Germination patterns of *Chamaecyparis obtusa* Sieb. et Zucc. depending on picking time

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Abstract

Chamaecyparis obtusa Sieb. et Zucc.(Hinoki cypress) is one of the most important tree species for wood in southern part of Korea and seeds of the species needed for plantation are increased. The picking time is regarded as one of the elements to obtain sound seeds. We have observed the fruiting aspects of *Chamaecyparis obtusa.*

3 trees which have the same amount of cones were selected in a *Chamaecyparis obtusa* clonal seed orchard. And 20 cones were picked from them every 10day from August to October. Seeds from the picked cones were microscopic analyzed and set in a glass petri-dish to see the behavior of germination. According to picking time, various shapes like just a liquid type, jelly types and fully matured types of seeds were observed. Also several germs were appeared from the seeds which had picked at the end of August after 20days of seeding. The highest germination rate of about 30% was observed at the period between 20th of September and 10th of October. We have also analyzed the effects of weather data from two consecutive years on fruiting of cypress. Among the climatic factors, daily temperature radiation and the days of precipitation were the main factors for maturation of *Chamaecyparis obtusa* seeds.

Key words : fruiting, seed orchard, picking time, climatic factors

Material and Method

1. General weather information of the seed orchard

C. obtusa seed orchard is in Juju island located at southern part of Korea. The Korean peninsula is located in the mid-latitudes of the Northern Hemisphere and the Temperate Zone with four distinct seasons. Geographically, it lies on the east coast of the Eurasian Continent adjacent to the West Pacific. Jeju Island is a volcanic island lied in 126° 08' 43" ~ 126° 58' 20" of east longitude, 33° 11' 27" ~ 33° 33' 50" (excluding islets) north latitude. The South Sea and

the East China Sea surround the island, encompassing the Jeju Sea Area at the north and south respectively. Should you look at the map on Jeju Island upside down, you can see that it serves as an important advanced base for Korea. In other words, since Jeju Island is located at the heart of Korea, Japan, China, it has, from the past, played a quintessential role in geopolitics around these regions. According to statistics for the year 2000, the area of the Jeju Islands totals 1,848.2㎢, taking up a mere 1.86% of Korea, and also includes a 419.95 km-long coastal line, 8 inhabited islands, and 55 uninhabited ones. The annual average temperature, precipitation and temperature sum arefrom 16℃ to 17℃, 1,300mm to 2,000mm and 4,100℃ to 4,700℃, respectively (refer to table 1).

Table. 1. The general weather aspects at Jeju island of three consecutive years.

Year	2004	2005	2006
Temperature(℃)	17.8	16.2	17.1
Precipitation(mm)	2,018.0	1,390.6	1757.6
Temperature sum(℃)	4727.4	4172.2	4467.6

2. Seed picking germination test

C. obtusa trees which have the average seed productivity had been chosen and assigned to each picking time. The picking time of seeds were designed to each 10 day from 20th of July to 31th of October. The harvested cones were measured by shape. From the cones havested, the seeds were collected and observed. To observe embryos, the seeds were cut and investigated on a microscope. Total of 100 seedswere plated on a glass petridish with wet paper towel. Germination rates calculated according to emerged seeds every day.

Results and discussion

1. Shapes of embryos

The most flowering time was 20th of April. About three month later, different types of embryos were appeared depending on the picking time (refer to figure 1). Two or three seeds were present in a round seed coat (refer to figure 2). At the beginning, a germ-like shape of embryo was taken from the seed picked 30th of July. Around one month later, the size of 1 mm embryo was observed with somewhat hard shape. Another one month later, a normal-like embroy was appeared. The perfect one was from the seeds picked 15th of October. Generally we harvested the seeds of C. obtusa from late September to early October. Even though the perfect shape of

embryo could get at middle of October, the sound seeds would get several days before due to after-ripening.

