness of the importance of agricultural resources, there are domestic and global efforts to preserve and manage such resources**

- **National Agricultural and Rural Heritage Areas are places in which local residents have wisely utilized their natural environments to sustain agriculture, making it possible to maintain their rich natural environments**

- **In order to reflect on such characteristics, domestic and overseas policies on the subject consider the harmony with nature and ecological characteristics of the local agricultural practices**

*Reference: GIAHS Traditional Gudeuljang Irrigated rice terraces(http://gudeuljangnon.co.kr/)

Ⅰ. Background and purpose

1. Background

- **Gurye, in which *Cornus officinalis* farmlands are situated, has a terrain consisting of 77.28% forests, which are unsuitable for farming. In order to overcome such terrain characteristics, people of Gurye began cultivating *Cornus officinalis* to make a living**

- **The history of the plant is long in Gurye, with Sandong-myeon playing host to Korea's first *Cornus officinalis* plant that is approximately one thousand years old**

- ***Cornus officinalis* farming area in Sandong-myeon produces 63.37% of all such plants grown in Korea, with the plant being cultivated and harvested in traditional methods to this day**

- **Also the agricultural districts are protected by stone fences which also act as habitats for various animals and plants**

*Reference: Gurye-gun(2013). National Agricultural and Rural Heritage Application for Cornus officinalis Trees and Habitat

Ⅰ. Background and purpose

- *Cornus officinalis* cultivation is a major source of income for the local residents, and because of its scenic and ecological value, the national government designated the area as a National Agricultural and Rural Heritage
- Furthermore, Guyre is preparing to register the *Cornus officinalis* farmlands as a Globally Important Agricultural Heritage, and so for this the ecological survey is needed

2. Purpose

- The current study aims to investigate and analyze flora features of vascular plants at the *Cornus officinalis* farmlands in Sandong-myeon, Gurye, in order to identify the flora features of the farmlands and utilize the information as a basis for registering the area as a Globally Important Agricultural Heritage

<Pray ritual for rich year>

<Special product market>

<Peel the Cornus officinalis fruit>

*Reference: gurye-sansuyu.com

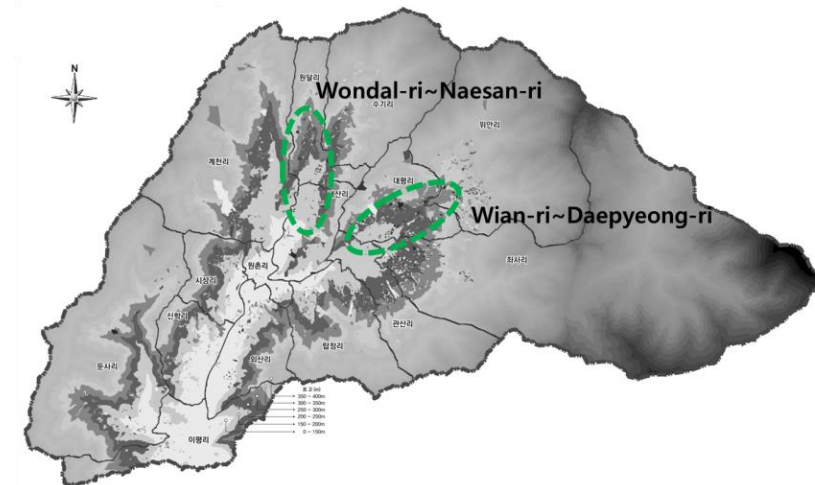## 1. Scope of the survey

- **Temporal range :**

    September 15 ~ 18, 2015

- **Spatial range :**

    The study selected two districts in Sandong (Wian-ri to Daepyeong-ri; Wondal-ri to Naesan-ri) that maintained *Cornus officinalis* farming for a long time and therefore thought to represent the characteristics of such farmlands well

    - ✓ **Wian-ri to Daepyeong-ri : hosts many old *Cornus officinalis* trees, along with 157 main *Cornus officinalis* trees**
    - ✓ **Wondal-ri to Naesan-ri : has a relatively small number compared to Wian-ri to Daepyeong-ri**

