C.S.I.R.O.

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One - Shift Versus Continuous Heating for Timber Seasoning Kilns

By G. S. CAMPBELL and G. W. WRIGHT, Seasoning Section

So FAR as is known, little information has been published on the above subject, especially on the important aspects of relative kiln-drying times required for matched material and on drying quality obtained with the two methods of drying. It is recognized that part-time kiln heating may be undertaken for any of a number of reasons, including labour difficulties, fuel shortages, or a recession in timber demand. On occasions, however, it may be undertaken from choice, the plant management having assumed that, despite reduced turnover, drying costs may be reduced thereby.

In an endeavour to examine some of the effects obtained under the two procedures, experimental work was recently carried out at the Division of Forest Products, C.S.I.R.O., during drying studies on mountain ash (*Eucalyptus regnans*) and radiata pine (*Pinus radiata*).

It should be made clear that in the laboratory studies, the only operational variable examined was that of continuity of kiln heating (i.e. the influence of heating kilns for one shift only each day compared with that of heating them continuously). No variation was made to the fan operation (air circulation), the fans being kept running continuously irrespective of the heating practice, which is in general conformity with recommended trade practice. This is because fan operation can usually be maintained over any number of shifts without involving additional labour, whereas steam can usually be provided over more than one shift only by employing additional boiler attendants for each additional shift. For three-shift heating, steam was, therefore, continuously supplied to the kiln-heating coils over the full 24 hours of each day (so that full operating temperatures were maintained), whereas for one-shift heating steam was supplied for only 8 hours each day (so that kiln temperatures gradually dropped over the remaining 16 hours). During the "heat off" periods of the one-shift operation, the kiln vent dampers were set to provide only a small vent opening. In all cases the standard seasoning schedules for the classes of material being dried were used.

For an Impervious (Slow-drying) Species

Five experimental runs of 1 in. thick, mixed sawn mountain ash were prepared, and then dried as follows:

(i) *Run 1* was air dried to a moisture content of 24 per cent. and then kiln dried with *three-shift (continuous) heating.*

(ii) *Run 2* was also air dried to a similar moisture content and then kiln dried under *one-shift heating.*

(iii) *Run 3* was kiln dried from the green condition with *three-shift (continuous) heating.*

(iv) *Runs 4 and 5* were kiln dried from the green condition under *one-shift heating.* Run 4 was, however, kiln dried during winter, whereas run 5 was kiln dried during summer, so that any influence exerted by ambient temperature during the "heat off" periods could be determined.

In Figure 1 the drying curve for each run has been plotted, and the mean rates of drying obtained per day (i.e. per 24 hours) over the total kiln-drying period (i.e. the time in kilns) are also shown.

The studies demonstrated that to dry the 1-in.-thick mountain ash from the green condition (average moisture content 90-100 per cent.) to a moisture content of 12 per cent., the time required with three-shift (continuous) heating was approximately 17 days (414 hr) compared with approximately 30 days (723 hr) (mean of winter and summer drying times) under one-shift heating. This gives a ratio for drying times under three-shift and one-shift heating of about 4 : 7, i.e. the total time in kiln required for one-shift heating approximated some 75 per cent. longer than that necessary under three-shift heating.

The influence of external (atmospheric) temperatures on kiln-drying times during one-shift heating was found to be fairly marked. Under summer conditions a total time of approximately 27 days (642 hr) was required to kiln dry the 1-in.-thick mountain ash from the green condition to a moisture content of 12 per cent., whereas under winter

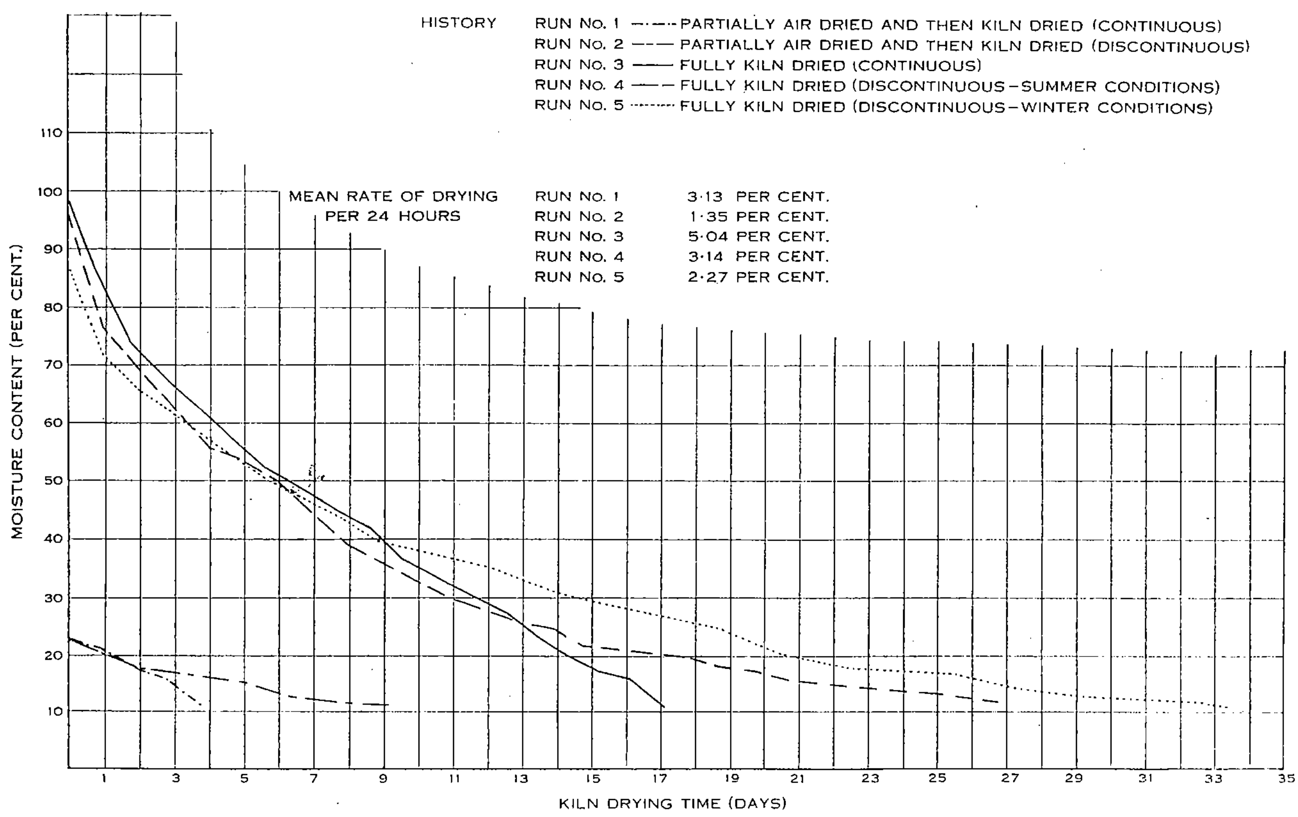


Fig. 1.—Relationship between drying times for one-inch E. regnans *(mixed sawn) for continuous and discontinuous operation.*

conditions a kiln time of the order of 34 days (804 hr) was found necessary for the same moisture content limits. This represents a difference of some 25 per cent. (based on the summer drying time). It is of interest to note that the difference was a little more marked during the early stages of drying, i.e. during drying to approximately fibre saturation point (about 25 per cent. moisture content).

It was also noted that for drying from the green condition to approximately fibre saturation point, one-shift heating under summer conditions gave a drying time not significantly different from that recorded for continuous drying.

An aspect of particular interest brought out by the study is that, despite the fact that one-shift heating required a longer kiln-drying time, in the proportions demonstrated, the total "kiln heating" period that it involved was very much shorter than for the continuous drying. In fact, the one-shift heating (mean of summer and winter) involved a total heating (or boiler operation) time of only about 60 per cent. of that required for continuous heating (i.e. 241 hr compared with 414 hr).

For the partly air-dried material (runs 1 and 2 of Figure 1), the time required for kiln drying, from an average moisture content of 24 per cent. to 12 per cent. by continuous and by one-shift heating, favoured the former in the ratio 1 : 2. With drying terminated at an average moisture content of 16 per cent. the ratio was further reduced to 3 : 4.

For a Pervious (Fast-drying) Species

Studies made with 1-in.-thick back-sawn radiata pine showed that, although trends similar to those described above were noticeable, the difference in drying times was somewhat more marked. In drying from the green condition (average moisture contents between 90 per cent. and 120 per cent.) to 14 per cent. moisture content, the drying times (times in kiln) required for continuous and one-shift heating were found to be approximately in the ratio 4 : 9 (44 hr compared with 99 hr), i.e. the one-shift heating required some 125 per cent. longer time than continuous heating. It was not unexpected that the ratio for the pervious softwood would be greater than that for the more impervious hardwood.

In this case, for an equivalent amount of drying, one-shift heating required steam to be supplied to the kiln for only 75 per cent. of the time required for continuous heating.

It is not known, however, whether or not the shorter heating period for one-shift operation provides any economy in the use of fuel, as no measurements of steam quantities used were obtained.

