TEAK FRUIT TREATMENT MACHINE - A PROTOTYPE - II

A.R. BAPAT* AND M.M. PHULARI**

Maharashtra Van Sanshodhan Sanstha,
Chandrapur (Maharashtra).

Teak is a universal timber species par-excellence. Durability, strength properties, workability, figure, polishing qualities and versatile utility offer teak timber this distinctive position in world-wide timber trade. Market-rates steadily rising but stable, reaching sky-heights and ever widening gap between demand and supply are clear manifestation of its paragon timber values. Massive teak plantations have been and would be taken in India and abroad in most of the isoclimatic regions of the World.

The paragon timber qualities of teak received recognition far early in the history of scientific forestry development. Teak plantations were taken in the past to enrich forests, since over and a half centuries. Besides there are vast areas over 9.77 million ha under natural teak forest in our country. Conservation and management of those for progressively increasing and on sustained basis, teak plantations on an average over 82,000 ha, are being taken annually. It is imperative to raise at least 21 million seedlings, and that we have to handle over 1640 MT of Teak seed annually. Requirement of quality good seed is going to continue in perpetuity.

Teak fruit/seed bears a thick, hard and felty cover mesocarp. The mesocarp is responsible for inhibition of seed germination. Teak fruits are therefore, subjected to various treatment methods before in the nursery beds to get high germination percentage. Various methods of pretreatment have been developed and are traditionally in practice. The simplest one being alternate soaking, drying. In pit-method fruit mesocarp is subjected to decay by burying seeds in pit with cow-dung slurry for three weeks. Acid treatment to burn mesocarp is another method. All these methods are having various limitations. They are adhoc, elaborate, time-consuming and with an element of subjective skill and experience. The pretreated seeds are not of gauged standards, effective qualitatively and with timely assured bulk supply. There are lot of wastage and spilling over of seed during the process at number of stages due to handling. The process is elaborate, laborious and expensive.

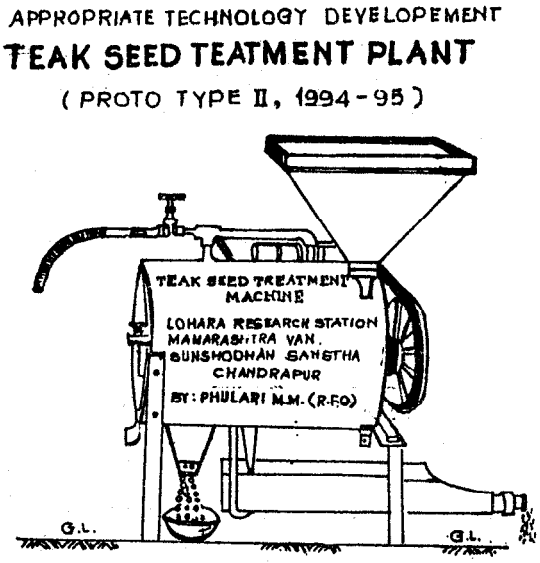
A Vast stretches of Teak forests are being managed scientifically since long, there has been a bottleneck in getting quality pretreated seeds for raising massive seedling stock of Teak. This lacuna received attention of Maharashtra Van Sanshodhan Sanshta, Chandrapur since past few years. A mechanical simple device was evolved, on the pattern of concrete mixing-miller-

* Director and Silviculturist, ** Research Range Forest Officer

machine, for teak seed treatment viz. Teak fruit treatment machine - A prototype, (Grewal *et al.*, 1993). While handling this machine certain practical difficulties and shortcomings were experienced. In this device for treatment, teak fruits, sand and metal, mixed in equal proportion i.e. 1 : 1 : 1 ratio, was required to be placed for churning for about 2 hrs. After treatment, it was difficult to separate seed from mixture. The heavy load of charge after repeated short use to treat about one tonne of seed, was found to cause irreparable damage and required replacement. Machine was unsuited for small quantities i.e. less than about 10 kg. The study and experience gained in the process, institute succeeded in developing another appropriate technology device viz. the present "Teak Fruit treatment Machine - A prototype - II", the new machine is easy to handle and has now clearly removed the snags in the pretreatment process of teak seed.

The new prototype-II is a simple machine, on the pattern of an ordinary floor-mill, and very easy to handle. It consists of a outer drum 53 cm long and 40 cm diameter mounted on angle iron frame with an axle. Axle ends are fitted with bearings to reduce the friction when set into rotation. The outer drum has two openings, one at right hand top provided with hopper, serving as "Inlet" while other at left hand bottom fitted with channel to serve as an "Outlet", for seeds. For the constant supply of water, a pipe with two inlets is fitted lengthwise at the top of the outer drum. On the lower side of the drum seven rows 1 x 1 cm apart and 1 cm long slit openings are provided. The edges of the slits are kept slightly projecting inside. The slit arrangement serves dual purpose of rough surface for scraping seed while in rotating motion and as drain out for worn out slushy mesocarp and water (Fig. 1).

