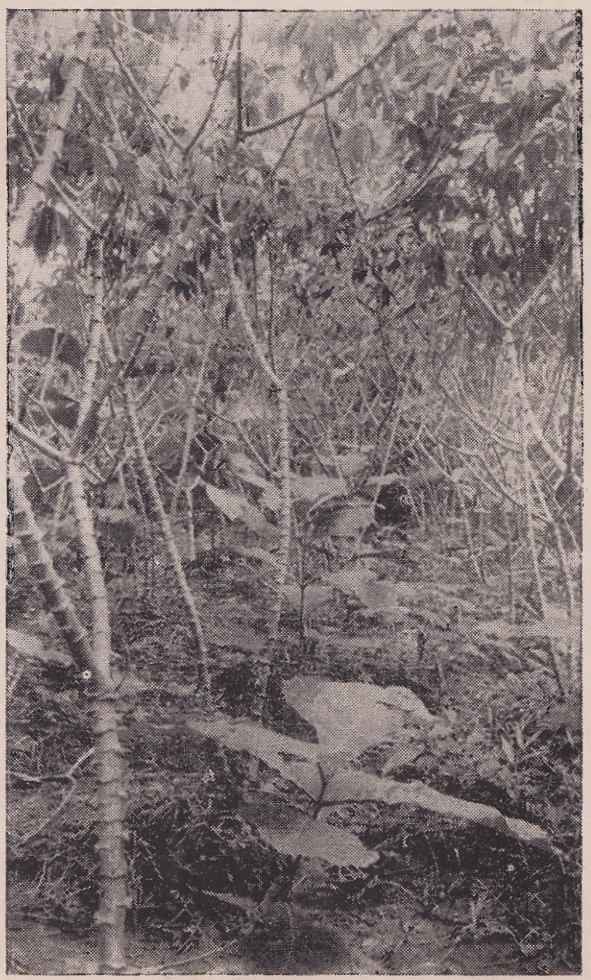
kerala forest research institute

No. 6 September 1979

evergreen



Smothering of one-year old teak seedlings by tapioca at Vazhachal

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EVERGREEN No.6, September 1979

PAST SAPLING STAGE

How wonderful it is for KFRI to enter bole stage with hope to grow much in the coming years. This does not mean, we have not grown during the formative four years. From a humble start, we have built up Entomology, Genetics, Pathology, Plant Ecology, Plant Physiology, Plant Taxonomy, Silviculture, Soil Science, Statistics, Wildlife Biology, and Wood Science Divisions; Engineering, Library and other Technical Services; and Administration. Many have joined us from far and near to give their might in building up KFRI. With the mature leadership of senior staff and the unstinted co-operation from Kerala Forest Department, the Institute can serve Kerala Forestry. Let our motto be "grow as much as possible before we reach tree stage". ---- Editor

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SOCIETY, GOVERNMENT AND SCIENTISTS

Lacking concrete demands from society and government, and incapable of defining their own socioeconomic role, the members of the scientific establishment self-define their role in the abstract. They devote their efforts to the general scientific progress, but only from an intellectual point of view and not as development tools of their own society. ---- From a joint report from the ECLA and OAS on the application of research and technology for development.

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Forestry for Flower, Fuelwood, Fodder, Food, and Fibre.

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GENETIC IMPROVEMENT OF TREES BY SELECTION

Forest tree species can be genetically improved to give us more wood or timber of better quality. However, such improvements are necessarily much slower to achieve in the case of timber trees because they take a long time to flower and seed. Also timber plantations may take several years to attain optimal yielding age.

Selection of Plus trees

Selection of superior individual trees from planted or natural stands is the first step and the trees thus selected are known as 'Plus Trees'. Initially, only phenotypic, that is easily observable external characters are used in choosing plus trees. Superiority in growth rate and volume content, straightness and length of clear bole, narrow or compact crown, freedom from flutes, buttresses, channels, knots, rots, holes and other defects, hardiness, and resistance to specific disease or pests are the several criteria used for plus tree selection. The same plus tree need not be equally good in all respects but its total score or merit is very high as compared to other average trees of its stand.