Ⅱ. Method

2. Method of researching Flora

- The land use at the studied areas were classified into: forests (bamboo forests and pine forests) adjacent to villages, general farmlands (rice paddies or fields), *Cornus officinalis* farmlands, villages, streams, and cemeteries
- The flora in the districts were studied by researchers walking the designated path, who investigated accessible areas from the path
- The investigation was conducted using Braun-Blanquet Method (Braun-Blanquet, 1913)
- When possible, plants were identified on site, and those that could not be identified were collected and later identified using literature by Lee Wu-cheol (1996), Lee Chang-bok (2003), and Lee Yeong-no (2006)
- The arrangement of the plants and the publishing of their academic names were done so in accordance with Korea Plant Names Index by the Korea National Arboretum and the Korean Society of Plant Taxonomists, as well as Engler System of Classification (Melchior, 1964)
- Naturalized plants were identified 321 Classification by Lee Yu-mi et al (2011), and naturalization rate (NR) was calculated by dividing the number of naturalized plant species by the number of total plant species found in the studied area
- Life form was analyzed with Numata and Asano (1969), which is a detailed expression of Raunkiaer (1934)'s life form

2. Method of researching Flora

Flora Depending on the land use

Analysis and Comparison

Flora Depending on the Existence of Stone Fences at *Cornus officinalis* Farmlands

Flora Depending on the Difference in DBH of *Cornus officinalis*

1. Flora depending on Land use

1) Wian-ri to Daepyeong-ri District

- **According this order, _Cornus officinalis_ farmlands>streams>villages>pine tree forests>fields>cemeteries>rice paddies>bamboo forests, many plants appeared**

- **_Cornus officinalis_ farmlands had Compositae(14.4%), Polygonaceae (8.7%), and Leguminosae (5.8%), in descending frequency**

- **NR(the rate of naturalization) by land use was the highest in fields (19.0%), streams (17.0%), villages (15.9%), rice paddies (14.3%), cemeteries (11.9%), _Cornus officinalis_ farmlands (10.6%), and pine forests (1.3%), with a relatively lower naturalization shown in _Cornus officinalis_ farmlands**
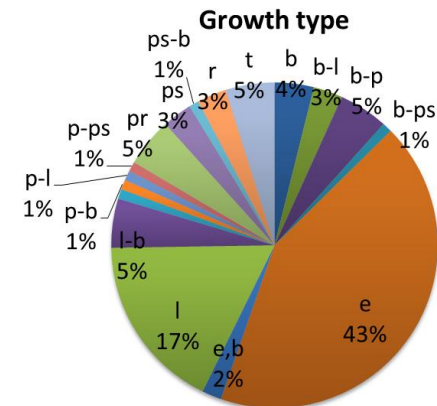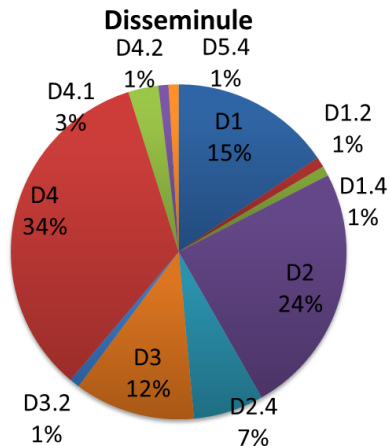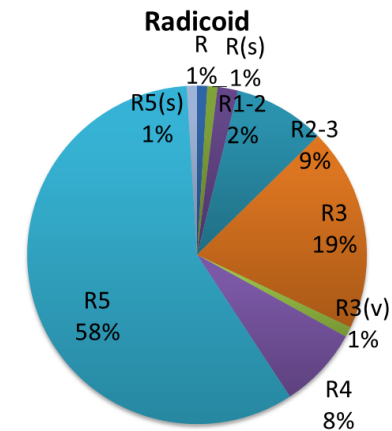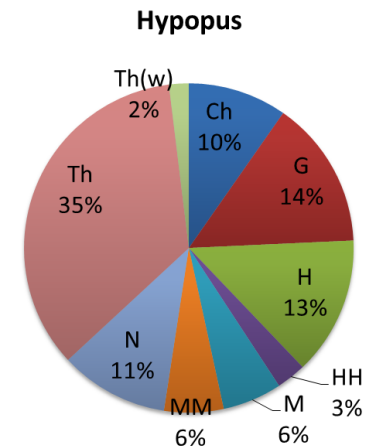
Land Use	Results
Streams	49 Families 78 Genus 76 Species 1 Subspecies 16 Varieties 1 Forma 94 Taxa
Rice Paddies	21 Families 61 Genus 31 Species 3 Varieties 1 Forma 35 Taxa
Bamboo Forests	18 Families 27 Genus 25 Species 5 Varieties 1 Forma 31 Taxa
Villages	47 Families 79 Genus 74 Species 14 Varieties 88 Taxa
Cemeteries	22 Families 40 Genus 34 Species 7 Varieties 1 Forma 42 Taxa
Fields	36 Families 53 Genus 53 Species 5 Varieties 58 Taxa
Cornus officinalis Farmlands	**46 Families 86 Genus 87 Species 1 Subspecies 15 Varieties 1 Forma 104 Taxa**
Pine Tree Forests	42 Families 59 Genus 57 Species 1 Subspecies 16 Varieties 3 Forma 77 Taxa

