

DON'T try to force the water up hill. You won't get uniform coverage. If a slope is present, let the water run down hill.

DON'T try to hoe weeds and grass over a drip line. You'll cut it all to pieces.

DON'T let the line crawl out of the row. Through expansion and contraction the line will get off the row unless kept in place by stakes or soil on the line. The effectiveness of the water application is cut down if the line is not kept in place.

## **PROPAGATION OF BAMBOO BY VEGETATIVE MEANS**

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Of the hundreds of bamboo species grown in the United States only two are native; most were introduced from Asia. Most bamboo grown by commercial nurseries is used for ornamental purposes; however, the uses seem only limited by man's ingenuity and imagination. At our nursery, located at Jefferson Island, Louisiana, we produce container-grown bamboo of both *clump* and *running* species. Specific problems or limitations exist in propagating these plants.

First we will separate and define the two classes of bamboo currently being propagated on a commercial scale.

Clump-forming bamboo typically produce late summer and autumnal growth, each successive cane developing adjacent to the preceding one. They are generally tropical or subtropical and grow constantly if moisture and temperature are right.

Running bamboo produce sprouts very early in the spring followed by underground development until late fall. Generally this type is from temperate climates. By understanding these simplified characteristics, it becomes apparent that many techniques used for one group will be unsuccessful if used on the other without modification.

Since some bamboo do not flower freely or only rarely, seeds cannot be depended on for propagation. Some species flower only once a century. In addition, most species currently in clonal production are maintained for characteristics favored for particular purposes.

Murashige at Riverside, California reports success with

meristem culture of *Phyllostachys*. This will offer tremendous possibilities for those species currently considered to be difficult to transplant or propagate and will also provide for rapid multiplication of some clones where propagation material is scarce.

The following information describes techniques with which we have first hand experience. No laboratory techniques are used, only traditional propagation methods are employed at our nursery.

When propagating clump-forming bamboo a tremendous amount of labor and stock planting are required when the old method of hand digging and separating established clumps is used. We begin by dividing the individual rhizomes, preferably the young peripheral ones. The bare-root rhizome is taken in late spring or early summer to ensure ample growing season before winter. The cane is cut back to a foot or two, depending on the size and species.

The rhizome is then potted in a container of appropriate size. We use a standard potting mix of 5 parts ½-in grade pine bark, 1 part coarse washed sand, 10 lb dolomitic lime, 10 lb starter micronutrient blend, and 12 lb sulfur-coated slow-release fertilizer. Propagules are placed in the growing area fully exposed to the elements and watered daily. By the following spring the rhizomes have given rise to numerous small branched rhizomes with pencil-size canes up to 3 ft tall. This is when the multiplication process really begins in earnest. These plants are shaken free of medium and washed in order to better determine the best point to cut. Each culm is cut free at the narrowest part of the rhizome. These are then potted in 1-gal cans without being allowed to dry out and then cut back about half their height. With warming weather these propagules grow rapidly, and the process is repeated. If placed in a heated greenhouse, the rate of multiplication is improved dramatically. Most clump-formers are tropical and are often damaged when left unprotected in containers. Last winter our canned stock survived remarkably well with a 11°F low and with a solid freeze for 3 days. Established plantings were killed to the soil level, however; only container plants lost tips and most foliage. This may be due to conditioning and salt levels.

When more rapid establishment of a salable plant is desired and when sufficient stock is available in containers we merely remove the clump from a 5- or 10-gal container, then cut straight through the ball of roots. After each cut the halves are turned and halved again. Good 5-gal plants will easily produce 8 wedge-shaped divisions consisting of numerous

small canes. Tops are cut back, then potted and placed out in the nursery to continue growing. By the fall we have salable 5-gal plants. In addition to the starter fertilizer and sulfur-coated products, we spoon feed each can with urea formaldehyde products every 6 wks. Some of these plants will be kept to divide for the following crop.

