Flowering and Seeding of Giant Bamboo (Sinocalamus latiflorus)

By TZE-TING WANG and MING-YI CHEN

(Received September 1972)

The giant bamboo (Sinocalamus latiflorus (MUNRO) McCLEARE = Dendrocalamus latiflorus MUNRO) is one of the most important bamboos of Taiwan. It is cultivated at low and medium elevations in all parts of the island. At present there are more than 20,000 hectares of plantations.

This is the largest bamboo in Taiwan. Its culms or stems, which grow to mature size in one year but require another 1-2 years to become fully lignified, reach 25 m in height and 20 cm in diameter. It is widely used for construction purposes and to a limited extent for paper-making. The young shoots are esteemed for food and many plantations have been established primarily for bamboo shoot production.

Bamboo is a perennial grass which can live for many years, new culms arising annually from the sympodial rhizocauls. But if a culm flowers, it dies soon afterward and must be replaced. Thus, flowering is of great practical importance to bamboo farmers as well as to bamboo breeders.

We undertook the present study to learn more about the flowering habits of this species. Our observations extend over a 1% year period from October 1968 to March 1970. That is not long enough to learn all about a species which some farmers say requires a 60-year cycle from seed to flowering. So we have supplemented our own observations with the lore of farmers, but cannot guarantee the accuracy of that lore because of the absence of detailed written records.

Flowering and Seed Production of a Single Clump

All culms in a single clump of giant bamboo flower the same season. Flowering occurs from October to January in Taiwan and is preceded by yellowing of the leaves and branch elongation. On a single culm, flowering starts on basal branches and proceeds upward. By the time of full bloom, most of the leaves have dropped.

For a single branch the period of full bloom varies between 20 and 30 days. Another 50-60 days elapse until the flowers wither. The few seeds we were able to find were mature in early April in Chiayi in northern Taiwan.

The flowers are borne in sessile spikelets which occur at the nodes, 5-10 per node. The spikelets are 1.6-2.5 cm long, slightly flattened and with sharp tips.

Each spikelet consists of 7-10 florets. The florets are bisexual, male ones having six yellow anthers about 6 mm long. Female florets have ovoid ovaries 2 mm across by 3 mm long, smooth below and hairy above. The 2-parted styles are slender and about 7 mm long. The glumes are sharply ovate. The lemmas are ovate, entire and smooth. The paleas are elliptical-lanceolate.

If the flowering culms in a clump are felled, new culms arise which have small leaves and which produce flowers immediately. On this type of culm there are 80-120 spikelets per node. After this secondary sprouting and flowering, the entire clump dies.

Although giant bamboo flowers frequently, seed production is sparse. The few seeds we found occurred one to a spikelet and were in the uppermost florets of the spikelets. The seeds were ovoid, 8 mm long, 4 mm across and 9-10 mm awns at their tips.

We germinated the seeds which we found in Chiayi in Torey's solution. About 80% germinated, requiring only 4 days. Growth was rapid and 6 days after germination the culms were 6 cm tall with one leaf, and the roots were 3 cm long. The young seedlings were field planted at National Taiwan University's Experimental Forest at Chi-tou in Nantou Hsien, central Taiwan.

Frequency of Flowering

Table 1 — Flowering frequency of giant bamboo clumps and age since planting, based upon data from 24 bamboo farms in Taipei and Chiayi Hsien.

<table>
<thead>
<tr>
<th>Age since planting years</th>
<th>Number of clumps studied</th>
<th>Frequency of clumps which flowered and died percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>125</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>313</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>373</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>459</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>36</td>
<td>11</td>
</tr>
<tr>
<td>7</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>29</td>
<td>10</td>
</tr>
<tr>
<td>20+</td>
<td>753</td>
<td>9</td>
</tr>
</tbody>
</table>

Total or average 2,106 7.8
According to farmer's lore, giant bamboo requires more than 60 years from seed to flowering and death. According to our data, the annual rate of clump flowering and death is about 4%, which might be interpreted as showing an average life expectancy of 25 rather than 60 years. However, the logic of this calculation is open to question because we do not know the age from seed of any of our material.

