

THE NATURAL AND ARTIFICIAL REGENERATION OF TEAK IN BURMA

By H. BERESFORD BARRETT, M.A.
(Late Indian Forest Service).

When I told my relatives and friends that I had been posted to Burma I usually had to show them on an atlas where it was. One dear old aunt wondered how I could find enough forest on the islands: she was thinking of Bermuda!

Burma, to the East of the Bay of Bengal and cut off from India by mountains, is really the western part of Indo-China. The country is mainly in the drainage of the Irrawaddy, exceptions being Tenasserim in the South and Arakan in the West, and some Salween drainage in the East, in the Shan States really.

On arrival in Burma, one enters the orbit of China. Decennially what the Burmese called "Ambassadors" and the Chinese "messengers bearing tribute," were expected at the Court of the Sun of Heaven in Peking. If the expedition failed to arrive, the Yunnan Viceroy would send an army, which would ravage much of Burma and chase the King into the jungle. As might be expected the people are of Mongolian types mainly speaking monosyllabic languages with tones.

Burma, with the Shan States and frontier tracts, some of them sketchily or not at all administered, is about 8 times the size of Ireland, with, before the war, a population of about 15 millions, about three-fifths being Burmans, the rest mainly Shans in the Shan States, Karens and Talung, in the South, Chins and Kachins in the North and Arakanese in Arakan. There were a good many Indians, coolies and shopkeepers in the towns. The indigenous people were nearly all Buddhists, except that there were a good many Christian Karens.

Buddhism among the Burmans, like many other things with that delightful, gay, brightly dressed race, was somewhat vague, shading off to animism. The women are perfectly free; Burmans are rather henpecked.

Historically, there were three powers; the Burmans whose capital was usually near Mandalay, the Talaings or Peguans of Pegu, and the Shans of the East. In the middle of the 18th century, the Burmese got control and kept it till the dynasty began to collapse in the 19th century. They never achieved anything much of an ordered Government; when a king died his successor was the one who succeeded in murdering all possible rivals, male or female, *a la turque*. The successful one rewarded his followers with districts or provinces, on condition that they sent an annual contribution to the Capital. These Myo-Wuns sent as little as they dared and

squeezed as much as they could. The last dynasty had a strain of madness. Thorrawaddy Min's idea of a joke was to rush into the audience chamber and throw spears at his Privy Council. Thibaw Min could not maintain order at all and the people migrated in numbers to British Burma. When he was deposed, the only reasonably sober member of the Royal Family died soon after and Upper Burma had to be annexed and the long task of restoring order began. But all the time the forest grew on and the teak trees in it.

GENERAL DESCRIPTION OF FORESTS.

There are broadly, from the legal point of view, three kinds of land in Burma: (1) *fields*, etc., which belong to someone, though land revenue is paid to Government on practically all land; (2) "*unclassed forest*," which is really commons, and may or may not contain trees—it usually does—94,855 square miles in 1939-'40.

In practice, one could cut unreserved trees within 10 miles of one's village, for one's own use, cultivate land and so on, though in some cases restrictions were imposed.

(3) There were also 31,409 square miles of *reserves*, nearly the area of Ireland, about 80 % teak bearing. These were, of course, completely under Government control, apart from rights granted at settlement. There are considerable areas of forest in tribal tracts not under forest control.

Burma has a moist monsoon climate, governed by the S.W. monsoon, which reaches Tenasserim, Lower Burma and Arakan usually about the middle of May; meeting high hills near the coast in Tenasserim and Arakan. The precipitation there is heavy, up to 300 inches, producing evergreen forest without natural teak. The Irrawaddy Delta being wide, the rain drives across it and up the Irrawaddy and Sittang country, and along the low Pegu Yomas, losing force as it goes.