Quality of Drying Obtained

With neither species dried could any significant difference be observed in the drying quality obtained by one-shift or three-shift heating; in both cases drying quality was satisfactory. If anything, however, it would be expected that moisture gradients would be less severe with one-shift than with continuous heating; some limited moisture distribution tests tended to confirm this.

An important precaution required when operating with heating on a part-time basis is to provide correct adjustment of the vents during "no heating" periods. If the vents are completely closed, the kiln atmosphere will ultimately cool below the dew point, so that condensation will occur on the kiln walls and the timber charge. On the other hand, if the vents are too open, low humidity will develop in the kiln, particularly during the early stages of cooling, and this could cause degrade. Ultimately, too, the kiln temperature will fall to such a degree that an excessive time would be required during the following heating period before operating temperatures were again reached.

In a future article it is hoped to discuss the economics of one-shift and continuous kiln heating.

PROBLEMS OF RAIL SLEEPER PRESERVATION IN AUSTRALIA

By N. TAMBLYN, Officer-in-Charge, Timber Preservation Section

(This article is part of a paper presented at the 1952 Convention of the British Wood Preserving Association. The final part will be published in the next issue of the Newsletter.)

Introduction

THERE ARE over 70 million sleepers in Australian railway systems which are almost exclusively untreated eucalypt timbers of various species, the maintenance of which should involve replacement at a current rate of at least 3½ million sleepers annually.

In the past these sleepers were supplied at low cost from species of high natural durability which experience had shown also to possess desirable mechanical properties. Untreated eucalypts such as ironbarks, boxes, river red gum, jarrah, and many others were used, and in specified quality gave a service life of about 15-50 years, depending on species, density of traffic, type of ballast, locality of service, and so on. Because of this long life, preservative treatment was generally considered unnecessary, or at least of doubtful economic benefit.

This was illustrated when attempts were made to utilize preservative-treated sleepers of less durable eucalypts, such as karri, in Western Australia. This species has relatively low decay and termite resistance, but good mechanical properties. Being refractory to conventional pressure treatment, it was treated green by a diffusion process involving a long heating and cooling cycle in a water-borne preservative. Some open tank effect was gained during the cooling period and the so-called "fluarizing" treatment (using arsenic-fluoride-dinitrophenol preservative), which was commercially applied about 1926, did result in a considerable increase in service life. In controlled tests conducted by the Division of Forest Products, the average service life of fluarized karri sleepers was about 13 years, compared to approximately 6 years for untreated karri sleepers installed in gravel ballast. However, although treatment was cheap and its cost amply repaid in terms of better service, the process was not economically successful because untreated jarrah sleepers were freely available and gave longer life at a cost which represented a lower annual charge. This served to emphasize the economic law that a treated sleeper must be proven in terms of ultimate cost a cheaper and better product than the best available alternative. Until recent years it has not been possible to demonstrate this in Australia.

The favourable supply position of the past has changed rapidly during the last decade and it is now increasingly evident that some form of treatment is becoming economically desirable. Preferred species in readily accessible stands are not in sufficient supply to meet all demands, the quality is lower, the density and speed of rail traffic have increased, and track inspection has consequently become more critical. Species of lower natural durability and with less satisfactory mechanical properties are being used increasingly to supplement requirements at high costs of purchase and installation. Without treatment the life of these species will undoubtedly be much lower than the long service obtained in the past.

General Problems

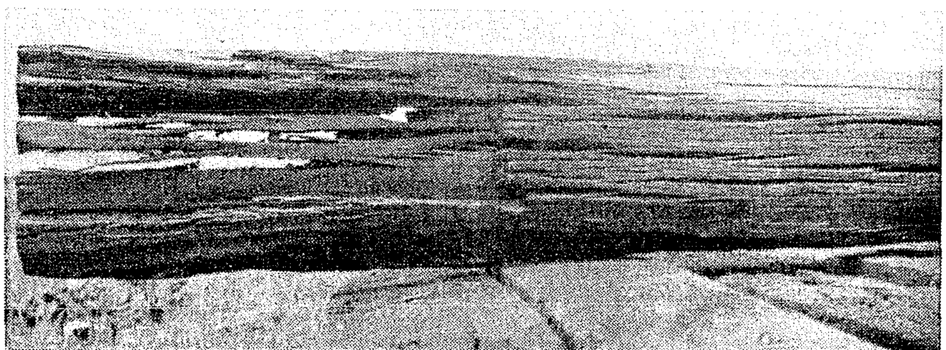
Unfortunately, satisfactory preservative treatment of sleepers under Australian conditions is not a simple problem which can be solved readily from the experience of other countries. Eucalypt sleepers typically possess little or no sapwood and the heartwood is extremely difficult to treat with preservatives.

Most species used for sleepers are heavy, slow-drying timbers and because of their high shrinkage, which is markedly different in the radial and tangential directions, are liable to severe end splitting and surface checking during drying. Many species tend to be fissile, which further accentuates their liability to splitting during drying and service. Also, conditions of service and causes of failure vary considerably over the wide Australian climatic range.

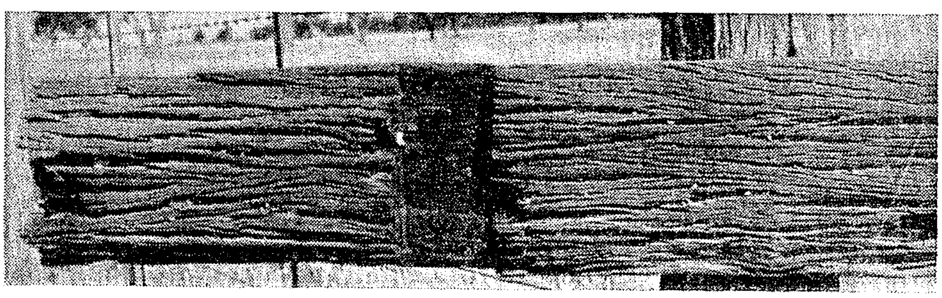
In southern Australia, the main causes of renewal of untreated naturally durable sleepers are mechanical failure and decay or a combination of both. Other causes of failure, including termite damage, are usually of minor importance except under special conditions or in restricted areas. Under mechanical failure are included end splitting, loosening of the spikes, rail or plate cut, shatter at the rail seat, surface deterioration, and embrittlement of the wood. Observations have shown that end splitting, with associated loss of spike-holding capacity, is commonly the most important single cause of failure. Thus, in a recent survey in some 60 localities in Victoria this type of failure was predominant, and together with other types of mechanical breakdown was primarily responsible for over 90 per cent. of all sleeper renewals. Decay, although occurring quite frequently in small amounts, was mainly a secondary cause of deterioration and did not assume major importance in any of the species included in the survey.

Increasing use in future of untreated eucalypt sleepers of lower natural durability might be expected to modify this picture by increasing the relative importance of decay failure. However, it is expected that this trend will be counteracted to some extent by the shorter mechanical life of many of the less durable species, which tend to be lighter in weight and more free-splitting than the species on which the survey was made.

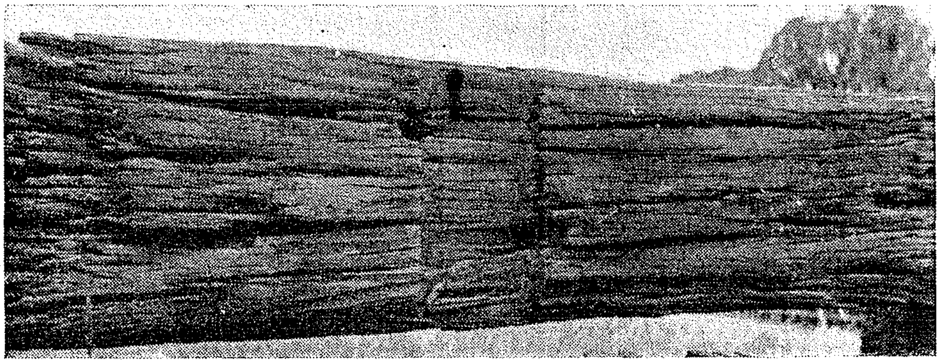
Interim results with a number of less durable species in service tests confirm this expectation. Therefore, as a generalization applicable to most eucalypt sleepers, it is considered that mechanical failure of untreated sleepers will predominate in the Mediterranean and more arid inland climatic areas of southern Australia. This is particularly so where the decay hazard is reduced by the use of well-drained stone ballast. In the high-rainfall tropical and subtropical northern coastal areas decay is of greater



Severe shattering in a eucalypt sleeper.

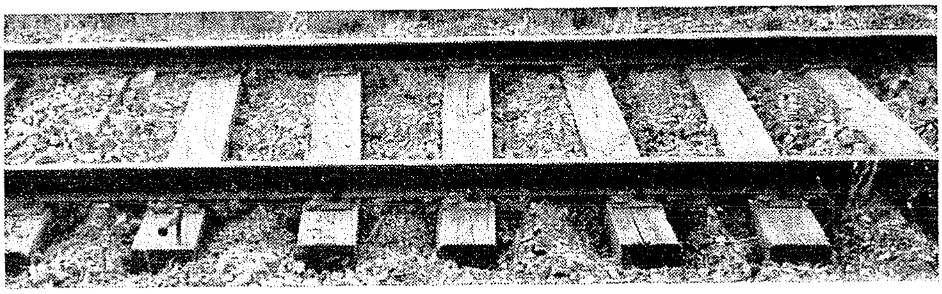


Rail cut and surface breakdown in a eucalypt sleeper.