While approving plus trees of a species, measurement of age, height and girth at breast height should also be taken of five other trees of the same species growing in the vicinity that is, within 25-50 m from the plus trees. These trees of comparison will enable us to determine the selection differential in volume growth and other characters which can be used for calculating genetic gain in various characters. All the comparison trees should be dominants and must nearly be of the same age group as the plus tree. Site conditions should be similar for the plus tree and trees of comparison. The approved plus trees are marked with two painted bands, the first when initially marked as a candidate and the second when it is finally approved and registered as a plus tree.

Grafting

The selected plus trees are established as grafts. Though many methods of grafting are known to horticulturists, the

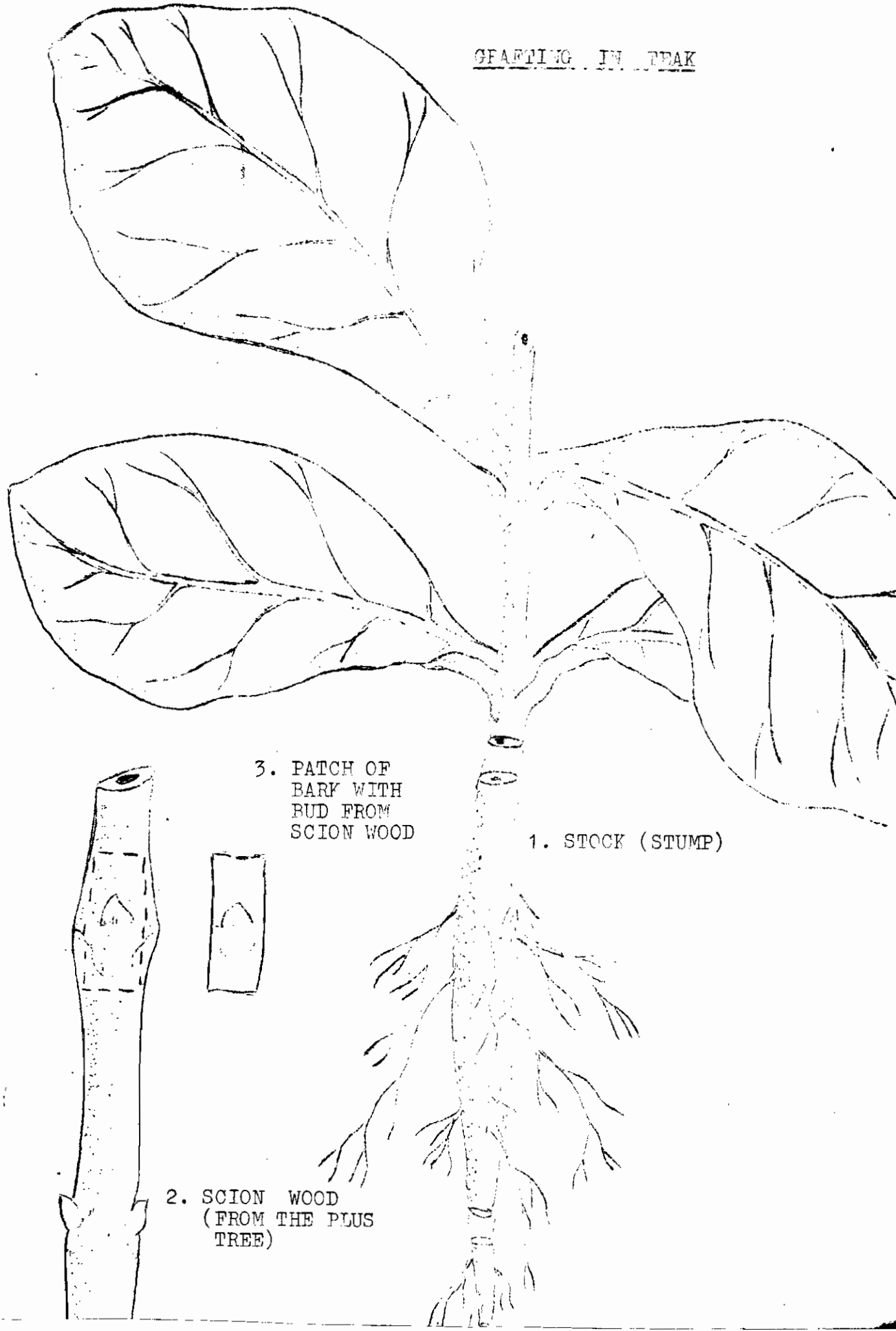
technique of 'Patch-budding' has been found to be the best suited for teak (teak is used as an illustrative example). Details of this technique are illustrated in the accompanying diagrams. One or two year old teak stumps are used as the root stock for grafting. A rectangular patch of bark is removed from the collar region of the stump to create a 'window'. A bud patch of the same size is prepared from the scionwood cuttings collected from the crowns of plus trees. This is fitted in this 'window' and the graft union is tied with polythene tape. The budded stump is then planted in a polythene bag filled with soil. The grafts should be protected from direct sun by a thatch or placed within a glass house with misting facilities. Successfully established buds sprout within ten to twenty days of grafting. Such prebudded stumps can be field planted one to two months after grafting in the seed orchard. Field planting is best done with the onset of monsoon rains. Field grafting directly on orchard site is comparatively laborious and less amenable to environmental control.