1. Flora depending on Land use

1) Wian-ri to Daepyeong-ri District

- *Cornus officinalis* showed similar results in rates of every types of life forms with other land uses except bamboo forests and pine tree forests

Hypopus

Radicoid

Disseminule

Growth type

Ⅲ. Results

1. Flora depending on Land use

2) Wondal-ri to Naesan-ri District

- According this order, *Cornus officinalis* farmlands>villages>pine tree forests>rice paddies> streams>cemeteries>fields>bamboo forests, many plants appeared
- *Cornus officinalis* farmlands had Compositae(9.6%), Polygonaceae (6.8%), in descending frequency
- NR(the rate of naturalization) by land use was the highest in fields(25.0%), villages(19.0%), rice paddies(18.0%), cemeteries(12.9%), *Cornus officinalis* farmlands(6.9%), streams(5.7%), and pine forests(3.6%), with a relatively lower naturalization shown in *Cornus officinalis* farmlands

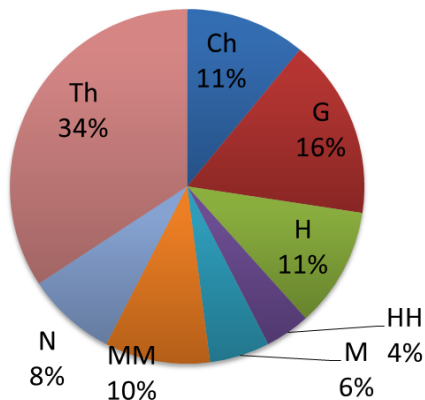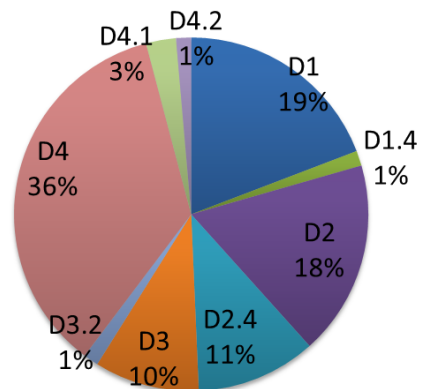| Land Use	Results
Streams	23 Families 229 Genus 23 Species 10 Varieties 2 Forma 35 Taxa
Rice Paddies	21 Families 37 Genus 35 Species 3 Varieties 1 Forma 39 Taxa
Bamboo Forests	18 Families 25 Genus 21 Species 4 Varieties 1 Forma 26 Taxa
Villages	32 Families 55 Genus 51 Species 6 Varieties 1 Forma 58 Taxa
Cemeteries	17 Families 28 Genus 28 Species 2 Varieties 1 Forma 31 Taxa
Fields	16 Families 27 Genus 26 Species 1 Varieties 1 Forma 28 Taxa
Cornus officinalis Farmlands	**41 Families 62 Genus 56 Species 16 Varieties 1 Forma 73 Taxa**
Pine Tree Forests	32 Families 47 Genus 44 Species 7 Varieties 4 Forma 55 Taxa

