with their food. Among such are cockroaches and our local coco-nut tree-hopper (*Sexava spp.*). These pests have a habit of cleaning themselves by passing their feet and antennae through their mouths, thus removing any adhering particles of dust. Hence, if a poison dust is projected on to them, they frequently absorb a lethal dose in this way. This method is frequently used against cockroaches, sodium fluoride, which is non-poisonous to humans, being freely dusted in cracks and crevices and other haunts of the 'roaches. As the insects pass through the dusted area, a number of particles adhere to them, which they clean off later with fatal results. With such a wary feeder as the cockroach, this method is probably superior to any other.

It is hoped that successful control of *Sexava* will be obtained by dusting affected palms, and in this connexion many laboratory experiments have been carried out to ascertain the lethal effect of various dusts. At present, it appears that calcium arsenate possesses the best combination of cheapness and efficiency, and it has been shown by experiment that it kills the tree-hopper through both the cleaning habits and the feeding of the pest.

The practice of dipping probably needs little description here, as most people know of the regular dips given to sheep and cattle to control lice and so-called tick in the former, and tick in the latter. These dips are arsenical preparations, and experience has proved them to be most effective, so much so that legislation compels their use

Finally, there is the widely used control measure of fumigation. This is commonly employed against the pests of stored products, such as grain weevils, dried fruit moth and numerous others, and is also a standard method of controlling household pests and the scale insects attacking citrus trees. For stored products, the commonly used fumigants are carbon bisulphide, chlorpicrin, and hydrocyanic acid gas, while the last-mentioned substance is employed for citrus tree fumigation and house fumigation practically to the exclusion of all others. Hydrocyanic acid is sold in the form of powder, which, on exposure to damp air, gives off the gas. Fumigation of citrus trees is carried out under special gas-proof tents, and is an operation calling for knowledge and care. It is done at night, so that the air will be damp and the heat of the day avoided, but dew must not be present on the leaves, otherwise the gas dissolves in the dew, causing severe burning of the foliage. Of recent years, vacuum fumigation has been increasingly used with stored products such as grain, where difficulty might be experienced in securing a thorough distribution of the gas throughout the bulk of the material. Where vacuum fumigation is used air is drawn out of the space to be fumigated, and the fumigant is then liberated, and is drawn into the most inaccessible spots by the partial vacuum created. This ensures that fumigation is thoroughly carried out.

LOCAL TIMBERS FOR PLANTATION BUILDINGS, AND NOTES ON NON-INDIGENOUS HARDWOODS.

By G. E. Bliss.

The exports of timber from this Territory have advanced rapidly in the last two years and now form a valuable addition to the territorial income. These exports, however, are all in the form of logs and the imports of milled building

timber are still considerable. During each of the last two financial years timber was imported to the value of over £11,000, and to this must be added the heavy cost of freight and handling. There is also a large quantity of furniture imported which might be made locally.

It seems possible that, as far as Rabaul and other main ports are concerned, it may always be cheaper to import timber; the obstacles to the establishment of saw-mills sufficiently large to cope with the demand are considerable. Two main drawbacks are:—

Firstly, lack of pure stands. With the exception of small areas of kamerere in New Britain and the *araucaria* belts in the highlands, the New Guinea bush is very mixed forest, rarely containing as much as 10 per cent. of any one species.

Secondly, lack of virgin country. Nearly all the New Guinea bush has been and is being marred, from the timber-getter's point of view, by the shifting cultivation and wasteful methods of the kanaka. The native obtains such timber as he requires in the sapling stage; uneconomically and often, unfortunately, before it is old enough to bear seed and regenerate itself. Matured timber trees are useless to him and in making new clearings for food crops he rings these, with axe or fire, or fells them. He leaves, however, such trees as bear edible fruits and it is fortunate that these include such useful timber species as "Tun", "Talis", and "Lup". These methods, combined with the lighting of hunting fires, have, in the course of generations, greatly altered the rain-forests of the country and gradually converted a large portion of them into kunai land, maintained as such and further extended by seasonal burnings. The remaining forest land has also suffered radical alterations and now consists very largely of secondary growth interspersed with food-bearing trees; a type of country which is, as a rule, not very suitable for the large-scale saw-miller.

It is, however, a type of country which is generally capable of providing ample supplies for the limited needs of a plantation and this article is written in the hope of assisting those planters who may be interested in producing their own timber. Many planters already do so; there are several plantations in this Territory on which all the buildings have been constructed from native woods. But there are also many plantations, surrounded by suitable bush, where all building material has been imported.