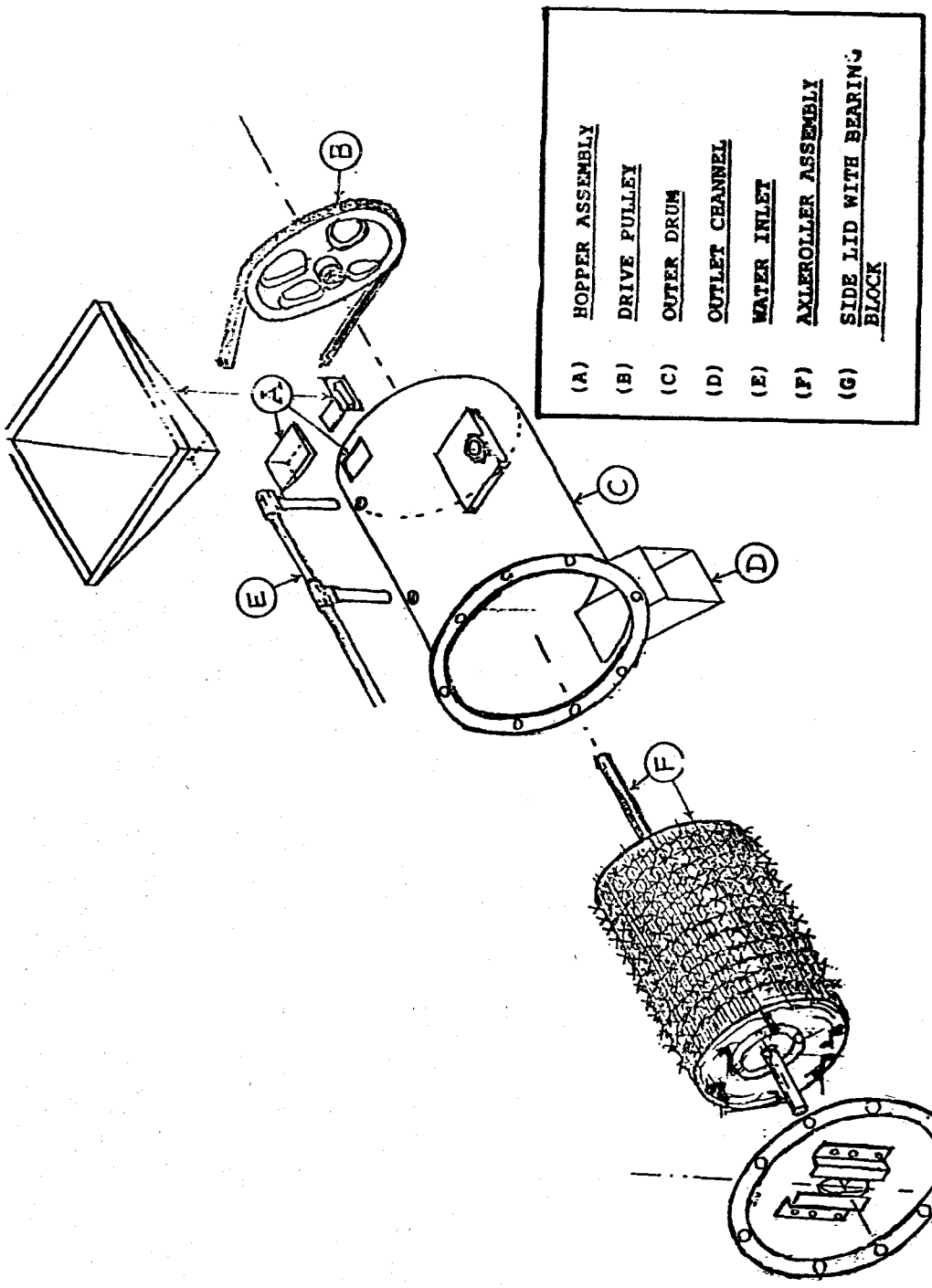
Fig. 1



The axle passing through the horizontally placed outer drum is fitted with firm wooden hub. For firm grip, axle is actually passed through a wooden roller made up of *Chloroxylon sweitenia* wood. For perfect shape, wooden roller was moved on a lathe machine. Roller has 27 cm dia while 38 cm length, much less than outer drum length for free rotation. On the wooden roller, 12 x 12 gauge barbed wire is tightly wrapped and fixed with "U" nails. Distance between two rows is kept 1 cm apart. The outer drum and inner roller is adjusted in such a way that free allowance between them is kept about 4-5 cm. One end of the roller is provided with 4 steel plates projecting 6 cm cut to avoid accumulation of teak fruits between drum-wall and end of roller (Fig. 2).