The high Arakan Yoma stops the rain from the S.W. further North so that there is a dry zone, more or less desert in places for about 100 miles N.S. of Mandalay, with rainfall down to 20" against about 100" in Rangoon. Again there is a wet zone in Upper Burma with a fall of 60"-100". Teak will grow with 40", but 60"-120" is best; above that the forest becomes evergreen. It must be borne in mind that little or no rain falls from November to May, the Sittang, for example, a bigger river than the Shannon, is only a few disconnected pools in March.

Teak is a deciduous light-demanding tree, and can only regenerate in a deciduous forest, the best types being moist bamboo forests, with good drainage. There are, of course, numerous other species as well as teak. Leaves begin to fall in December and the first fires begin in January and accelerate leaf fall. The second lot of fires is in February and by March the ground in the average teak

forest, apart from evergreen along more or less perennial streams, is black with ashes.

EXTRACTION OF TEAK.

Distances are such that the only economical way is usually by floating. Green Teak is useless and will not float, so the trees are girdled by cutting a ring exposing 3" of heartwood round the butt. The trees then stay 3 hot weathers to dry. Girdling, usually in a thirty year cycle, begins as soon as the forests are healthy after the rains, working plan control being now usually by basal area.

Minimum girth limits are usually, at 7' 6" in moist forest, and 6' 6" in dry. Also trees down to 3' are measured and recorded at girdling and grouped 3'-4' 5", 4' 6"-5' 11" and 6'-7' 5" in the report, and a stock map is made. Girths are taken at 4' 6".

RELATIVE IMPORTANCE OF TEAK.

Teak is far more important than all the rest of the forest produce put together. It has always been a royal tree in Burma—it being illegal to cut a teak tree anywhere without a licence. It is extremely durable. For example, when girdling in Katha about 1924, I found a log which was left behind by the Bombay Burma Timber Trading Company and by chance had got into a moist spot, so escaped fires and bore perfectly clearly Mindon Min's marks and was perfectly sound. King Mindon died in 1878. The timber also has the advantage that iron nails do not rust in it. To show its relative value, out of £1,079,500 revenue in 1939-'40, about £750,000 was from teak, though 400,000 tons of teak came out against 434,000 tons of other timber, 1,236,000 tons of firewood, astronomical numbers of bamboos and quantities of other kinds of produce from sea-swifts' nests to leaves for thatching. We work a few forests in Lower Burma, but otherwise extraction is done by timber merchants and the revenue is thus nearly all royalty. A ton is 50 cubic feet, nothing to do with weight. The expenditure by the way, was £447,000, surplus £632,500 over 58 % of the revenue.

NATURAL REGENERATION.

The best teak is in bamboo forests burnt over annually. At the beginning of this century, fire protection was tried extensively with unfortunate results. Evergreen species came in and teak regeneration failed. In some cases fire has not re-entered the reserves and there may even be a top storey of teak with an evergreen undergrowth. This is largely the case in Myitkyina Division, which is near the northern limit of teak and is moist and misty. It was also found that the girth classes were not normal, even in forests never protected, one of the smaller classes often being deficient.

Ring countings are made on felled trees where possible, and an approximate relationship between their girth variations and

flowering of bamboo begins to be noticed. It was also noticed that young teak often comes up profusely in old "*Taung-yas*." "*Taung-ya*" is "hill-farm" in Burmese and is our old friend, shifting cultivation. The *Ya-Thama* cuts the forest down, burns it, sows his crop in the ashes, reaps it and moves on. Seed buried in the undergrowth for years then germinates. When the bamboo flowers, there are exceptionally fierce fires next season, and by the end of the rains, the ground is covered with bamboo seedlings. The teak seed germinates and gets well ahead of the bamboo. Though we cannot make bamboo flower to order, we help the teak by cutting climbers on it at girdling, leaving climbers not likely to reach teak, carrying out improvement fellings in favour of young growth, and felling ficus-bound trees. Teak is vigorous and responds very well to these operations: where funds permit, and the teak stock is good these operations are repeated at intervals and local timber merchants are encouraged to extract other species, the less valuable having very low royalty rates. The quantity of teak per unit of area has in many cases doubled in the last 50 years.