Owners and managers of such plantations may have been influenced by the theory that the cost of the necessary equipment would render local production uneconomic. Extensive and expensive machinery is not necessary for milling on a small scale. Logs can be pit-sawn where felled into slabs up to 6 or 7 inches in thickness and brought in by road or water to a small plant consisting of a 24-in. circular saw bench, a power planer and a heavy duty oil engine of about 3 b.h.p. Total landed cost of such equipment should not exceed £150.

The cost of building timber on plantations is generally allotted under two heads, viz., construction and maintenance, the latter including minor alterations and improvements. The writer, who admits to a lack of building and costing knowledge, estimates the first as averaging well over £1,000; and the second at about £100 per annum. The latter item alone, if approximately correct, should warrant an attempt at local production.

The following include some of the more common timber trees of the Territory: many of these are now being exported to Australia for the manufacture of plywood and veneers. Some of them are too small to interest the exporters but are

nevertheless, sufficiently large for plantation requirements. Their pidgin names are given, where possible, as a means of identification.

Intsia (Afzelia) bijuga—"Kwila".—This timber is too well known to need description. Makes an excellent, though heavy, furniture wood.

Pometia pinnata—"Towan" or "Tun". Another well-known timber, not quite as hard and durable as "Kwila", but easier to work. Rots quickly in the ground unless well tarred.

Eucalyptus naudiniana—"Kamerere".—Grows only in New Britain, but is worthy of introduction to other parts of the Territory. It, and *Eucalptus deglupta* (which occurs in the Celebes and the Philippines and is held by some botanists to be identical with the local species), are the only eucalypts which thrive at sea-level in the tropics.

Calophyllum inophyllum. Common on nearly all the beaches of the Territory; unfortunately, its habit of growth makes it difficult to secure timber of any length. It is a very popular boat-building timber in Malaya.

Vitex cofassus—"A-sang" or "Sang".—A hard, straight-grained, brown timber with yellow sapwood; has been described as "New Guinea Teak".

Dracontomelon spp.—"Lup".—Large, heavily buttressed trees with edible fruits. Yield fair wood.

Albizzia spp.—"Poun-poun". Several of the indigenous *Albizzias* yield good hardwood; the commonest, *Albizzia procera*, is generally found among and in competition with kunai (*Imperata cylindrica*) and should be very useful in re-afforesting kunai land. It is rather small for a milling timber but makes good round posts which last well in the ground.

Hibiscus tiliaceus—"Mungas". A small tree which is readily recognizable by its hibiscus type of flower which is yellow with a reddish-purple centre. It is generally found, like *Calophyllum*, on or near beaches and has much the same gnarled growth. The sapwood is perishable, but the purplish brown heartwood is tough and durable.

Canarium spp.—"Galip".—Yield a moderately hard wood which, however, seems very liable to insect attack and is not very durable. Moreover, the trees, being valued for their fruits, are not readily available. However, their long, straight boles supply good lengths of timber, which, suitably treated, should be useful for ceilings and inside work.

Octomeles sumatrana—"Erima".—A large tree with a long, buttressed bole. Provides a rather soft, light wood, nicely grained and suitable for all interior work.

Glochidion sp.—There is, apparently, no pidgin name for this tree; it may be recognized by a furrowed, grey bark and a small fruit which contains a number of red, wedge-shaped seeds attached to a central core. Yields a hard, tough, reddish timber.

Terminalia calappa (and other *Terminalia spp.*)—"Talis".—These are common throughout the Territory and are conspicuous for the autumn-tinting of their foliage just before leaf fall. They yield a good, durable timber, elastic and easily worked, but since they also bear an edible nut it is, as in the case of Galips, difficult to purchase the trees from natives.

Heritiera littoralis.—Has been called "Looking Glass Tree" and is recognizable by the reflecting sheen on the lower side of the leaves. Generally found on or near beaches and yields a tough, hard, dark-brown timber; unfortunately, the tree is often gnarled and low branching.

Alstonia spp.—"Ai-ting".—This genus, which may be distinguished by its panicles of white, scented flowers and the latex which can be obtained from leaves and bark, is represented by three (possibly more) species in New Guinea. One, *Alstonia scholaris*, yields a soft wood which is not recommended for anything but case-making, but there is another species, possibly *Alstonia longissima*, which yields a hard, very durable, cream-coloured wood.

Pterocarpus indicus.—This is one of the best of the New Guinea hardwoods; other species of this genus yield "Padauk" which is exported in large quantities from Burma and the Andaman Islands. The local species is a large tree with yellow flowers borne on axillary racemes and the fruit is a round, single seeded, winged pod. The timber varies from pale yellow to red, and is considerably lighter than "Kwila" or "Tun". Makes an excellent furniture wood. Has no pidgin name, but the following local names may assist in its identification:—E-Yoh (Gasmata), Sae Lupae (Aitape), Surum (Wosika dialect of Karkar, Madang), Saiko (Nakanai), Tangi (Manam and Lower Ramu).