End brooming in a eucalypt sleeper.

Radiata pine sleepers pressure treated with creosote oil. In test for 13 years on a curve, Snowtown-Kadina, S.A.



importance and will become increasingly so if the usage of less durable species increases. However, only a minority of sleepers is in service under these latter conditions and their treatment is of secondary importance to the main problem of sleeper preservation in the southern and inland areas.

Stated briefly, the main problem in preservation of eucalypt sleepers in Australia is thus to increase mechanical life to the maximum compatible with economy and to ensure that with all species failure from decay remains of minor importance. During the last several years the Division has given much time to seeking some solution to this difficult problem, which is by no means restricted to Australia. Interim results and conclusions are here given briefly, not as a solution to the problem, but as some progress towards a difficult goal.

Conclusions From Service Tests

Service tests of preservative-treated eucalypt sleepers in Australia have been limited in the past because of the great difficulty in obtaining worth-while penetration by conventional pressure treatment. Early tests were conducted in Western Australia with fluarized karri sleepers treated by the open tank-diffusion process previously mentioned. This salt treatment improved decay resistance but had no obvious beneficial effect on mechanical life.

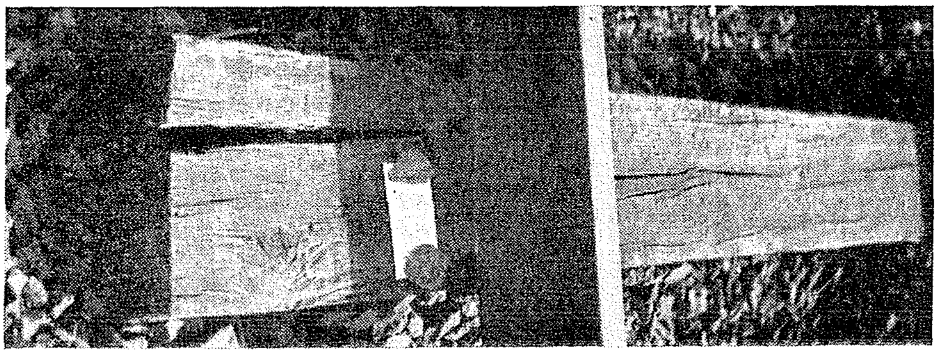
This result was also very clearly shown in service tests of *Pinus radiata* sleepers installed in South Australia in several localities in 1936. Sleepers pressure treated and well penetrated with two different salt preservatives developed severe surface checks and end splits in service, and in this regard were definitely inferior to similar sleepers in the same test treated with creosote oil and with a mixture of creosote and fuel oil. This test is still current and the mechanical superiority of the oil-treated sleepers is now very marked, particularly in the hot inland areas where the exposed ends and top face are subject to severe solar effects and to considerable stresses set up by rapid changes in moisture content during periodical wetting and drying.

Further tests in Victoria with sleepers of several eucalypt species surface treated (and retreated *in situ*) with a creosote-fuel oil mixture have also demonstrated the same result. Our field tests have further confirmed overseas observations that mixing of heavy mineral oil with the creosote increases its mechanical protection.

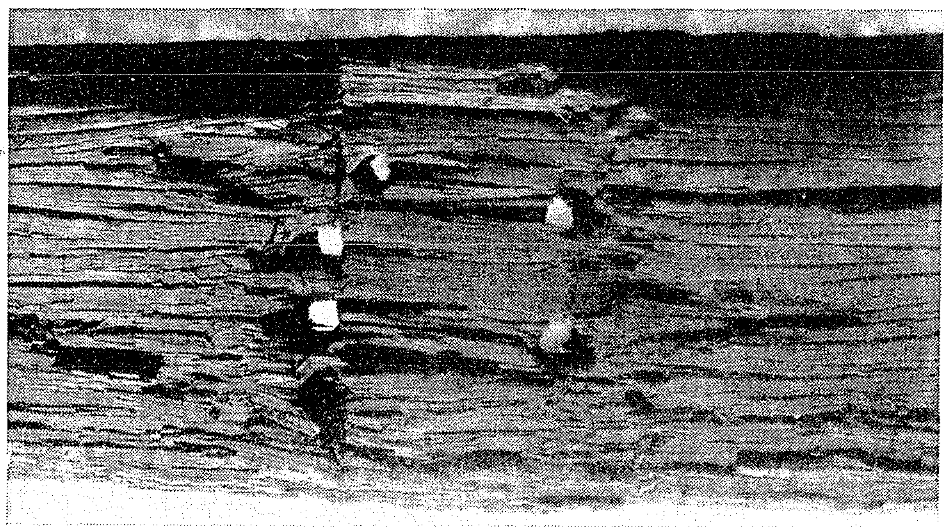
The significance of these conclusions is not always fully realized, as there is a tendency among engineers to accept the cheapest preservative which controls decay until the end of the mechanical life of the sleeper. Our conclusions are opposed to this, and it is considered that the first essential is to select the type of preservative and the treatment method which will give maximum mechanical protection to eucalypt sleepers, with only secondary emphasis on its decay-retarding efficiency, which can be readily adjusted as required.

This work is now in progress and involves consideration of the reasons why oil preservatives confer some mechanical protection. Our interim conclusions are that surface checks and end splits which develop during service are largely initiated by moisture gradient stresses caused by wetting and drying of the sleeper and consequent movement of the case over the core. Once formed, splits and checks are liable to further extension under stresses imposed by the wedging action of the spike and the rapid loading and unloading of the sleeper during passage of traffic. The beneficial action of preservative oils is considered to be mainly that of reduction of moisture gradient stresses.

(To be concluded)



End splitting in an E. regnans *test sleeper.*



A "spike-killed" eucalypt sleeper.

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High-frequency Heating applied to the Manufacture of Case Ends

By N. C. EDWARDS, Timber Physics Section

THE COMMON METHODS of joining boards to form wide panels are by means of cleats, corrugated metal fasteners, and gluing. All three methods are used for the manufacture of case ends, but the first two are unsuitable for certain classes of cases requiring a "one-piece" end. If gluing is used, it is generally in conjunction with machined interlocking edges. After gluing, the panels are usually stacked for several hours until the glue has set sufficiently to withstand subsequent machining operations.

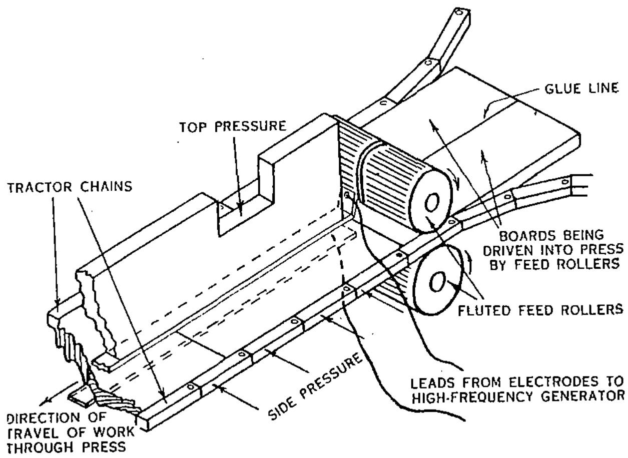
Some thermo-setting glues can be set in a matter of seconds by raising their temperature, thus enabling interlocking edges to be dispensed with more easily. The boards to be joined are machined to size with square edges, glue is applied to the mating edges, and the work is fed into a press designed to apply heat to the joint whilst either moving or stationary. The process is continuous if the operations are carried out as the stock moves through the press at a uniform rate, or a batch process if the panel is held stationary while heat and pressure are applied to set the glue.

The initial cost of a batch press is generally much less than that of a continuous one of the same capacity, but the output of the heating equipment is not fully utilized on account of the time required for reloading. This may be overcome, if it is economical to do so, by using two batch presses, loading one while curing the glued joints in the other; generally, however, a single press only is used. The relative merits of the continuous and batch processes must be investigated for each individual installation.

In America and Europe, where butt jointing is used much more extensively than in this country, the batch process is adopted almost exclusively, e.g. in one plant visited recently by an officer of the Division, two operators using a batch press with dielectric heating were gluing corestock panels in $1\frac{3}{4}$ min with a break of 10-15 sec for unloading and reloading the press. In another plant visited in the United States, the provision of automatic loading enabled one man to handle the complete gluing process. Most users of dielectric heating equipment for gluing corestock and similar products find it more economical to use a single batch press than to incur the extra cost of a continuous press or of an additional batch press. The latter alternative may be resorted to if the reloading time represents a considerable proportion of the complete cycle.

