

PROPAGATION AND AFFORESTATION OF BAMBOO

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I. Seeding breeding of Bamboo

When bamboo is afforested in an area, offset planting method can be used. However, bamboo afforesting in a large area must be conducted by planting bamboo seedlings when they are bred up to the standard. The ways of breeding bamboo seedlings in China are as follows:

1. Seed breeding

Bamboo seeds are able to germinate, so they can be cultivated into seedlings. Bamboo seeds when they are ripe, can germinate as long as they are sown under appropriate temperature, moisture and air, since they have no afterripening. In the tropical zone, where the contrast between rainy seasons and dry seasons is remarkable, it is best to sow bamboo seeds when a rainy season is just beginning, while in the subtropical zone or temperate zone spring is the best season for bamboo seeds to sow. Bamboo seeds can be sown in a green house at anytime of the year. The time between the collecting and sowing of the bamboo seeds is a stage for store. This stage generally should not be too long, otherwise it is apt to germinate. Most of the seeds which are caryopsis-shaped or nut-shaped need to be stored in dry and low-temperature place; a few of them which are berry-fruit-shaped need to be dressed with moist sand and kept in cold storage. Before the bamboo seeds are put in store they must be disinfected with insecticide

and germicide so as to protect the seeds from being eaten by pests or becoming rotten and going bad. The plot for growing bamboo seedlings from seeds requires good drainage, convenient irrigation, loose and fertile and acid soil, which needs to be carefully ploughed and leveled, and formed into seedbeds in rectangle 1.2m. to 1.5m broad; at the same time ditches for drainage should be cut ready. Before being sown the bamboo seeds should be examined on their quality and tested whether they germinate. The quantity of bamboo seeds for sowing is decided according to the results of the examination and the test mentioned above. Small-sized seeds are fit for broadcasting, the medium-sized and large-sized are fit for drilling or dibbling. After sowing the seeds are to be covered with the soil 2~3 times as the thick as the diameter of the seed. Then let the seedbeds covered with hay so to keep the soil moist. After germinating of the seeds, the hay covering the seeded is to be taken away without delay while a shed is to be put up to protect young seedlings from burning sunlight. Young seedling management (1) Weed the seedbed; (2) Water the seedbed to keep its soil moist; (3) Condition the soil to prevent it from being fixed and tight; (4) Apply manure to make the soil fertile and help the bamboo seedlings grow; (5) Prevent and eliminate plant

diseases and pests to guarantee healthy growth of the seedlings. Generally, in the growing season of a year, bamboo seedlings tiller 4 to 6 times. The young seedlings are growing thicker and thicker with each tillering and they crowd together and form a "bamboo culm" or "seedling cluster". Yearly "seedling cluster" of the running type and intermedial type is very similar to clump of cluster type. But only after the growth for a year, when rhizome of seedling cluster of the running type intermedial type come up out of land, will the feature of the diffuse or intermedial bamboo seedlings gradually present. In tropical zone yearly bamboo seedlings can be used for afforestation. In the subtropical and temperate zones some varieties of bamboo seedlings should be bred for two years before they can be used for afforestation.

2. Breeding by layering of culms or nodes

This method is fit for clump seedling of the sympodial type. Such bamboo species as *Bambusa*, *Dendrocalamus*, *Sinocalamus*, *Lingnania*, *Schizostachyum* etc. can be bred in this method. The rainy season or spring is the best time for seedling breeding by these two methods. Selection of breeding material. Breeding material is selected from those bamboo culms having grown for two or three years, well-cultivated and healthily-developed, and without insect pest and plant diseases. Cut down the selected bamboo culms get rid of their tops and branches, reserve the bud on the first one or two nodes of the base of the branches as well as those on the culm. The culm can be used as the material for layering of culms when it is cut off 2/3

deeper of its diameter with a saw on either side of the neighbouring nodes. In some places the sawed culms are soaked in water. After water enters bamboo internodes, the cut is to be sealed with clay. Thus the internodes full of water inside are used as breeding material.

The selection of the breeding plot, preparation for the land and seedbed demand the same requirements as those in bamboo propagation from seeds. Vertical ditches are cut on the seedbed with the span of 0.3m to 0.4m. Then lay the breeding material at the bottom of the ditch, cover it with soil from 3 to 6mm, level the seedbed, cover it with a layer of hay so as to keep the soil moist. In one week or two weeks young seedlings will be growing out of the shoots on the internode of the buried culm. The management of seedlings is the same as that of seed breeding. Young seedlings tiller 4 to 6 times a year. Tillering shoots are getting larger and larger and forming altogether a seedlings cluster.

Breeding by layering of internodes means selecting proper culms for breeding, cutting each one node or two nodes off before burying them respectively into the soil for breeding. The rest of the process of management is exactly the same as that of layering of culms method used for breeding.