1. Flora depending on Land use

2) Wondal-ri to Naesan-ri District

- *Cornus officinalis* showed similar results in rates of every types of life forms with other land uses except bamboo forests and pine tree forests
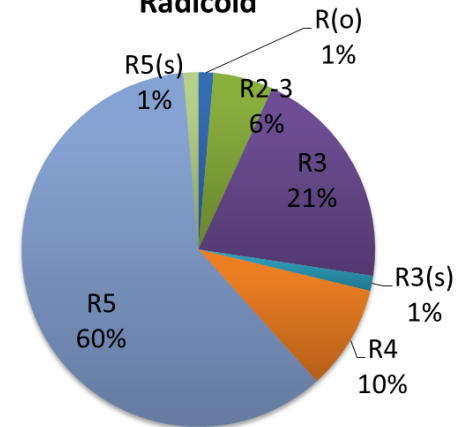

Hypopus

Ch 11%
G 16%
H 11%
HH 4%
M 6%
MM 10%
N 8%
Th 34%

Radicoid

R(o) 1%
R5(s) 1%
R2-3 6%
R3 21%
R3(s) 1%
R4 10%
R5 60%

Disseminule

D4.1 3%
D4.2 1%
D1 19%
D1.4 1%
D2 18%
D2.4 11%
D3 10%
D3.2 1%
D4 36%

Growth type

ps 4%
r 3%
t 8%
t-p 1%
b 4%
b-l 3%
b-p 5%
b-ps 1%
pr 4%
p 1%
p-b 1%
l-b 5%
l 16%
e,b 3%
e,p 1%
e 37%

1. Flora depending on Land use

3) Comprehensive Comparison of the Districts

- Wian-ri to Daepyeong-ri district with more *Cornus officinalis* trees and older trees were shown to have more plant species compared to the district encompassing Wondal-ri to Naesan-ri

- Both districts, however, had the most number of plants at their *Cornus officinalis* farmlands

- In case of *Cornus officinalis* farmlands adjacent to forests, both districts had xylophytes such as *Aralia elata*, *Morus bombycis*, and such farmlands surrounded by stone fences had vine plants such as *Paederia scandens* var. *scandens*, *Parthenocissus tricuspidata*

- Overall, *Cornus officinalis* farmlands were host to more plant species encroaching from forests, rice paddies, and fields

- This is a reflection of the *Cornus officinalis* characteristics, in which the sub-tree *Cornus officinalis* can host other plants on its base, thereby playing a role as a habitat for other species

- In addition, the crown of *Cornus officinalis* creates a lack of light on the ground below, making the environment similar to a deeper forest. This obstructs the introduction of naturalized plants, driving down the NR than other types of land researched

1. Flora depending on Land use

< *Cornus officinalis* farmlands adjacent to forests >

< *Cornus officinalis* farmlands surrounded by stone fences >

[*Morus bombycis*]

[*Aralia elata*]

[*Paederia scandens* var. *scandens*]

[*Parthenocissus tricuspidata*]

2. Flora Depending on the Existence of Stone Fences at *Cornus officinalis* Farmlands

- **Stone fences not only mark the borders of farmlands, but also inhibit the evaporation of water in land as well as providing habitat for various animals and plants**
- **The study investigated the difference in flora depending on the existence of stone fences at *Cornus officinalis* farmlands; many species were found at sites with stone fences, but there were no tendencies**
- **However, that the stone fences can host *Ampelopsis heterophylla, Paederia scandens* var. *scandens, Celastrus orbiculatus, Parthenocissus tricuspidata, Cocculus trilobus, Metaplexis japonica, Clematis apiifolia*, and other various types of vine plants**
- **Vine plants can prevent the stone fences from collapsing and host various pollinating insects, ultimately helping *Cornus officinalis* cultivation**

3. Flora Depending on the Difference in DBH of *Cornus officinalis*

- Through on-site observation, the study defined more recent farmlands having plants with less than 8cm of DBH on average, and older ones as having plants with more than 15cm of DBH on average

- In case the average DBH was more than 15cm, the distance between the plants were wider and the plants were generally adjacent to forests, with more cases of stone fences being present at the farmlands

- But in case the average DBH was lower than 8cm, in contrast, the distance between the plants were shorter and the plants were adjacent to villages, rice paddies, and fields, with farmlands being rarely surrounded by stone fences

< *Cornus officinalis* farmlands with the average DBH > 15cm>

< *Cornus officinalis* farmlands with the average DBH < 8cm>

3. Flora Depending on the Difference in DBH of *Cornus officinalis*

- **Wian-ri to Daepyeong-ri and Wondal-ri to Naesan-ri both hosted more plant species in *Cornus officinalis* farmlands with plants that had an average DBH larger than 15cm**