Whichever process is used, dielectric heating is a convenient method of raising the temperature of the glue to accelerate setting. Further details of the method, types of glue, and gluing rates were contained in articles on "High Frequency Dielectric Heating in the Timber Industry" in Newsletters Nos. 163, 164, 167, and 168.

Partly because of the smaller production in the Australian timber industry as compared with that of Europe and the United States, dielectric heating has not been generally adopted in this country. However, several companies have found that they can profitably employ small units and a few use larger units up to 10 kW output. Generally speaking, mass production processes are the ones most likely to benefit economically from the use of such equipment, but the versatility of dielectric heating renders it applicable to such a diverse number of gluing jobs using relatively simple and inexpensive jigs that the absence of mass production does not necessarily preclude the economic use of dielectric heating equipment.



Method of applying pressure to the glued joints as they proceed through the gluing press.

In an effort to determine the power and time required to produce satisfactory joints, a press was designed by this Division for the continuous edge gluing of pairs of boards to produce panels $14\frac{1}{4}$ in. long, $8\frac{3}{4}$ in. wide, and $\frac{5}{8}$ in. thick. The glue used was a cold-setting urea formaldehyde resin. The boards were of radiata pine at approximately 12 per cent. moisture content, and were heated by dielectric heating as they moved under lateral and vertical pressure, glue having been applied to both the mating edges. Pairs of boards with machined edges were hand fed into the press between motor-driven feed rollers, synchronized with traction chains running the length of the table. Side pressure was applied by springs and rollers to these chains which moved along in contact with the outer edges of the boards, as shown in the figure.

The dielectric heating raised the temperature of the glueline as the work travelled through the press. The electrodes to which the high-frequency energy was supplied were in the form of two $\frac{3}{8}$-in. strips of sheet copper, the top one being 12 in. and the bottom one 18 in. long. The electrodes were insulated from the frame of the press and maintained in contact with the work by the spring loading of the top electrode. As the glueline was parallel to the electric field between the electrodes, selective heating of the glueline occurred because its loss factor was higher than that of the surrounding wood.

The best gluing rate obtained in these tests was six joints per minute using the full output of the available experimental high-frequency generator. This rate represents an energy dissipation of 450 watt sec per sq. in. of glueline. On this basis, a 5-kW dielectric heating unit and associated press would handle boards at the same rate as a mechanical jointer costing several times as much, the output being about 4500 case ends per hour, each having a single glueline.

Although it may be argued that the production figures of very few Australian industries warrant such equipment, it is felt that a dielectric heating unit purchased primarily for one purpose, such as the manufacture of case ends, could be used on other jobs such as the gluing of joints in furniture or the manufacture of corestock. This versatility and lower first cost, added to the fact that the disadvantage of small production applies equally to the mechanical jointers which have been found necessary in many of the larger timber industries, place dielectric heating equipment generally in a much more favourable economic position. An approximate comparison of the cost of a dielectric heating unit and press with a mechanical jointer can be drawn from the fact that equipment using dielectric heating and costing roughly £2000 will have the same output as a mechanical jointer costing probably £12,000.

The Use of Chemicals in the Control of Blue Stain in *Pinus radiata*

By E. W. B. DA COSTA, Timber Preservation Section

BLUE STAIN in *Pinus radiata* is caused by fungi which attack the sapwood during the interval between the felling of the tree and the final drying of the sawn timber. These fungi do not appreciably reduce the strength of the timber, but may seriously affect its appearance (Fig. 1). Such blemishes reduce the sales appeal of the product and may prevent its use for some purposes, e.g. for export food cases or for clear-finished lining timbers.

The spores of the causal fungi are so abundant in the air of the plantation or the sawmill that infection of any unprotected moist sapwood takes place very quickly. Development of the fungi in the wood is, however, completely arrested once its moisture content has fallen below 25 per cent., and with quick extraction and conversion of the logs, followed by kiln drying of the sawn timber, the wood will have dried to this point before blue-stain blemishes can develop. This also applies where air seasoning is used, provided that the boards are promptly stacked in a suitable fashion (as described in Trade Circular No. 46, "The Air-Seasoning of Timber") and climatic conditions are favourable for rapid drying. In some cases, however, timber will remain green long enough for severe stain to develop, whether through delay in conversion of the logs, bad stacking methods, or prolonged humid weather. Where this is unavoidable, the only method of preventing blue stain is to prevent the fungus from entering the wood in the first place by the application of a surface coating of a chemical which prevents fungal growth.

Chemical protection of sawn timber against infection by staining fungi is obtained by dipping the timber in, or spraying it with, a suitable preservative solution *immediately* after sawing. Where timber is being dipped by hand, it may be desired to block stack the timber as it is sawn up and to dip it later as it is being stripped out; in these cases, care should be taken that all timber is dipped within 24 hours of being sawn.

Where large amounts of timber are being treated, some form of mechanical dipping is essential. The design of the equipment will depend on the mill layout and the method of handling the sawn timber, but one highly effective design is shown in the accompanying illustration (Fig. 2). This consists of a shallow V-shaped trough, built across the path of the transfer chain, in which the boards may be carried though the preservative on the green chain. The chains should be slack where they pass through the vat to allow the boards to sink into the solution, and boards can be prevented from floating

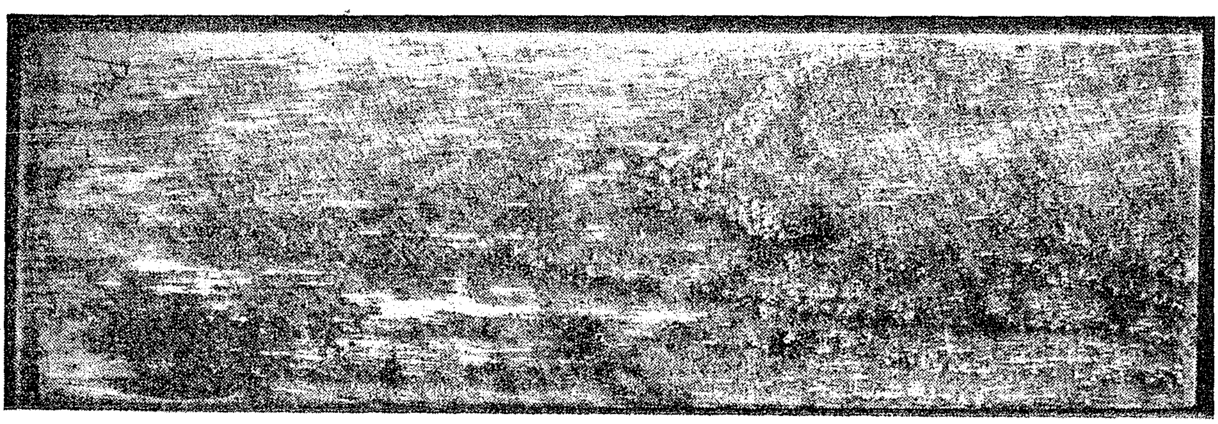


Fig. 1.—Typical blue stain on Pinus radiata *board.*

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by the weight of hanging rollers or wheels, as shown. The draining slope should be fairly steep and as long as practicable, in order to get the maximum recovery of solution from the treated boards. With good provision for drainage, the amount of solution used will be in the vicinity of 15 gal per 1000 super. ft of sawn 1-in. boards. The treating vat, which has a capacity of 200-500 gal, should be cleaned out periodically to remove accumulated sawdust, and fresh solution should be added frequently to keep the solution up to its original volume. It is desirable to use a separate mixing vat or tank for preparing the treating solution, and a cask or drum of 50-100 gal capacity would be suitable.

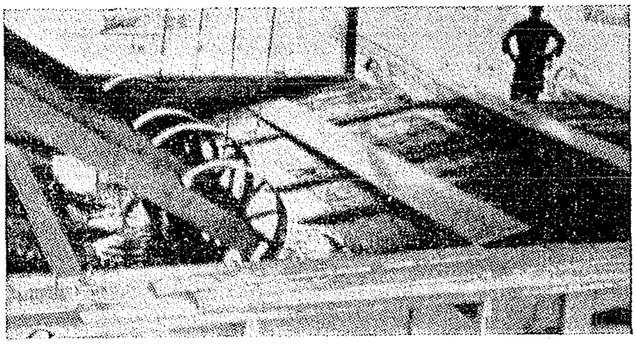


Fig. 2.—Mechanical dipping equipment showing boards passing through vat on the transfer chain.

Spray treatment may be used instead of dipping, but there is a greater risk with spray treatment that small patches on the surface may be left untreated, which would nullify the treatment. Care must also be taken to prevent production of a fine mist of the preservative solution, which would be objectionable to the operators, and the difficulty of providing adequate drainage usually means that spray treatments use much more solution. In some cases, however, spray treatment may be preferred, especially where it is convenient to treat the timber at a point where it is being moved longitudinally by conveyors. The boards should pass through a small closed compartment in which the solution is sprayed on all four surfaces of the board by coarse low-velocity sprays. To prevent clogging of the spray nozzles, the intake for the re-circulating pump should be well above the bottom of the collecting tank and should be screened by a fine wire mesh.