ARTIFICIAL REGENERATION.

In 1939-'40 about 140,000 acres of plantations remained on the books; 1,640 acres were planted that year. There has always been considerable controversy about plantations and the less successful centres were closed down and unsuccessful areas written off. At first areas of forest were cut down and planted by direct labour but this cost too much. Since about 1915 all plantations have been by the *Taungya* method. We have seen that profuse teak regeneration was found in old *Taungyas* and after bamboo flowering.

The method is this. An area is selected that is considered suitable for teak, though poorly stocked or not stocked at all. Any teak in this area is girdled and got out. When this is done other species if marketable are sold to contractors and arrangements are made to start a forest village. Considerable care is needed in selection. A village should be about 20 households, each household needs anyway three acres of forest a year for its *ya* and the centre should be big enough to last 20 years. As far as possible plantations should continue straight ahead, not in patches. There must be a good permanent water supply for the village and reasonably good grazing for the village cattle.

The villages are usually inside reserves, are called forest villages and are largely under forest department control. Incidentally they are about the most contented part of the rural population and there are always applications for vacant places in these villages. They have privileges but I think what they most like is that practically all their dealings with Government are with the local forest ranger and so they are not harrassed by numerous petty

officials who make a nuisance of themselves to villagers in accessible areas.

The plans are drawn up for ten year periods, revised after five years if need be, the annual area being prescribed in the management map. The individual *yas* are allotted by the headman in consultation with the villagers. Disputes, which are very rare, are settled by the ranger. If any villager really makes a nuisance of himself he can be evicted after due inquiry by the D.F.O. I held 6 different charges in my service and I think I can only remember having evicted one man who refused to cut *yas* and took to theft.

By the end of December the fire lines have been cleared. It has been found advisable to fire-protect teak for about 5 years; young bamboo forest does not burn to any extent. In practice fire lines follow the most convenient boundaries—rivers, wide roads, etc.—as far as possible to save expense. It is most essential that no accidental fire reaches the *ya* of the year as an imperfect burn spells failure. To make things safer the ranger carries out controlled burning of a wide belt outside and up to the fire line.

In January the villagers begin to cut their *yas* and the felled forest dries during the hot weather. Near the end of the hot weather the great day arrives, a calm evening being chosen. The ranger and his staff and the villagers assemble. At a given signal, usually by the ranger firing his gun, torches are put to the now dry *yas*. Fierce flames roar up, clouds of smoke billow up into the sky, thousands of bamboos explode in all directions, the noise is terrific. Next day the villagers start clearing up any debris left. If the burn has been good they should not have much to do. Then the ranger comes and puts in rows of stakes 6' by 6' across each *ya* and issues teak seeds with which the villagers form nurseries. When the rains come the villagers sow their crops in the ashes and transplant the teak seedlings to the stakes. In the first rains the villagers keep the teak weeded; about December, after their crops have been reaped, the ranger comes and counts the successful and unsuccessful stakes. The villagers are paid so much per hundred live plants, rates varying according to the percentage of success—highest rate for 90 % and up, then 75 %-89 %, 60 %-74 %, and under 60 %. I have had every single *ya* over 90 %. Percentages under 75 % are bad luck of some kind and one did one's best to make it up to the villager. Apart altogether from the cash the villager took great interest in the work. In the slump of the early thirties villagers offered to plant for nothing and during the rebellion in Lower Burma they carried on on their own.

