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Summary : The phenomenon of flowering has been described with particular reference to Bamboo species used for paper manufacture. The difficulties experienced by Paper Mills in exploitation of flowered bamboos are described and solutions to these problems have been suggested.

Introduction :

There are some species of plants which flower profusely after a gap of certain fixed years. The flowering interval is practically independant of weather conditions. Only sporadic flowering or even no flowering takes place in the intervening years. Strobilanthes is the best known genus which behaves this way. A twelve year interval between flowering is well established for S. Wallichii and S. atropurpureus.

Still more striking is the behaviour of bamboos. Here a whole ronge of flowering intervals is encountered from a long cycle with practically no flowering between times, to flowering so irregularly that some flowers can be found every or nearly every year. The periodic flowering affects in the same year

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Flowering of Bamboo in Relation to Paper Manufacture

practically all the plants of the species growing over a tract of country of varying extent, the remainder usually flowering during the next year or two. The whole range of species is, however, not affected in the same year, and the flowering usually proceeds in a waveform across it. After such gregarious flowering, the plants with rare exception die, and a new seedling crop replaces them. Flowering generally takes place from November to February and the grain like seeds fall from April to June and germinate during the rains of the same years.

Causes of flowering :

It is very difficult to enumerate the causes of bamboos. However, the following factors were observed effective by different Foresters at different times :

- (i) age
- (ii) climatic influences
- (iii) Physiological influences.

Brandis mentions the Burmese belief of the non production of new culms before the bamboo is to flower. Troup mentions that this has actually been confirmed by observations. But P. N. Deogun says that for Dendrocalamus Strictus this is doubtful.

Reproduction of bamboo :

Under naturals conditions the seed germinates at the commencement of

the rainy seaon. The whole ground round about the clumps becomes full of large number of seedlings. The seedlings do not like shade and are also supposed by heavy growth of weeds. Grazing and fire are inimical to the seedling growth.

Bamboo reproduction can be done artificially by sowing the bamboo seeds in lines 14'-15' apart 4''-6'' deep. For transplanting 9''-12'' deep pits with a dia of 6-2'' at $10' \times 10'$ or 15' spacing may be made before hand.

Rhizome plantings have shown the best results. 9"-12" rhizomes are cut from the forest stand containing one eye atleast and are transplated.

Pattern of flowering of different species of bamboo cycle.

Species	Flowering cycle
Arundinaria falcata	28-30 years.
Ochlandra travancor	ia -do-
Bambusa polymorph	a 55-60 years
Dendrocalamus	
strictus	30-40 years
Melocana baccifera	30-40 years
Bambusa	
arundanceae	32-34
Bambusa tulda	40 years

Effect of Flowering of bamboo on exploitation for paper manufacture.

1. Fire hazard — Bamboos catch fire by friction, incidiniary

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and accidental fires are also common.

2. Problem of exploitation— Arrangement of labour and their management becomes difficult since extra labour is required for quick exploitation of the affected forest.

3. Transport difficulties—Again the arrangements with Railway and transporting agencies comes up as a problem, to carry the cut material to depots and Mill yard.

4. Storage stacking—A vigilant eye on the material is needed to safeguard it against insect and fungus attack and consequent deterioration.

5. The problem of raw materrial after sometime arises. For 2 or 3 years the bamboo of the flowering area will suffice, but after that from where should the mills get the bamboos ? Other areas are already committed and sustained supply can can not be maintained. It takes 8-10 years for a rhizome to form commercially exploitable size clums and be available for exploitation.

Suggested Solutions

For solving the above mentioned difficulties the following solution are suggested :

1. It is possible to keep fire away by enforcing a special guard over the area and arrangements to

extinguish any accidental fire in the forest should be made.

2. The industries can afford to meet the exra cost involved on the exploitation of flowered bamboos. This can also be solved by the departmental working and charging the exploitation cost from the body to which it is leased out. Unleased areas can be auctioned as such or the stacked material sold in situ. This will pull down the market prices of bamboo for the time being and again increase after 2-3 years as the supply will be scanty.

3. To meet the transport difficulties it is advisable that small plots are leased out side the forest area and cut material stacked there and transported to the factory site at convenient time. The will obviouly require prophyletic treatment, as felled bamboo is very susceptable. to borer attack.

4. Storage of raw material will be costly as in open air dry bamboo may get deteriorated by fungus and insect attack. Covering of material will be uneconomic. For this, it is advisable to convert raw material into chips and stacked after proper treatment. In Western countries *outside chip storage* (O. C. S.) has been found quite suitable.

5. Amount of raw material will be sufficient for 2-3 years. The forest department will find it difficult to lease out other forest area at once

to the lessee for sustained supply raw material while leasing a bamboc forest for along time, the department does not anticipate the flowerring of bamboo. The sustained supply of raw material becomes such an acute problem so warrant the closing down of the Mills.

- (b) The bamboo areas which are to feed the industry should make ample provision for sustained supply of matcrial in case of gregarious flowering of bamboo.
- (b) Some substitute to be grown-e.g. Eucalyptus spp. It has found by various plantation trials at different places that various spp. of Eucalyptus can do well, in different soil and climatic conditions.

(6) Other hardwoods can also be used to meet the emergent problem. A 50 : 50 or 60 : 40 mixture of bamboo pulp and hardwood pulp can yield good quality paper.

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