One end of the axle is provided with pulley wheel of size 30 cm dia. The pulley

Fig. 2



Teak Seed Treatment Plant

wheel in turn is linked by "V" belt, to another pulley fixed over the shaft of 2 HP electric motor. In the absence of electricity, it can be operated by Diesel engine. This motor can set roller inside the drum into circular motion. The 30 cm pulley wheel over the roller help reducing rotational speed of motor from 15000 RPM to 500 RPM for axle with roller (Fig. 1).

The fruits/seeds which are to be treated are soaked in water for 24 hrs. The soaked seeds are poured through inlet-hopper into the drum. In a charge about 10-13 kg of teak fruits can be ingested for treatment. Water tap is opened to have constant water flow inside the drum. The outlet is kept closed and machine is switched on while teak seed charge is poured into the drum simultaneously. The axle with roller is set into the rotation at 500 RPM. Due to abrasive action of rotating barbed wire on the roller and raised edges of slit-opening, on presoaked seeds inside the drum cent per cent mesocarp is removed. There is minimum abrasion of seed on the wall of drum and not likely to cause any damage to the drum. The seeds are constantly washed with inflowing water during the rotating motion. The worn out mesocarp flows out as slurry through the slit-opening below. Out flowing water soon becomes free from mud and clean water start flowing out of the slits. This is the indication of complete removal of mesocarp of fruits, and in turn completed desired treatment. At the same moment, hard endocarp exposed seeds, produce ringing sound due to their collision on the drum-wall, giving another signal of completed treatment. The water supply is then stopped, outlet at the bottom is opened to let out treated seeds in gunny bags through outlet channel, while the motor is in running position. The treated seed is then spread out to dry in shade for 3 to 4 days, and subsequently stored in gunny bags.

For a charge of 10-13 kg, fruits, complete treatment time taken is about 10-15 minutes only. From 10 kg untreated seed it is observed that net weight of treated seed output is 6 kg i.e. 60 %. In a day two labourers and eight hours working, 250-300 kg of untreated seed can be treated at ease with this machine. At the present rate structure the cost of pretreatment works out as cheap as Rs. 0.30/kg. For bulk treatment, machine operation can be planned from the date of collection to time of sowing.

This appropriate technology developed for pretreatment of teak seed in the shape of simple machine-Prototype-II, is easy for handling effective and gauged quality treatment. Besides, it will help assuring timely bulk supply of treated seed at economic rate. It is a great technological breakthrough in the commercial teak plantations and will go long way in annals of Teak plantation Forestry.

SUMMARY

Teak is a universal timber species of commercial importance. Teak forests 13.1 per cent i.e. over 9.77 million ha exist in our country. To maintain this cover atleast 82,000 ha annual planting is essential. A large quantity over 1628 MT of fruits/seeds are annually required to meet the target. Treatment to remove felty mesocarp before sowing is pre-requisite. Conventional treatment methods are alternate drying and soaking, pit-method, placing to soak in running water and Acid treatment. They have short-comings, adhoc, subjective, partially effective, wasteful, crude and elaborate, lengthy, labour intensive and costly. Innovative treatment plant has been successfully fabricated.

सागौन के फलों का उपचार करने वाल यन्त्र प्राग्रूप-2

एo आरo बापट व एमoएमo फुलारी

सारांश

सागौन व्यापारिक महत्व की विश्व भर में फैली प्रकाष्ठ जाति है । सागौन के 13.1% अर्थात् 97.7 लाख हेक्टेयर में फैले वन हमारे देश में मिलते हैं । इतना वन सतत बनाए रखने के लिए कम से कम 82 हजार हेक्टेयर क्षेत्र में उसका प्रतिवर्ष रोपण करते जाना अनिवार्य है । इस लक्ष्य की प्राप्ति के लिए 1628 मीटरी टन से भी अधिक फल/बीज प्रतिवर्ष चाहिए । बीज को बोने से पूर्व उसकी नमदे जैसी मध्यभित्ति को निकालने का उपचार आवश्यक है । इसके पारम्परिक उपचारों में बीज को क्रम से सुखाना और भिगोना, गढ्ढे में डालना, बहते पानी में भिगाने डालना और अम्ल उपचार आते हैं । इनकी कमियाँ हैं - तदर्थ व्यक्तिपरक होना, अंषतः प्रभावकारी होना, बरबादी परक, भौड़ा, अधिक समय लगने वाला, अधिक श्रम चाहने वाला और महंगा होना । एक नया उपचार संयंत्र सफलतापूर्वक तैयार कर लिया गया है ।

Reference

Grewal, J.S., Anmol Kumar and S.R. Gaikwad (1993). Teak Fruit Treatment Machine - A Prototype. *Indian Forester*, **119** (3) : 352.