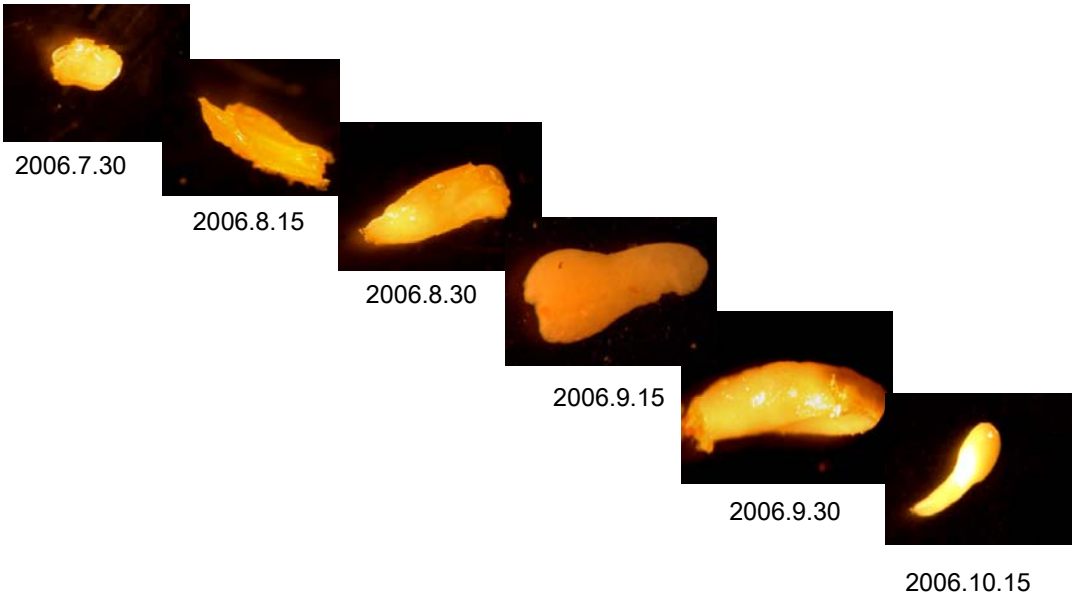

Fig. 1. Various types of embryos depending on picking time of *C. obtusa*

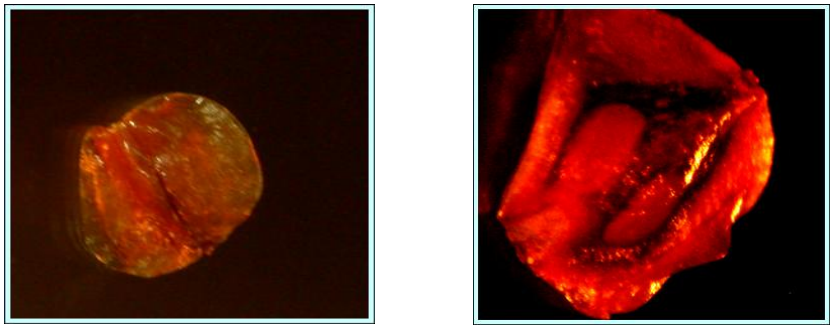

Fig. 2. Seeds (right) in a round seed-coat (left) of *C. obtusa*.

2. Germination rates

The highest germination rate was 30.7%. It was observed from the seeds picked at the 29th of September in 2006. In 2005, 29.7% of rates was appeared from those picked at 19th of September (refer to figure 3). Comparing the rates of two consecutive years, the highest rates was slightly superior in 2006 to 2005. However, around 20days were adequate to collect seeds in 2006, only 10days (from 19th to 29th of September) were in 2005. This was might be caused by the difference of seed production. The amount of seeds produced in 2006 was more than

two times of those in 2005. This result suggested that the amount of sound seeds could be more in a year of abundance than in a bad year.