- **This was determined to be caused by the fact that *Cornus officinalis* with DBHs larger than 15cm are mostly located near forests, where more plants can be introduced from**

- **In addition, because the distance between individual trees are wider for larger trees, there is more room for other species to take root**

Classification		Results
Wian-ri to Daepyeong-ri	Average DBH > 15cm	41 Families 74 Genus 73 Species 1 Subspecies 13 Varieties 1 Forma 88 Taxa
	Average DBH < 8cm	25 Families 33 Genus 33 Species 3 Varieties 36 Taxa
Wondal-ri to Naesan-ri	Average DBH > 15cm	36 Families 53 Species 47 Species 14 Varieties 1 Forma 62 Taxa
	Average DBH < 8cm	21 Families 24 Genus 23 Species 4 Varieties 27 Taxa

<Xylophytes in *Cornus officinalis* farmlands where show the average DBH > 15cm>

[*Cudrania tricuspidata*]

[*Zelkova serrata*]

[*Kalopanax septemlobus*]

IV. Conclusion

- The current study was conducted in order to understand the flora of the *Cornus officinalis* farmlands in Sandong-myeon at Gurye, which is registered as a National Agricultural and Rural Heritage

- In order to conduct the study, the flora characteristics were compared and analyzed in terms of land use, existence of fence at the farmlands, and the average DBH of *Cornus officinalis* trees

- The results showed that the *Cornus officinalis* farmlands hosted more types of plants compared to other land use types, but had lower rate of naturalization(NR)

- As for the existence of stone fences at the farmlands, it did not affect the number of plant species present greatly, but farmlands with average DBH larger than 15cm was found to host more types of plant species than those with average DBH lower than 8cm

- It is thought that the most important factor in such results is the characteristics of *Cornus officinalis*. Because it is a sub-tree species, it creates conditions in which plants introduced from nearby patches(mountains, villages, streams, and rice paddies) can take habitation at the lower part of the plant

- In addition, the thicker crown of *Cornus officinalis* creates an environment adverse to the naturalized plants, driving down NR and encouraging the robust habitation of indigenous species

- Furthermore, the existence of xylophytes and various other plant species at older farmlands showed that *Cornus officinalis* trees there are able to grow in harmony with their surrounding environment, despite them being located at a cultivating area
- In conclusion, *Cornus officinalis* farmlands provide habitat for various plant species, thereby playing a role as **ecological axes** that connect forests and villages, which in turn is expected to enhance **biodiversity**
- In order to retain such characteristics of *Cornus officinalis* farmlands, lower-level vegetation under the trees should not be removed, and preserved as they have been growing in the past

Ⅴ. References

- Baek Seung-seok (2015). A Study on the Value-Assessment Criteria of Korea's National Agricultural and Rural Heritage. Sungkyunkwan University Ph.D. Dissertation. p.10

- Gurye-gun(2013). National Agricultural and Rural Heritage Application for Cornus officinalis Trees and Habitat pp.4-24.

- Lee Chang-bok (2003). Coloured Flora of Korea (Vols. I & B). Hyangmunsa.

- Lee U-cheol (1996). Standard Illustration of Korean Plants

- Lee Yeong-no (2006). New Flora of Korea (I & II). Kyohaksa.

- Melchior, H.(1964) A Engler's syllabus de pflanzenfamilien band Ⅱ. Gebruder Borteaeger. Berlin

- Numata, M. & S, Asano(1969) Biological Flora of Japan. Vol, Ⅰ, Tokyo(Jap./Eng.)

- Raunkier, C.(1936) Life Forms of Plantsets and Statistical Plant Geography. Charendon of Illinois press. Urbana USA. 117pp

- The Korean Society of Plant Taxonomists (2007). Korean Plant Name Index (KPNI). Korea National Arboretum.

- You Mi Lee, Soo Hyun Park, Su Young Jung, Seung Hwan Oh, and Jong Cheol Yang (2011). Study on the Current Status of Naturalized Plants in South Korea. The Korean Society of Plant Taxonomists. 41(1): 87-101

- 沼田眞(1975) 歸化植物, 環境科學ライブラリ-13. 大日本圖書

감사합니다
Thank you