The above list is, of course, by no means complete. Different districts vary largely in their range of timbers available and local knowledge and the local natives will, no doubt, be able to suggest other trees worthy of trial.

Afforestation is generally, by reason of its long-delayed returns, a concern of companies and governments rather than individuals, but some planters may be interested in the planting up of non-indigenous hardwoods. The following notes are based, mainly, on observations of trees introduced to, and growing in, the Botanic Gardens, Rabaul. Most of the trees mentioned below are growing as specimen trees and have, therefore, larger girths than they might have attained in a timber plantation, although they have, however, been handicapped by the poor pumice soil of Rabaul. An asterisk (*) indicates that seed can be supplied.

Teak (*Tectona grandis**).—This is not really suited to the damp, non-seasonal climate of New Guinea, but the trees in the Botanic Gardens (now about 28 years old) flower and seed freely and have girths up to 7 ft. 9 in.

Mahogany (*Swietenia mahogani* and *Swietenia macrophylla**).—These are doing well. One of the latter, planted about 1910, has a girth of 6 ft. 5 in.; the former, planted ten years ago, girths up to 3 ft. 11 in.

East Indian Walnut (*Albizzia lebbek**).—This yields a good hardwood which has been used as a substitute for walnut. It is a quick grower and was planted in Rabaul as an avenue shade tree. Unfortunately, it has proved liable (as have many of the *Leguminosae*) to attack by fomes.

Trincomalee Wood (*Berrya cordifolia**).—Only one specimen of this is present in the gardens. It has a girth of 3 ft. 2 in. at eight years old.

Crabwood (*Carapa guianensis*).—This is also represented by a single specimen which has apparently suffered some damage in its early stages of growth. Planted in 1932, it now has a girth of 20 inches.

Spanish Cedar (*Cedrela odorata**).—This appears to flourish here; trees planted 28 years ago now show girths up to 7 ft. 4 in.

The above are timbers with an established commercial reputation. The following, which are not so well known, are all good hardwoods which have proved suited to local conditions:—

*Tamarindus indica** (Tamarind).
*Artocarpus integer** (Jakfruit).
*Adenanthera pavonina** (Bead Tree).
*Cassia fistula** (Indian Laburnum).
Filicium decipiens.
*Lagerstroemia flos-reginae** (Indian Lilac).
*Michelia champaca** (Champak).
*Myroxylon balsamum** (the source of Balsam of Tolu).
Pericopsis mooniana.

Dipterocarpus grandiflorus, which provides the "Apitong" which is imported into this Territory from the Philippines, has never been tried here, but should do well.

Trees planted for timber should be grown as far as possible under forest conditions. Specimen trees and trees planted in avenues may grow more quickly, but they generally branch too low and fail to form long straight boles.

KAMARERE (*EUC. DEGLUPTA* (*NAUDINIANA*)).

By C. E. Lane Poole, Inspector-General of Forests, Canberra.

In New Britain kamarere (*Euc. deglupta* (*naudiniana*)) occurs as a very fine riverine type thriving best in pure stands on the alluvium in a valley which is flat enough to be subject to annual flooding in the height of the rainy season which in New Guinea occurs in the north-west monsoon.

The species come under the category of a giant gum, for it towers to a height of 240 feet, and yields timber both in size and quality which rivals that of the great gums of Australia.

After the undergrowth has been removed, a stand of kamarere resembles in appearance the mountain ash forests of Victoria (Australia). The trees shed their bark in the same way, and, although the colour of the boles is darker—sometimes purplish—the species are very much alike.

The crowns of the kamarere, however, carry more spreading foliage, and the leaves do not hang down straight like the more sclerophyllous of the eucalyptus species, but spread out straightly. The leaves are, moreover, of less leathery texture.

The volume of timber yielded by the kamarere may be gathered from the following measurements of a tree felled some time ago for the Korindal Mill in New Britain:—

1. Log, 20 feet in girth, 8 feet long.
2. Log, 18¼ feet in girth, 16 feet long.
3. Log, 15 feet in girth, 18½ feet long.
4. Log, 14 feet in girth, 19½ feet long.
5. Log, 13 feet in girth, 18½ feet long.
6. Log, 12½ feet in girth, 29½ feet long.
7. Log, 11½ feet in girth, 18½ feet long.