Grafting success depends upon a number of factors such as nature of species, season of grafting, condition of scionwood, skill and experience of grafter and availability of glass house with misting facilities. Under ideal conditions 90 - 100% success is possible.

Seed Orchard

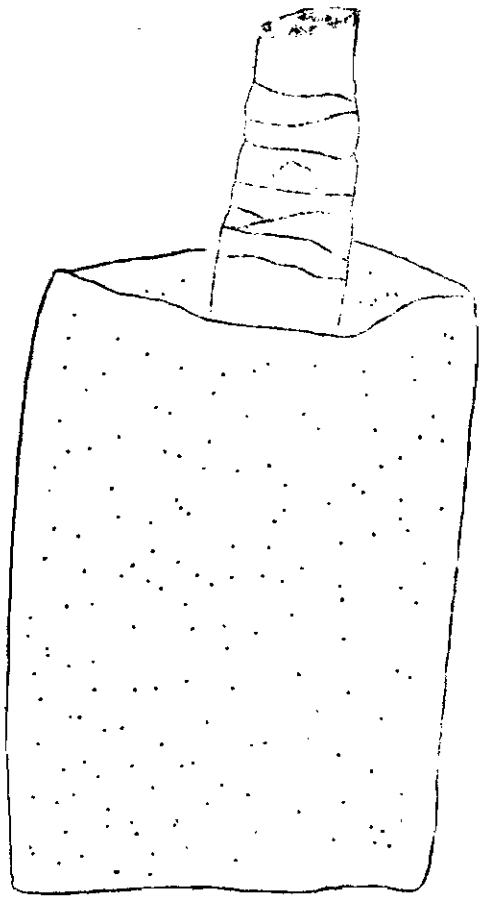
By definition, a seed orchard is a plantation of genetically superior trees, isolated to reduce pollination from genetically inferior trees and intensively managed to produce frequent, abundant and easily harvested seed crops. It should be emphasized that the grafted plants in the seed orchard are not going to be directly utilized for timber production. They are meant only to produce genetically high quality seeds for raising future plantations. Grafted clonal orchards are preferred to seedling seed orchards, since the former start flowering and seeding much earlier than the latter.

GRAFTING IN TEAK

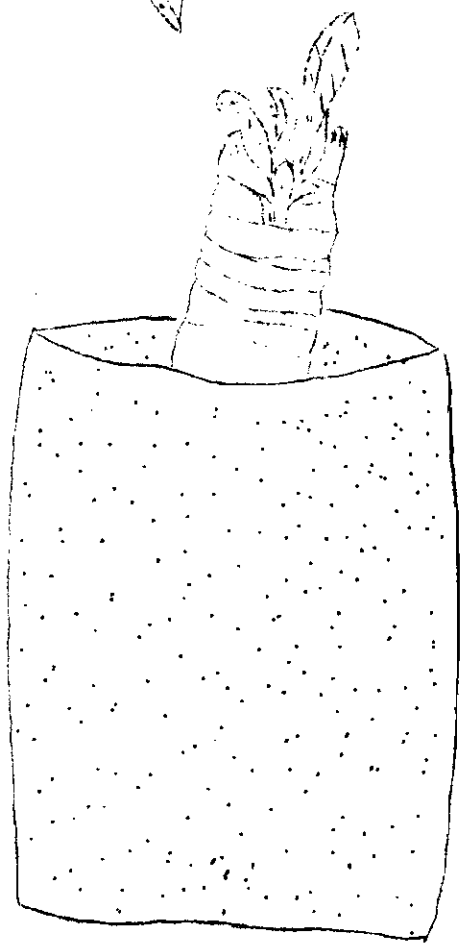


4. EQUAL-SIZED PATCH OF BARK REMOVED FROM PREPARED STUMP

5. PATCH OF BARK WITH BUD FROM SCION WOOD INSERTED IN THE WINDOW ON THE STUMP



6. STUMP AND BUD HELD TIGHT WITH POLYTHENE STRIP (CUT END OF THE STUMP IS WAXED) STUMP PLANTED IN POLYTHENE BAG FILLED WITH SOIL.