From the second year we do the weeding. At the onset of the rains myriads of weeds appear, one can almost see them grow. The first weeding has to be well judged. If done too soon work and money may be wasted. If done too late the weeds may overtop the teak and climbers get too bad. Towards the end of the rains another

weeding is usually needed, and occasionally a third. This is an anxious time for the ranger. The finance department in Burma kept a tight hold of the purse strings and money was hard to get. Usually by the third year the canopy had begun to close and at most one weeding was needed; in good areas the canopy might have closed and teak shade keeps down weeds. By the fifth year teak should be 20-25' high and a first thinning is done. It is essential to keep young teak growing vigorously so this is drastic, 50 % usually and it may be 75 %. By now *ya* cutting has moved on and the plantation is probably outside the fire line. It is carefully inspected by the D.F.O., failed areas, if any, written off and the balance taken as established. Another thinning is usually made between the tenth and fifteenth year and after that thinning is done at much wider intervals. As far as possible, plantations are inspected annually and arrangements for the thinning made well ahead.

All this sounds ideal, but there are, alas, snags—two principal ones, the Beehole-borer and erosion.

The Beehole-borer is the larva of a small brown moth, who lays her eggs in the bark. The grub lives three years in the tree and makes the timber useless. Infestation in plantations is appalling and many otherwise excellent centres had to be closed down. Shortly before the recent temporary irruption of unpleasant yellow savages into Burma a parasite had been found but it is rare.

Teak is very deciduous and casts a heavy shade when in leaf. In the hot weather the sun burns the ground and cracks it. In the rains with no weeds to hold the ground, erosion is heavy, many plantations have begun to show signs of stag-headedness.

CONCLUSION.

Two problems have been mentioned, (1) Natural *v.* artificial regeneration; (2) To burn or not to burn.

As far as Burma is concerned I was in favour of natural regeneration except in areas where teak had become scarce in sites suitable for its growth. It became obvious that, apart from the few years initial fire protection that corresponded to the early non-burning stage of the bamboo, it was better to burn.

As regards Ireland, I have been abroad so long, you know far more than I do about it. I make the following suggestions for what they are worth.

I think a survey of the country as a whole from the forestry point of view should be made. Such regeneration centres as are selected should be of reasonable size and the question of establishing permanent forest villages should be considered. There should be plenty of work, planting, thinning, fire-protection, road making, felling, boundary repairs and many other things. My opinion is that forestry will never flourish in any country that is not forest-minded.

Of course in war time, Governments get scared and forestry gets a temporary boost up but when people begin afterwards to grouse about taxes, finance ministers cut first on things fewest people know or care about. Forestry is one of these. If the forest village idea is practicable we shall have at any rate a nucleus of forest-minded people living a healthy outdoor life. The people should have good gardens, a certain amount of free grazing would probably be available in old woods and along fire lines. It might be possible to run poultry in old woods, the birds would eat large quantities of harmful insects. In some cases crops might be taken from old felled woods, this working improving the soil. I have very happy recollections of my forest villages with their churches and schools if Christian, or pagodas and monastery schools if Buddhist, peaceful happy people among whom crime was almost unknown. In over 20 years I can only remember one bad man.

BURNING.

In many mature woods I have seen leaves or needles so thick that the chances of the seedling root reaching the mineral soil seemed to me to be negligible and the forest floor must be very sour. Would not a controlled burning help to get us natural regeneration? Has natural regeneration ever been tried?

FOREST MINDEDNESS.

We must, I think, aim as far as possible at seeing the point of view of others. I come from Connemara, I think Sir Shane Leslie would like it to be a National Park. I think I am as keen on forestry as anyone but I heard some time ago that our lovely country was to be covered with rows and rows of Sitka spruce. *Absit Omen*. Forestry can be beautiful as well as useful, there are oak and beech and ash.

We are all foresters. We are all Irishmen too. The cynical say that the difference between doctors and foresters is that they bury their mistakes and we are buried before ours are found out. Let us try and not make a mistake, but help to leave behind us not only a well afforested Ireland, but a beautiful Ireland.

APOLOGY

Owing to the continued accumulation of arrears of work in the printing trade, the editor regrets that the first issue of volume IV of the Journal has been delayed in going to press and apologises for its lateness in coming into the hands of members.—ED.