Where only small amounts of timber are being treated, boards may be dipped by hand in a long wooden trough which is fitted with a roller at one end over which boards may be slid into the trough, with splashboards to reduce wastage of solution, and with a drainage rack on which boards may be rested for a few seconds after dipping (Fig. 3). A foot-operated lever to raise one end of the board out of the solution for removal is a convenience for the operator. Hand dipping is quite effective, but involves much higher labour costs than mechanical dipping or spraying.

A number of chemicals have been used successfully for blue-stain control, but the chlorinated phenols are outstanding in effectiveness and convenience. A suitable formula for general stain control is:

Sodium pentachlorphenate	5 lb
Borax	15 lb
Water	100 gal

Fig. 3.—Hand dipping trough, with draining rack and splashboard.

Inclusion of organic mercurial compounds, such as ethyl mercuric phosphate, should give an equally effective treatment with a lower concentration of pentachlorphenol. A typical formula is:

Sodium pentachlorphenate	3 lb
Borax	10 lb
Ethyl mercuric phosphate	2 oz
Water	100 gal

(Continued on p. 7)

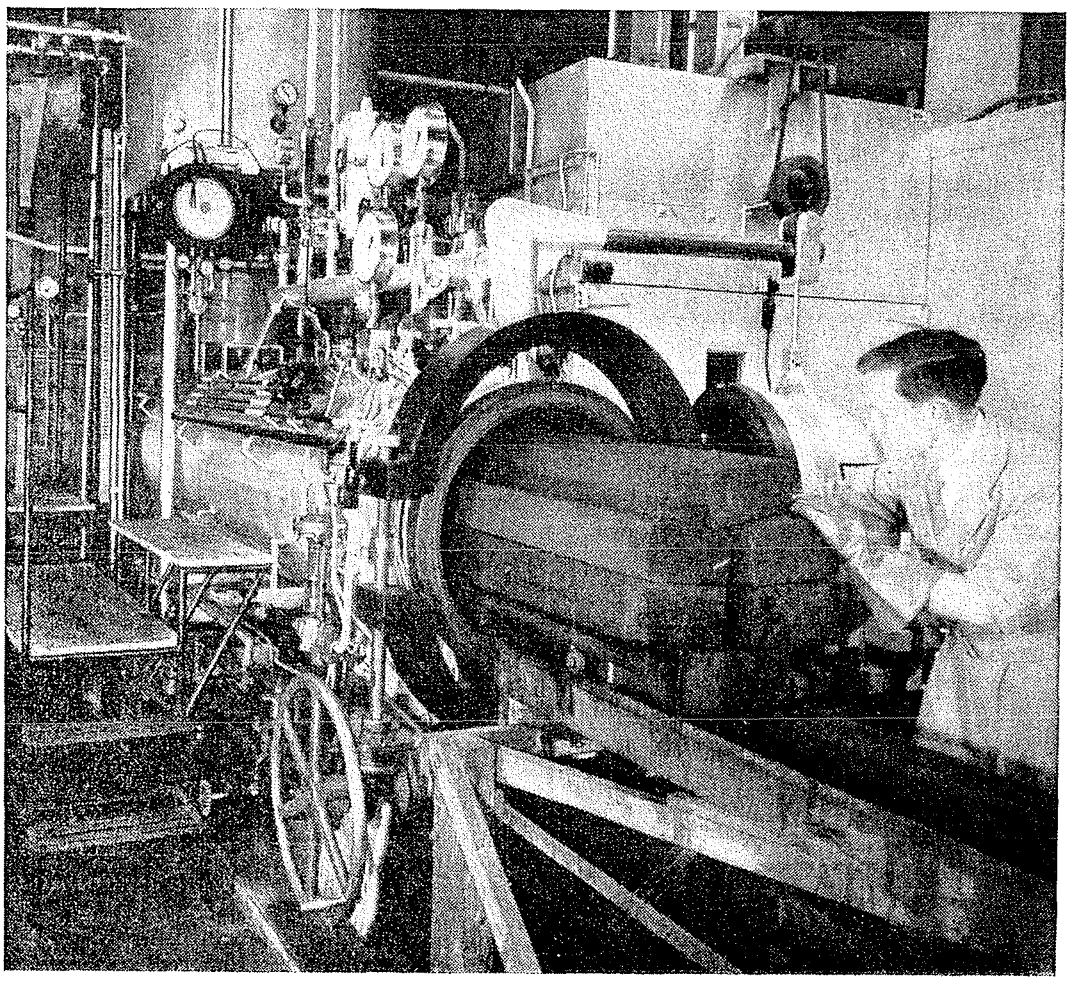
PROBLEMS OF RAIL SLEEPER PRESERVATION IN AUSTRALIA. II

By N. TAMBLYN, Officer-in-Charge, Timber Preservation Section

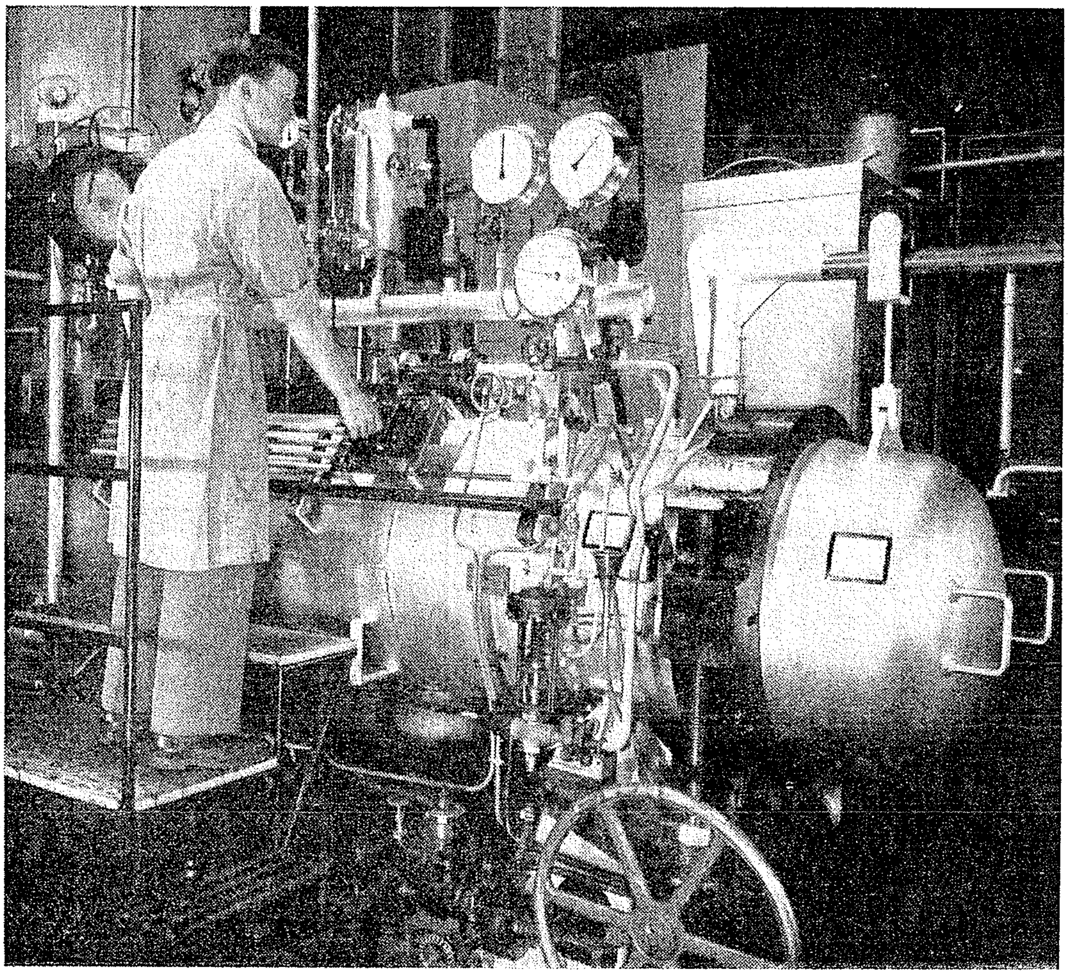
High-pressure Treatment

ACCEPTANCE of the need for treatment with a preservative oil has raised the problem of a treatment method suitable for timbers very refractory to penetration. Heavy absorptions at the ends and in the case are considered necessary to retard moisture changes, to replenish continually the surface film, and to assist in pavementing the sleeper with an oil-dust layer. This penetration cannot be obtained in the heartwood of most eucalypts by normal pressure treatment, and though incising assists case absorption, it has not given the results desired. Treatment at high pressures was, therefore, tried with promising results and after some years of preliminary tests at pressures up to 1000 lb/sq. in., a treatment has been developed which does secure the penetration and absorption desired in most eucalypt species.

A pilot cylinder constructed in Australia is now being operated at the Division with satisfactory results. The cylinder is of welded construction conforming to Lloyd's rules for Class I pressure vessels. It is 26 in. in diameter and 11 ft long, and has a 1-in.-thick wall and a specially designed quick-closing door and seal. It is steam jacketed



Loading a charge of six sleepers in the high-pressure pilot cylinder. Note door-closing mechanism.