According to farmer's lore intensive cultivation reduces flowering but we were not able to confirm or deny this. And there is a legend that flowering is increased by propagating pieces of the horizontally spreading rhizomes rather than by splitting the clumps vertically again. We were not able to obtain evidence on this point.

Abstract

Giant bamboo (Sinocalamus latiflorus), one of the most important bamboos grown in Taiwan, flowers from October to January. Flowering is preceded by yellowing of the leaves and is followed by death of the clump. The few mature seeds which were found ripened in early April, germinated promptly, and grew 8 cm tall in 6 days. A 2-year survey of 24 bamboo fields in northern Taiwan showed that 3.9% of the clumps studied flowered and died each year. There was no relationship between time of planting and frequency of flowering, the average flowering rates being similar in fields which had been planted 1–3 years and 20+ years. We were not able to determine the effects of cultural practice or age from seed on frequency of flowering.

Key words: Flowering, seed production, giant bamboo, Sinocalamus latiflorus.

Zusammenfassung

Der Riesenbamboo (Sinocalamus latiflorus) hat für Tai- wan eine große Bedeutung. Er blüht dort von Oktober bis Januar. Nach der Blüte seiner Schöllinge stirbt der Wurzelstock (clump) ab. Die wenigen gefundenen Samen reifen Anfang April, keinen sofort, und die Sämlinge wachsen bis zu 8 cm Höhe in 6 Tagen. Eine 2jährige Untersuchung von 24 Bambusfeldern im nördlichen Taiwan ergab, daß jedes Jahr dort 3,0% der Wurzelstücke blühen und abstehen. Es bestand keine Beziehung zwischen der Pflanzzeit der Felder und der Häufigkeit der Blüte von einzelnen Wurzelstock-Horsten.

Short Note

Resin Canal Number Varies in Ponderosa Pine
(Pinus ponderosa Laws.)

By Frederick Denke and Robert W. Funschi

(Received September 1972)

Examination of 77 geographic seed sources of ponderosa pine planted in an uniform environmental garden in 1968 at Kansas State University revealed variation in resin canal number. Of the 77, 62 had a consistent number of two resin canals per needle for the ten seedlings of each source examined. Sampling of 14 other geographic seed sources revealed a variation in one or two of the ten seedlings examined. One seed source, near Arnold, Nebraska, varied from two to seven resin canals with an average of 2.7 for the ten seedlings. Subsequent investigation of needles from this Nebraska origin indicated that their resin canal numbers were consistently high, often as high as eight or ten.

As this origin is isolated from other ponderosa pine populations by more than 100 miles, it may be a seed source for a potential new ecotype.

1) Department of Horticulture and Forestry, Waters Hall, Kansas State University, Manhattan, Kansas 66506.

Referate


Morphologische Symptome bei Tectono-Sämlingen werden beschrieben, die der Mangel an Hauptnährstoffen verursacht. Die Auswirkung auf das Wachstum, die Trockenstube-Produktion und die Nährstoffaufnahme dieser Pflanzen wird untersucht.


Verf. berichtet über seine 2jährigen Versuche, eine Technik zu entwickeln, um Sämlinge von Pinus taeda und P. elliottii var. elliotii unter sterilen Bedingungen mit Fomes annosus (18 verschiedene Herkünfte) zu infizieren.


[Russ. to. sum.]

In presented work is described the karyotype of Picea obovata Ledeb. Author has found, that in karyotype besides normal set of chromosomes are present additional B-chromosomes which are metacentric and rather smaller than normal ones. Their occurrence varies in populations following: 2n + B up to ca. 2%, 2n + 2B up to ca. 3%; 2n + 3B up to 1.8%.

Paula