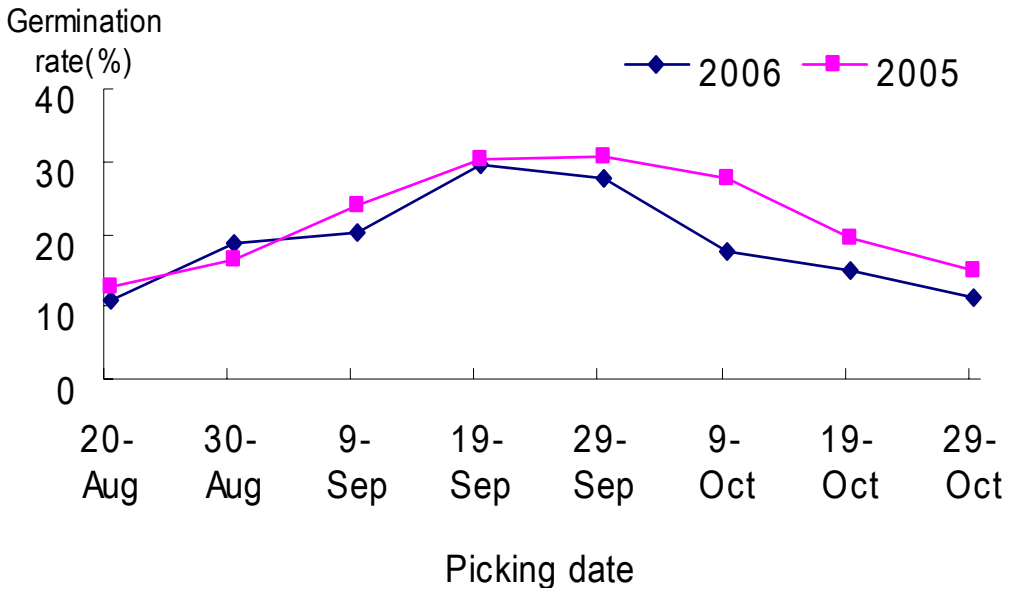

Fig. 3. Germination rate of *Chamaecyparis obtusa* depending on picking time

3. Weather affects on seed production

Seed productivity of a certain tree could be affected by many factors. There are some reports about weather condition affecting on the phenomenon of alternate bearing as well as seed production. Among the weather factors, temperature, the amount of precipitation and sunshine would be key ingredients. Especially the meteorology from April to May could affect decisively on pollination and fertilization. Looking at the amount of sunshine, it was more in 2005 than 2006 (refer to figure 4). The amount of precipitation which could be an adverse effect was higher in 2006 than in 2005 (refer to figure 5). Some scientists suggested that the temperature sum could also affect on the seed production, yet it wasnot significant between two years in this study (refer to figure 6).

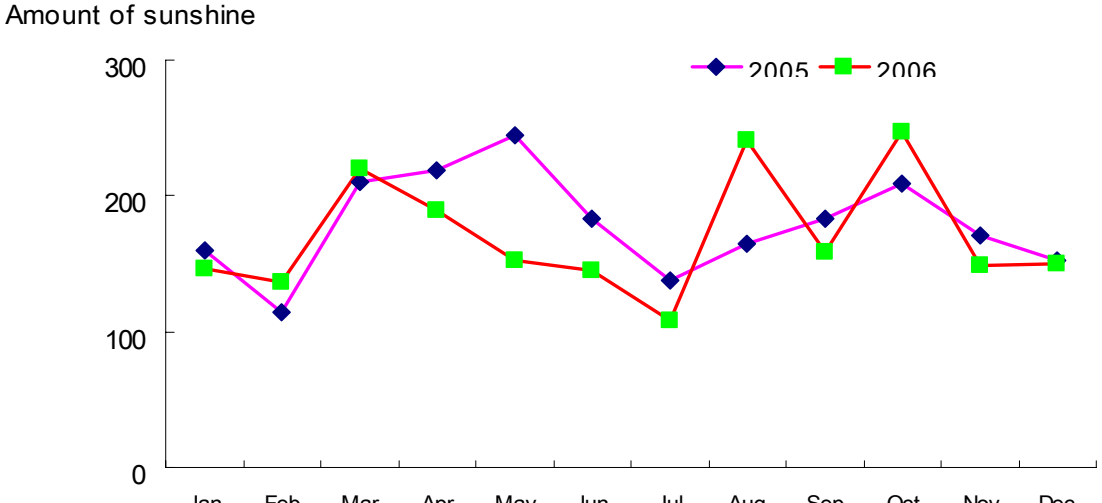

Fig. 4. Monthly sum of sunshine of two consecutive years.