Side view of high-pressure pilot cylinder, working at a pressure of 1000 lb/sq. in.

externally to eliminate internal coils, and can be operated so rapidly at 1000 lb/sq. in. pressure that eucalypt sleepers have been treated successfully to a 1-hour schedule. As 3-in. plate is available in Australia, there is no obvious technical reason why high-pressure cylinders up to 6 ft internal diameter could not be fabricated to the design of the present pilot plant.

The effect of high pressure in increasing absorption and penetration is now beyond doubt. A two-to-three-fold increase in absorption in eucalypt heartwood at 1000 lb pressure has been usual, compared to that obtained in matched material treated to approximate refusal at 200 lb. Visible damage to the timber has not occurred provided the oil temperature is reduced to about 150-160°F. With some species temperatures up to 180°F have been used, this being about the safe maximum for free-splitting eucalypts even in normal low-pressure treatments. High-pressure treatment of green eucalypt heartwood has also been tried and has given average oil absorptions of about 3-5 lb/cu.ft in the several species tested. With drier material these figures are usually doubled, the following results being obtained in a recent oil treatment of 50 sleepers each of jarrah, karri, and marri. These sleepers were treated at 1000 lb pressure by the full cell process, without incising, the average treatment cycle occupying about $1\frac{1}{2}$ hours.

Jarrah: Mean absorption 50 sleepers, 12.9 lb/cu.ft.

Karri: Mean absorption 50 sleepers, 6.7 lb/cu.ft.

Marri: Mean absorption 50 sleepers, 8.3 lb/cu.ft.

The treatment pattern, with most of the preservative concentrated in the ends and in the first inch of the case, was quite satisfactory and economical of preservative. The rapid treatment was particularly pleasing in its promise of high output from relatively small cylinders.

Further Work

Successful development of a method of treatment for eucalypt sleepers is regarded as only a partial solution to the broad problem of retarding mechanical failure. Other important aspects include the initial drying of the sleepers free from serious degrade, further work on incision patterns, selection of the best oil mixture, and close attention to methods of rail fastening, ballasting, etc. These aspects are interrelated and cannot be excluded from the field of wood preservation. Thus, the problem of drying relatively fissile timbers with high shrinkage and consequent development of considerable drying stresses, could possibly be overcome by incision and preservative treatment in the green condition. The lower absorption of oil is not necessarily critical because the preservative is not primarily intended to serve its traditional function of preventing decay. What absorption and penetration are sufficient for good mechanical protection is still uncertain and probably depends on the oil used, its permanence, and the extent of modification by addition of tar, mineral oil, or mineral waxes, etc. Certainly, treatment of green material would be economically attractive compared to the alternative of air drying for periods up to two years with application of heavy end coatings to reduce end splits, which otherwise shorten the mechanical life of a sleeper before its service is commenced. Probably some compromise between the two extremes will be found economically most desirable, and work is at present continuing on this aspect.

Type of rail fastening and the extent of ballast cover on the sleeper are usually considered as belonging in the province of the railway engineer. However, their importance can be judged best if the problem is viewed as a whole and for this reason they have been included in the programme of work undertaken by the Division. In hot, dry climates, shielding of the top and ends of the sleeper by ballast cover would be desirable and might even avoid the necessity for pressure treatment of durable species. It remains to be seen whether the advantages of ballast covering with simple preservative treatment would be outweighed by its practical disadvantages.

THE USE OF CHEMICALS IN THE CONTROL OF BLUE STAIN IN PINUS RADIATA *(continued from p. 4)*

Although sodium pentachlorphenate is not highly poisonous, prolonged contact with the solution may cause severe skin irritation. Some people are much more susceptible than others, but any workers continuously handling the wet timber should wear rubber or leather aprons and gloves, and should be provided with convenient washing facilities. In preparing the treating solutions, care should be taken not to inhale any of the dry powder. By the time the timber is fully seasoned, there is no risk of any harmful effects even in sanding the treated timber. The preservative solutions mentioned may be mixed and used in copper, iron, or wooden containers.

If more than a few days elapse between felling the tree and sawing the log, it may be necessary to protect the logs also against infection by staining fungi. This can be done by spraying or brushing all cut or barked surfaces with a 2 per cent. solution of pentachlorphenol in light oil within 24 hours of felling. Where end coatings are used to prevent end splitting, the pentachlorphenol should be applied before, or incorporated in, the end coating. Where the water-miscible wax emulsion type of end coating is used, the water-soluble sodium pentachlorphenate may be incorporated in it at 2 per cent. concentration in place of pentachlorphenol.

THE PROPERTIES OF AUSTRALIAN TIMBERS

MOUNTAIN GREY GUM

Name

Mountain grey gum is the standard trade common name of the timber known botanically as *Eucalyptus goniocalyx* F.v.M. In New South Wales it is also known as mountain gum.

Distribution

In New South Wales the main area is the far South coast in the Eden-Twofold Bay-Bombala area, spreading from there to the Eastern Monaro (Cooma) with other isolated pockets in the Blue Mountains area. It is also found occasionally in the Northern Tablelands. In Victoria the range extends from the north-east to the east and south of the State.

Habit

The tree grows mainly in gullies and on hillsides in moderately good sandy soil, but will grow on poorer types. The tree is tall, reaching 250 ft in height and 2-6 ft in diameter. It has a straight bole, and the bark is smooth, except for a few feet from the ground.

Timber

The wood is light brown in colour, and sometimes has a pinkish tint. The texture is moderately coarse, the grain somewhat interlocked. The timber is fairly hard, heavy, and strong, and is one of the best quality pale-coloured eucalypts. It is easy splitting. It has a density when green of 72 lb/cu. ft. and an air-dry density of 54 lb/cu. ft. There is some evidence that material grown in New South Wales is slightly denser and stronger than that found in Victoria.

On the basis used in the "Handbook of Structural Timber Design", mountain grey gum can be listed for strength in group C, and in durability (fungi and termites) between classes 2 and 3.

Seasoning

In drying from the green condition to 12 per cent. moisture content, this species shrinks 5 per cent. in the radial (quartersawn) direction and 11 per cent. in the tangential (backsawn) direction. As it is rather prone to check in drying, especially when backsawn, care is necessary in seasoning.

Kiln drying from green is not recommended. Sometimes it has a tendency to warp, and if cross grain is present, strips should be spaced fairly closely. Timber kiln seasoned in Victoria is usually reconditioned to reduce effects of collapse, although this treatment tends to open or extend checks. After air-drying to about 30 per cent., kiln time is about 6 days for 1-inch stock to reach 12 per cent. moisture content.

Uses

It is used for general constructional purposes, beams and girders in bridges, wharves, and house framing and flooring.

Availability

In recent years, owing to extended cutting operations, this timber has received more attention than previously. In 1950-51 the output exceeded 10,000,000 super feet in Victoria alone.

Additional information on mountain grey gum is available from the Forestry authorities in New South Wales and Victoria, and from the Chief, Division of Forest Products.

Maintenance and Sharpening of Power Saw Chains

The Division of Forest Products has produced a wall chart which gives details of the correct maintenance and sharpening of power saw chains.

This chart, which is amply illustrated, lists the steps to be taken to minimize wear, and also gives the full sharpening procedure, including details of equipment necessary.

The chart is available on request to the Chief, Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne, S.C.4.

This Newsletter is prepared for general circulation by the Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne, S.C.4, and will be supplied free on request to members of the timber trade and timber users who wish to keep abreast with current developments in the field of forest products.

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Forest Products Newsletter

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Do I Need a Power Chain Saw?

By W. M. McKENZIE, Utilization Section

ANYONE who sees a power chain saw cutting for the first time is impressed by its speed of cutting, but in considering its value for a particular job many other factors are also important. Whether a power chain saw is the best tool can be finally decided with respect to a particular job only by considering the sum of all the factors. The other tools to be considered in comparison are axe and hand cross-cut saw, drag saw, and mobile circular saw. The features to be compared are:

- Weight and portability,
- Speed of cutting,
- Versatility,
- Greatest diameter of log that can be cut,
- Reliability—time loss due to breakdown,
- Cost of purchase and maintenance,
- Operator skill required,
- Maintenance skill required.

In a general way the power chain saw has advantages over other tools in the sum of the first four features, and disadvantages in the sum of the last four.

Logging for Saw Timber

The power chain saw was originally developed to fell and cross-cut large trees, and is outstanding for this purpose. In hardwood forests the terrain is usually undulating to steep, and the undergrowth fairly dense, so that the portability of the power chain saw is a big advantage over other machines. As shown below, output is greater and costs are lower than with hand methods.