3. Breeding by planting-of-slip

Most of the varieties of bamboo which are fit for breeding by layering of node method or layering of node method can be bred by planting of slip. The golden time for breeding by planting of slip is rainy seasons or spring, 10 to 20 days before bamboo shoots. Internodes applied in the layering-of-internode method can be used as slips for planting; and the secondary

branches growing out of the branch on the base culms or young culms growing from seeds can also be used as slips. A few of the branches and leaves may be reserved on the slips. The selection of the breeding plot, preparation for the land and seedbed demand the same requirements as those for bamboo breeding from seeds. When a slip is planted in the seedbed, the node and the base of its secondary branch should be inserted into soil, leaving only a few of its branches and leaves exposed. Water the slip as soon as it is planted, to keep the soil moist, and spray water on the exposed bamboo leaves so as to prevent them from being dry and withering. A shed is needed over the seedbed. Breeding in this way young seedlings will come up approximately in 5 to 10 days. Each year young seedlings are able to tiller 5 to 7 times, growing into bamboo culm used for afforestation.

4. Breeding by layering

This breeding method is basically the same as the layering-of-culm method. The chief difference between them is that in this method the bamboo culm for breeding are not to be cut off from bamboo clump, but to be cut half at the base of the culm. Prune away some of the branches with a part of them reserved, then bend the culm down, bury it in soil, leaving a part of branches and leaves exposed out of the land. In about 2 or 3 months the bud on the base of the secondary branch from the nodes are growing into seedlings. After undergoing tillering for several times they will form seedling cluster themselves, used for afforestation. There are many ways to breed bamboo, nevertheless the basic principles governing the methods are mainly alike. Therefore no further breeding method is to be

introduced here.

1. Breeding by tissue cultivation

In adopting this method, culture media should be prepared and applied in the laboratory. A bamboo seedling is bred out of monocotyledon in the tube then transplant it into soil and further cultivate it into seedling cluster, which can be used as material for afforestation. However this method requires careful work and expensive equipment, it is not yet adopted in production.

II. Bamboo afforestation

When bamboo is afforested choice of area and selection of seeds should be completed. In China afforestation usually involves a large area and natural conditions are complicated, and bamboo species are numerous with different characteristics in nature, so any blind selection of area or seeds will lead to failure in afforestation. There have been a lot of experience, both positive and negative, concerning this in the last thirty years. Now there are divisions of region for bamboo afforestation in different parts of our country and afforestation work is under guidance. The locality for bamboo afforestation generally requires warm weather, fertile and acid land with good drainage. Bamboo is not fit to afforest in saline and alkaline soil, or low-lying land, or heavy-clayed soil or very stony soil. Spring or autumn is the best season for bamboo afforestation. It is best, in the place where rainy season is remarkable, to afforest at the beginning of the rainy season. Chief methods of afforestation of Chinese bamboo

1. Offset planting

Offset planting means to afforest by

selection of healthily-cultivated, normally-developed culms having grown for 2 or 3 years without pest and plant diseases and by transplantation of the "mother culm" together with their rhizomes. When rooting out and transplanting mother bamboo, its rhizomes and root system should be reserved, but the bamboo top is to be cut off with 5 or 6 branches and their leaves reserved. Keep as much soil around the rhizomes and root system as possible so as to protect the shoots and root ball of the mother bamboo should be wrapped in a straw bag or plastic bag and kept humid. Density of plantation is managed according to what variety it is, for example, *Phyllostachys pubescens*, 300 to 450 seedlings per hectare; *Bambusa textilis*, 750 to 900 seedlings per hectare. When planting mother culm, soil should be filled firmly without leaving any big holes in it. When plant hole is filled, the soil should stick out of the ground and preparation should be made for drainage. If bamboo is planted in dry weather, it should be watered without delay so as to prevent mother bamboo from being withered because of shortage of water.

2. Afforestation by stock planting

This method is fit for bamboo seedlings of sympodial type, such as *Bambusa*, *Dendrocalamus*, *Sinocalamus*, *Lingnanea* etc. Select mother culm in terms of requirements needed in offset planting. Root out the stock of the mother bamboo with a bit of root reserved. Keep the culm about a metre long with its top cut off.

This kind of culm with its base culms can be used for afforestation. This method is similar to that of afforestation by offset planting.

3. Afforestation by bamboo seedling

When seedling cluster is used for afforestation, it is called afforestation by bamboo seedling whether the seedling cluster is produced by seedling shoots, or by layering of culm, layering of node, transplanting or by cottage layering.

Bamboo seedling afforestation demands the same technical conditions as offset planting. Afforesting bamboo in this way results in more seedlings, lower cost and higher survival rate and it is fit for afforesting on a large scale, therefore it is widely applied throughout China.

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