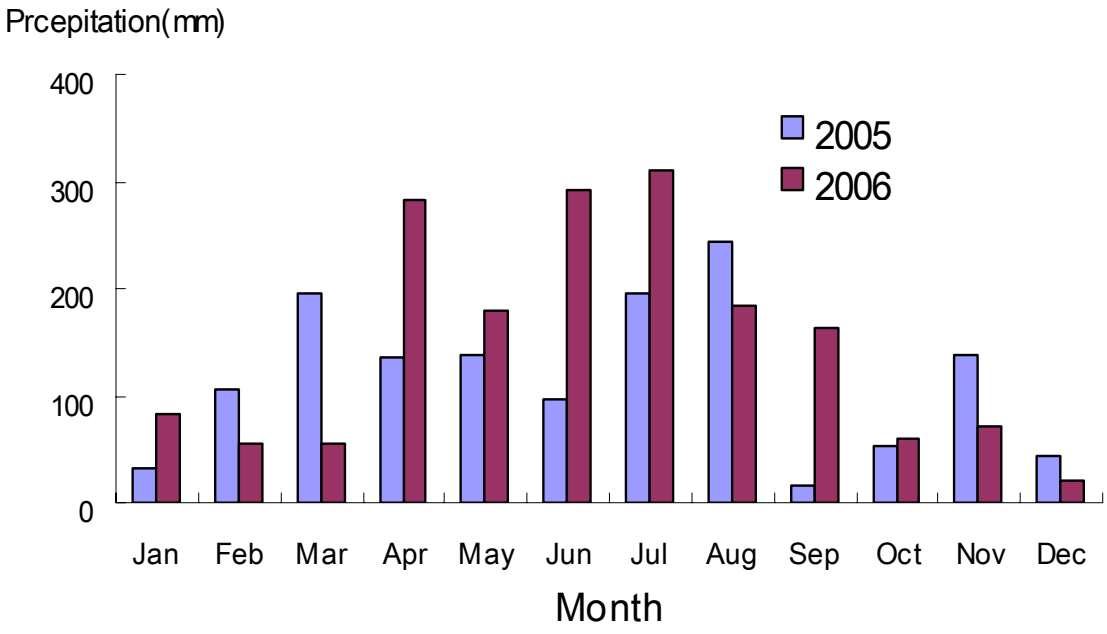

Fig. 5. Monthly sum of precipitation of two consecutive years.

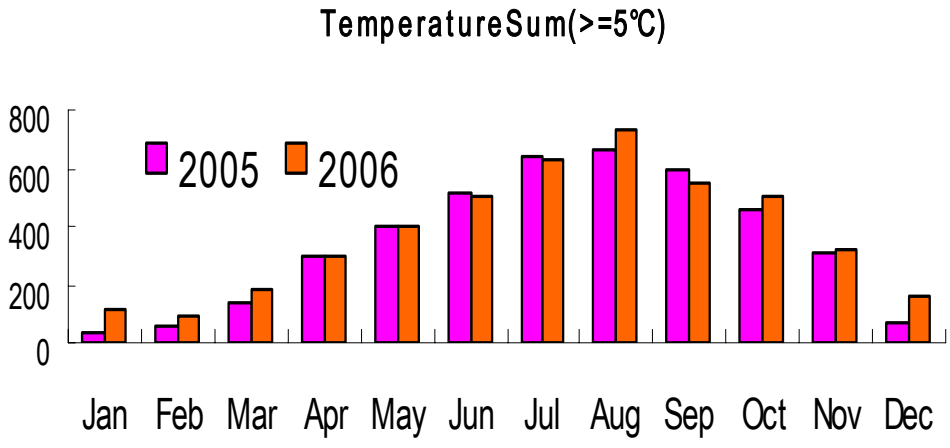

Fig. 6. Monthly sum of temperature of two consecutive years.

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