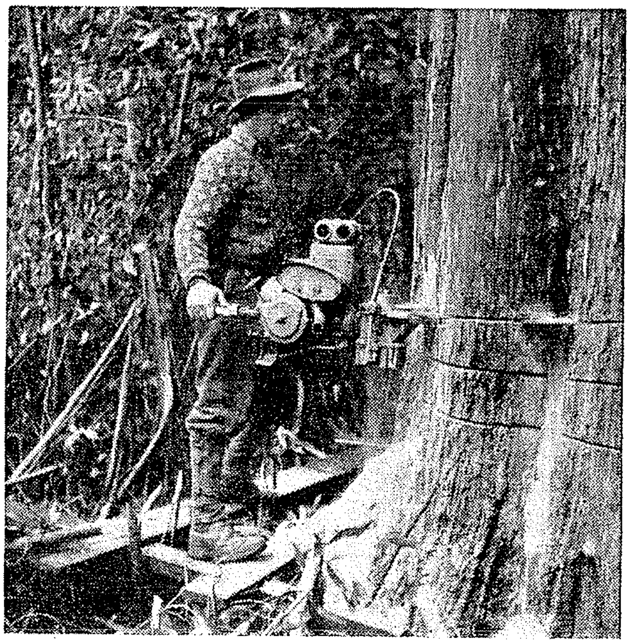
In pine forests the timber is usually dense and small, and the scrub light. Mobile circular saws could be used, but they would be cumbersome to work amongst the trees and loppings, especially as the billets are often long. A one-man chain saw, especially of the bow saw type, which is less easily pinched, is quite suitable. The size of tree has an important bearing on cost and output relative to hand methods. Studies have shown that below an average diameter of about 6 in., the use of power chain saws appears to be uneconomic.

Mill Landings

Cross-cutting on the log landing has not been a bottle-neck in most Australian sawmills. One or two men operating with hand cross-cut or drag saw have usually been sufficient to keep ahead of the breakdown saws. However, a chain saw reduces effort in log handling, and is lighter to move than the drag saw. Under the good conditions of the landing, a light two-man saw with the tail stock removed could be used by one man, or wheels could be put on a heavier model. In some cases the use of a chain saw could release a man part-time for other duties. In larger mills the use of a chain saw may result in greater efficiency and economy.

Firewood and Pulpwood Cutting

Many power chain saws are used in firewood operations. The more ruggedly constructed types are required, to keep maintenance low



Making cuts for front scarf in mountain ash with two-man chain saw.

under conditions where there may be almost continuous cross-cutting.

To choose between the power chain saw, mobile circular saw, and drag saw for a pulp or firewood operation, several factors must be considered. Among these are flatness of the ground, density of the undergrowth, the density and sizes of the trees, the amount of splitting in proportion to sawing, and the size of the crew.

In rough or scrubby country the power chain saw's mobility is a clear advantage. In more open country where it is possible to wield the circular and drag saws, the other factors are important. If the trees are far apart, the chain saw's mobility is again an advantage. A chain saw can be obtained with a set of blades to cut various sizes of tree, so it is more versatile than the other saws in that respect. However, a chain saw is costly to buy and operate, maintenance being higher than with other saws, and therefore its fast cutting rate should be fully utilized by arranging the crew so that other operations such as splitting and stacking keep pace with the sawing. If this is not possible, as is often the case with one- or two-man crews, the power chain saw may not be the best type to use. For instance, in some pulpwood splitting operations on large trees one man can operate a drag saw and split while it is cutting. This is a good arrangement for one- or two-man contracting crews, though the output per man may be lower than that of a big well-organized crew using a chain saw.

Constructional Works

In large constructional works, such as dams, bridges, and roads, there is often much site-clearing, firewood cutting, or cross-cutting of piles and bridge timbers to be carried out. Portability and reliability are important here, and a one-man chain saw, possibly pneumatically powered, would have advantages for this work. However, such operations tend to be intermittent, and are often carried out by different crews, so that a chain saw does not get the careful maintenance necessary. Unless good arrangements for this can be made, a more robust machine may be preferable.

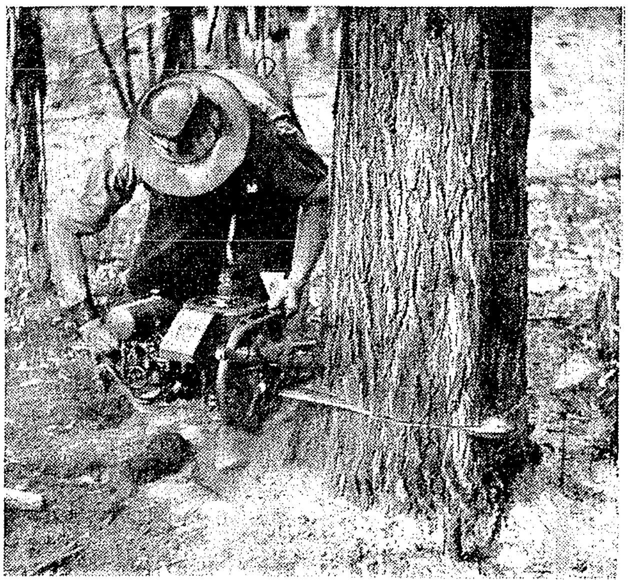
Fire-protection Work

The felling of dry trees to reduce fire hazard is a costly process, and mechanical saws offer a possible means of reducing costs. For continuous felling in rough country lightness and portability are essential, and a chain saw with a high power-weight ratio would be a valuable tool for the purpose. In emergency cutting during fire suppression, its portability and speed would be an asset.

Output and Savings Compared with Hand Tools

While there are many informal testimonies to the greater output of power chain saws compared with that of other machines and methods, facts and figures are few. In many

Felling cypress pine with one-man chain saw.



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cases the output and costs are not studied because the power saw is regarded as an amenity to attract and keep men on the job. It does save manual effort, and the type of machine saving the most manual effort is used. Even in those cases, more attention should be paid to measuring the output and costs of the various machines in use, because better crew organization can often improve output and costs.

In logging operations, the usual increase in output of logs, following the introduction of a power chain saw without greatly changing crew organization, appears to be 30-50 per cent. One trial compared the output of skilled pairs of fallers using axe and hand saw with that of a two-man team using a 12 h.p. chain saw with a 4-ft blade. The stand was fire-killed alpine ash ranging from 18 in. to 48 in. in diameter at breast height. The increase in output was from 14,000 super. ft. (Hoppus) to 21,500 super. ft., about 50 per cent. A later test in a different locality showed a similar increase. Costs were calculated for these tests and showed a saving of about 25 per cent. They were based on the contract rate for hand falling and a rate adjusted for chain-saw falling to give the same return to the fallers. The details are given in the table.

Costs of Felling and Cross-cutting by Hand Methods and by Power Chain Saw at Tanjil Bren

Item	Cost for 100 super. ft. Hoppus (pence)	
	Hand Methods	Chain Saw
Labour	18.00	12.00
Running costs		
Hand tools	0.15	0.04
Power saw		1.66
Total	18.15	13.70
Saving by chain saw: 24.6 per cent.		

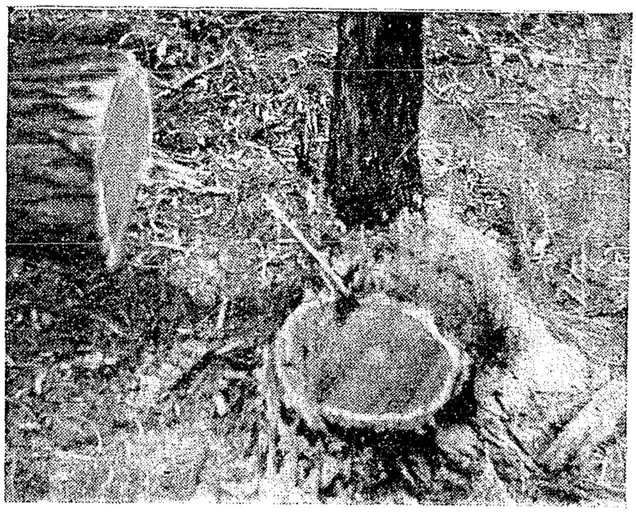
It is difficult to predict the result of using larger re-organized crews. Any arrangement that keeps the chain saw operating a greater proportion of the day should improve output and costs.

In firewood and pulpwood production, although there is an obvious increase in production and probably a reduction in costs with chain saws as compared with hand methods, the comparison with other power saws is not so clear. When the country is flat and the trees are small enough to permit a mobile circular saw to be operated efficiently,

Typical stump left by axe in felling cypress pine.

only detailed consideration of a particular job can decide whether a one-man power chain saw or a mobile circular saw should be used. One general consideration is that the chain saw is more costly to operate and maintain.

When the country is flat and the trees are large, a drag saw is the alternative to a chain saw. The chain saw is much faster in cutting than the drag saw. Its maintenance cost is higher, but the greater output possible with good crew organization may warrant the higher costs. In some cases, where only a one- or two-man crew was available, the drag saw was found to be more economical. Here again, only detailed consideration of the particular job can decide the issue.



Typical stump left by chain saw in felling cypress pine.

Saving Waste

One saving that can be made with chain saws lies in the amount of timber that can be obtained from a given stand. Generally the felling cut can be made closer to the ground, since there is very little more effort and time in cutting through the buttresses. A few feet at the base of a tree represents a high percentage of the volume of a tree. To make the felling cut even 3 in. lower may mean 5 per cent. more timber above.