7. BUD SPROUTING

Since seed orchards are of the 15, 20 or 30 clone types, it will be necessary to have corresponding number of plus trees to start with. The different plus tree clones (clones mean vegetative propagules, in this case the grafts) are planted in the seed orchard area in a randomized design. This is to ensure equal chances for each clone to cross-pollinate with every other clone. To prevent contamination from outside pollen sources, seed orchards should be isolated from other trees of the same species. A belt of different species can be planted as a screen.

Along with seed orchard establishment, progeny tests of plus trees should be conducted to test their genetic worth as parents. If testing proves that some of the plus trees are not genetically worthy, these are rogued out and substituted by elite tree clones. Only the proven elite trees are used for establishing the second cycle seed orchards.

The advantages of seed orchards may be summed up as follows: (i) these produce genetically improved seeds; (ii) these concentrate seed supplies thus making seed collection easy and control of seed origin practicable; and (iii) these can be used as breeding orchards for carrying out controlled crossing for further improvements. ---- Division of Genetics

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A LESSON FROM PINE

In youth a pine explores a large area, whilst later in life it exploits the area occupied more thoroughly.

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An understanding of the forest lies just as much below as above the ground line.

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CHANGE OF SCIENTIFIC NAMES OF COMMON TREES

Common name	Old scientific name	New scientific name
Matti	Ailanthus malabarica	Ailanthus triphysa
Plavu	Artocarpus integrifolia	Artocarpus heterophyllus
Karankongu	Balanocarpus utilis	Hopea utilis
Ilippa	Bassia malabarica	Madhuca neriifolia
Ilavu	Salmalia malabarica	Bombax ceiba
Vembu	Cedrela toona	Toona ciliata
Peruku	Clerodendron infortunatum	Clerodendrum viscosum
Appakudukka	Cochlospermum gossypium	Cochlospermum religiosum
Kuranguplavu	Cullenia excelsa	Cullenia exarillata
Ennappine	Hardwickia pinnata	Kingiodendron pinnatum
Kulamavu	Machilus macrantha	Persea macrantha
Balsa .	Ochroma lagopus	Ochroma pyramidale

---- Division of Plant Taxonomy

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OBSERVATIONS ON LORANTHACEOUS PARASITES OF TEAK

In Kerala, a large number of trees are infested with angiosperimic parasites belonging to the family Loranthaceae. In

some teak plantations of Nilambur Division, more than 90% of the trees are infested. On close examination it is interesting to note that a particular species of the parasite is associated with some tree species. For example the species growing on teak Dendrophthoe falcata is not found on Terminalia spp. whereas, Macrosolon parasiticus generally growing on Terminalia spp., Dalbergia sissoides, Grewia tiliaefolia, and Helicanthus elastica commonly growing on Mangifera indica are not seen growing on teak. Studies are under way to devise suitable method of control which would selectively kill the parasites without harming the host. ---- Division of Pathology

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IS LIME NECESSARY FOR EUCALYPT SEEDLINGS?

Yes. From the results of a probing trial, there is indication that lime can increase growth and vigour of eucalypt seedlings in the first few months of establishment. Lime neutralizes soil acidity as well as supplies Calcium to the seedlings. Dry matter yield of eucalypt seedlings increased when lime was applied at the rate of 0.5, 1.0, 1.5 and 2.0 g/1000 g soil. On a trial basis, we can apply lime at the rate of 200 g/planting pit. During planting time, spread about 200 g lime in the pit and cover it with 3-5 cm soil and then plant the bagged seedlings. Lime will increase the vigour of eucalypt seedlings which is so badly needed in a disease-prone area like Kerala. ---- Division of Soil Science

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A community in which science is regarded as a sort of tool for getting things done and major decisions are made by persons with no scientific understanding is likely to develop differently from one in which decisions are made by persons who understand what is involved in the processes they control.