*Bambusa glaucescens* culm can be cut late in autumn and individual joints inserted vertically in a ground bed, barely covering the dormant buds. By spring many of these buds will develop roots and begin active growth. It is important to note that the current season's canes have insufficient stored nutrient to produce reliable results. Canes each year should be selected. Some have reported success by covering the cane horizontally like sugar cane. We have not been very successful with this method.

Basically if culm size is kept too small by frequent division and limited rooting area, numerous culms develop rather than a few heavy canes.

With respect to running bamboo, timing is much more crucial. Running types produce a tremendous amount of above ground growth in a few weeks in early February and March. Growth of 48 in. per day has been reported from Japan; however, in Louisiana we have measured only 18 in. in a 24-hour period. This is a tremendous drain on the stored nutrient level in the rhizomes. Consequently we have on and off years. The complete culm is pushed up in a few weeks; this is followed by gradual expansion of the rhizomes until the beginning of winter. At this time carbohydrate levels begin to increase in preparation for the following spring's growth. We consider the optimum time to take parts for propagation is in February, just prior to sprouting.

We usually have two types of running bamboo, based solely on stature. Small types, less than ½ in in diameter, are propagated solely by division, whereas larger kinds are produced primarily from rhizomes.

Since the division method has been described already under clump formers, the following information applies to the large running bamboo, mainly the genus *Phyllostachys*. In order to begin a propagation program and continue it year after year without an extraordinary amount of labor, we chose to containerize the whole process.

During February, 1-year-old canes are dug from an established plant, cut back and canned in 10- or 20-gal containers. The cut back is made sufficiently high to preserve some 4 or 5 branches. One-year-old canes in full sun are best since they are adjusted to high light levels, branch lower, and are usually

easier to remove. These can easily be spotted since the protective sheath about the base remains intact only for the 1st year, decomposing before the 2nd year.

Another method which we employ involves digging 1-year-old rhizomes, which are usually barely covered by 2 or 3 in. of topsoil and leaf litter. One-year-old rhizomes are also covered by a protective paper-like sheath. Once you find a suitable rhizome, you can often rip it up like a cable 6 or 8 ft at a time. These must be kept moist before planting, or viability is seriously reduced. The heavier rhizomes produce the best results; in addition, the larger the pieces, the stronger the growth. We cut this rhizome into 1-ft sections and place on an angle in 5-gal cans for large species with  $\frac{3}{4}$ -in. thick rhizomes. Smaller rhizomes can be placed in smaller cans, with lengths reduced proportionate to the diameter and can size. After 2 years these plants will have produced sufficient number of rhizomes to allow removal of material for propagation.

The increase begins at this point. The plants are removed from the containers after this means destroying the container since rhizomes will have burst the can, or are so tight that you must cut the can to remove it. This is also performed in February. Now exposed, the end of the rhizome is grasped and pulled free from the ball that it encircles. If roots are too tough, hand shears make quick work of this. The rhizome is cut in 6-in. sections and potted directly while still fresh. The buds nearest the top develop. This method requires that new strong stock plants be coming on for each new crop. This stripping of rhizomes does not ruin the stock plant since only exterior rhizomes are removed. The reason for bringing in new stock is related to the root-bound condition that quickly develops. Shift up to a larger size is only practical to a point due to the excessive weight involved in healthy stock. We have used cans as large as 45-gal but feel that 20 gal is more practical. This method produces all fresh previous-year's rhizomes with tremendous nutrient level due to high fertility rates.

A major problem with this method is the tendency of the plants to escape through the drainage holes. This makes removal of the container very difficult. The major advantage is the ease with which the rhizomes are made available for propagation. When space is at a premium, many different kinds can be maintained, whereas in the soil they tend to grow together and become impossible to separate since some are almost indistinguishable from each other except when sprouting.

In summary, we may conclude that the most important element to consider when propagating bamboo is timing to coincide with the distinct growth cycle of the plant.