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POWER FROM PLANTS

Photosynthesis produces 155 billion tons dry matter per annum, of which two-thirds is on land and the remaining on the oceans. Of the terrestrial production, larger part is in the forests and woodlands. Though photosynthesis has been utilized only for food production so far, now emphasis is to harness this process to produce fuel on a renewable basis.

Hydrocarbon from plants

Most plants conserve solar energy in the form of carbohydrates but some latex bearing plants like rubber tree store it in the form of hydrocarbons. Rubber latex, being a hydrocarbon, has the same type of chemical composition as petroleum. However, this hydrocarbon has different atomic arrangement and a higher molecular weight of 500 000 to 2 000 000 as compared to 10 000 of petroleum. If the molecular weight of rubber latex can be reduced to 10 000, it is possible to have a renewable fuel tree.

In addition to this known hydrocarbon tree, there are about 2 000 other latex bearing plants belonging to Euphorbiaceae, Moraceae, Asclepiadaceae, Cactaceae, and Acanthaceae, which may produce hydrocarbons to be used as alternative fuels. Most promising family is Euphorbiaceae with its latex of molecular weight of 50 000 or less.

Energy Plantations

The raising of tree crops for their cellulose is 'Energy farming' and the stands developed are known as 'Energy plantations'. These plantations are managed to provide substantial amounts of fuel throughout the year at comparable prices. The plants selected for Energy plantations are known as 'Btu-bushes' and the chosen Btu-bush must be capable of efficiently capturing solar energy and should be fast growing.

The heating values of wood ranges from 3 000-6 000 K calories/kg whereas the range in coal is 5 000-10 000 K calories/kg. However, the advantage of fuel from Btu-bush is that it can be produced on a renewable basis and used

with less environmental pollution. Another advantage is that it can be converted to synthetic natural gas (SNG) through an anaerobic fermentation process. The methane thus produced is similar to natural gas and can be used in latter's place. ---- Division of Plant Physiology

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KERALA'S LAND RESOURCES

Population	:	24 000 000
Area, ha	:	3 886 400
Per capita land, m^2	:	
Cultivated	:	937
Forest	:	392
Uncultivable	:	186
Cultivable	:	104

Shouldn't we be wise in using our land resources?

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One hectare of tropical rain forest loses about 1 kg soil per year through erosion. After deforestation, the loss is 13 000 kg.

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WHITHER TAUNGYA?

Taungya is a Burmese system of temporary hill cultivation. In forestry, it is the practice of establishing agricultural crops among tree stands during initial years of plantation. The first taungya plantations were raised in Burma during 1860s and within a few years the system found its way to India. In Kerala, first taungya plantation was raised at Konni in 1922.

Has taungya come to stay here with its good ideas of satisfying land hunger and generation of employment in communities with a low standard of living? Though it helps to establish cheaper weed-free plantations, have we given enough thought to the side-effects of the system such as smothering of tree seedlings, root competition and soil erosion?

The irreparable side-effect is loss of topsoil through erosion. We should bear in mind that it took hundreds of years to form the upper few centimetres of soil. Are we not to keep this soil as a renewable resource for posterity? Shouldn't we be interested in establishing our forest plantations without annihilating the topsoil? Only when soil erosion from our forest plantations is kept to minimum, taungya will be an economically and socially desirable system for our people. Otherwise, it needs a close nipping. ----
Division of Soil Science

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KFRI BITS

WHO JOINED US: Administration - V.M. Amminy, K. Bhargavan, T.R. Chellamma, K.D. Chinnamma, K.R. George, K.R. Omana, B.P. Sreedharan, K.M. Thulaseedasan B.Com., P.A.Varghese B.Sc.,

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WHO LEFT US: Forest Economics - C.T.S. Nair I.F.S., M. Phil; Statistics - R. Balakrishnan Asan M.Sc.; Soil Science - K. Sobhana, M.Sc.; Wildlife Biology - M. Balakrishnan Ph.D.

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F ... Fish and Wildlife
O ... Outdoor recreation
R ... Range (forage)
E ... Environmental amenities
S ... Soil and watershed
T ... Timber

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Where once a forest has been, a forest could come again - given the chance.

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To rule the mountain is to rule the river — Chinese proverb.

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