With lowered cost and effort of falling and cross-cutting, fewer trees should be considered not worth the falling, because defective lengths can be quickly cut out. The result is a greater yield of logs from a given stand.

Cost per Unit Product

The final decision whether to use a chain saw, another machine, or hand methods, should be based on cost per unit of product, e.g. cost per 1000 super. ft. of logs or per ton of firewood. All the features listed above contribute to this cost. Initial cost of a machine may be offset either by high production or by low running and maintenance costs. A low-cost machine may give trouble and cause delays during which men are being paid, or may cause rapid fatigue and loss of output towards the end of a day. Therefore, many things should be considered apart from first cost.

It is important that a machine should be kept working steadily, if its cost is to be justified. The cost per unit product naturally rises rapidly if the amount produced is small because requirements are only intermittent. Thus the chain saw, with its high cost and high output, is, in general, best suited to production work.

PRESERVATIVE TREATMENT OF *PINUS RADIATA*

By F. A. DALE, Timber Preservation Section

THE PROPERTIES of *Pinus radiata* are well known to most of those who use it from actual handling of the timber. Its lightness, ease of working, and low shrinkage make it an ideal timber for cases, cupboards, core stock, and many other purposes.

However, to use the timber for house stumps, fencing, or anywhere in contact with the soil without giving it preservative treatment is to invite disaster, as its natural resistance to decay and termite attack is very low. Even in outside joinery such as window frames its use without treatment is risky, as any breakdown of the paintwork, particularly at the joints, may allow water in and decay will follow.

As compensation for its lack of durability, *Pinus radiata* is one of the easiest timbers to treat with preservatives. The wide sapwood, which comprises the greater part of the volume of most logs, is particularly easy to treat, in fact the problem with this material is often to keep the absorption of preservative within economic limits.

Now that dry *Pinus radiata* is freely available at prices competitive with local hardwoods, its treatment with preservatives and other materials opens a wide and as yet unfilled market.

Treatments which can be used successfully are set out below.

Round Timber

The sapwood of dry, round *Pinus radiata* can be treated by the hot and cold bath process with creosote or any other preservative which will stand heating. Such treated material makes first-class fence posts, and in larger sizes it has been successfully used for poles. The thick layer of treated sapwood provides adequate protection for the heartwood provided it is not cut away after treatment. With absorptions of 15 lb/cu.ft. of creosote or an equivalent preservative, easily obtained by this process, the rounds could safely be used as house stumps, where they would give service equal to or better than the best red gum.

Fence posts of dry, round *Pinus radiata* can be given adequate protection by cold soaking in preservative solutions for several days. The Division is now working on this and other simple methods of post treatment.

Sawn Timber

Sawn timber which is all sapwood can be treated in the same way as round timber, but unless the cutting is watched closely, it is difficult to ensure that no heartwood is included. For this reason sawn *Pinus radiata* is best treated under pressure, which ensures better penetration of the heartwood than other methods. The equipment needed is more elaborate, but a plant to treat the output of a small mill could be installed for £5,000-£10,000.

When the potential market is examined the outlay is not excessive by comparison and is little more than the cost of a planing mill or a kiln-drying plant.

With pressure treatment the absorption of preservative can be closely controlled to suit the purpose for which the timber is needed. Material for house stumps, fence posts, rail sleepers, palings, fence rails, weatherboards, bridge timbers, hand-rails, cooling tower timbers, etc., can be given treatments with absorptions varying to suit the conditions of service. Even with creosote loadings of up to 15 lb/cu.ft., clean treatments can be made, which is a great advantage if the timber is to be handled much after treatment.

Special Treatments

Treatment with special materials can be made to improve some particular property of the timber. Wax impregnation, for instance, can be used to give resistance to chemicals and water, so that the treated timber can be used for vats, tanks, laboratory benches, exhaust hoods, etc., in place of more expensive or scarce materials. Wax might also be used to give a clear, water-repellant finish for weatherboards or other outside woodwork. If a preservative is incorporated in the wax the impregnated flooring could be used on verandahs and laundry or bathroom floors, where untreated flooring would be liable to decay.

In the United States of America most softwood joinery is now treated by soaking, or by a vacuum process, with a water-repellant preservative solution which prevents decay, particularly at the joints, should the paint film break down.

Treatment with heavy oil-preservative solutions can be used where the maximum weather resistance at the lowest cost is required, as in railway sleepers or fence palings.

Economics of Treatment

Assuming, for example, that a small pressure plant is required with a cylinder 22 ft long and 3 ft in diameter, capable of treating about 110 cu.ft. or 1320 super. ft./charge, at least three treatments could be made in an 8-hr day, giving a minimum daily treating capacity of about 4000 super. ft. If attached to an existing mill, such a plant could be run by an operator and two labourers, which would give daily treatment costs (based on 200 working days per year) as below:

Preservative—Creosote—max. 10 lb/cu.ft. at 2*s*. 3*d*. per gal	£37	0	0
Labour—Three men at £4 per day	£12	0	0
Interest—5% p.a. on £10,000	£2	10	0
Depreciation—5% p.a. on £10,000	£2	10	0
Operation—Power, fuel, maintenance, incidentals, overhead	£10	0	0
Total daily cost of operation	£64	0	0
Cost per 100 super. ft.	£1	12	0

The mill could be expected to supply dry stock to the plant at £4/10/- per 100 super. ft., so that the treated cost would be £6/2/- per 100 super. ft. Raising the absorption of creosote to a minimum of 15 lb/cu.ft. for timber to be used in the ground would add less than 10*s*. to this figure. These treatment costs could be substantially reduced by increasing the size and daily output of the plant.

Treated *Pinus radiata* Versus Durable Timbers

Because *adequate* treatment can raise *Pinus radiata* to class 1 durability, the choice between it and the naturally durable timbers would be determined largely by: (1) cost, (2) weight, (3) strength, (4) workability, (5) moisture movement and resistance to weathering, (6) resistance to abrasion.

In items (2), (4), and (5), treated *Pinus radiata* has the advantage over most naturally durable timbers available here, so that it should enjoy a wide market if produced at a reasonable price, provided the market is not spoiled by careless and ineffective treatment.

As an example of the advantages of treated radiata pine, a truck could carry 50-100 per cent. more pine posts than split hardwood, and the round posts would be much easier to handle.

Further information on the treatment of *Pinus radiata* and other timbers can be obtained from the Chief, Division of Forest Products, C.S.I.R.O., 69 Yarra Bank Road, South Melbourne, S.C.4, where samples of treated timber and the equipment necessary to treat it may be inspected.

The Bark of *Eucalyptus robertsoni* x *E. rossii*

By M. MARGARET CHATTAWAY, Wood and Fibre Structure Section

In Newsletter No. 192 the use of the internal structure of the bark in elucidating *Eucalyptus* hybrids was discussed. The hybrid in question was between *E. macrorrhyncha* F. Muell. and *E. rossii* Baker and Smith. Ten logs of another hybrid have lately been received at the Division, this time hybrids between *E. rossii* and one of the peppermints—*E. robertsoni* Blakely. These logs had been specially selected, the seed sown and their hybrid nature assessed on the general appearance of the trees and the seedling characters of their progeny. These assessments varied from 9: 1, a tree with rough bark and mainly *E. robertsoni* features, through 5: 5 with intermediate features, to 1: 9, a smooth-barked tree with mainly *E. rossii* features. Other proportions indicated the trends towards the different parents.

The bark of *E. rossii* has already been described and illustrated (Newsletter No. 192). To recapitulate, its distinctive features are a row of radially elongated cells in the phelloderm* and a great variation in fibre diameter and fibre bundle size, as seen on cross section.

Tree No.	Assessment on Morphological Features		Assessment on Bark Structure	
	Assessment Nos.	Tendency Towards	Assessment Nos.	Tendency Towards
11	9: 1	*robertsoni*	9: 1	*robertsoni*
25	8: 2	*robertsoni*	8: 2	*robertsoni*
12	7: 3	*robertsoni*	7: 3	*robertsoni*
17	6: 4	*robertsoni*	9: 1	*robertsoni*
15	5: 5	Intermediate	5: 5	Intermediate
13	5: 5	Intermediate	4: 6	*rossii*
16	4: 6	*rossii*	6: 4	*robertsoni*
14	3: 7	*rossii*	4: 6	*rossii*
22	1: 9	*rossii*	3: 7	*rossii*
18	1: 9	*rossii*	2: 8	*rossii*

E. robertsoni is a rough-barked peppermint, the chief internal feature of which is the development of wide parenchyma wedges which run down into the inner phloem and are the sites of the cracks and fissures which give the characteristic appearance to the peppermint bark (Fig. 1*A*). These wedges are formed by the stretching and division of the cells of the phloem parenchyma. They often form conspicuous tangential files. The fibre bundles form a rather regular pattern through the phloem, without great differences in bundle size or fibre diameter (Fig. 1*B*).

* See Newsletter No. 190 for definitions.

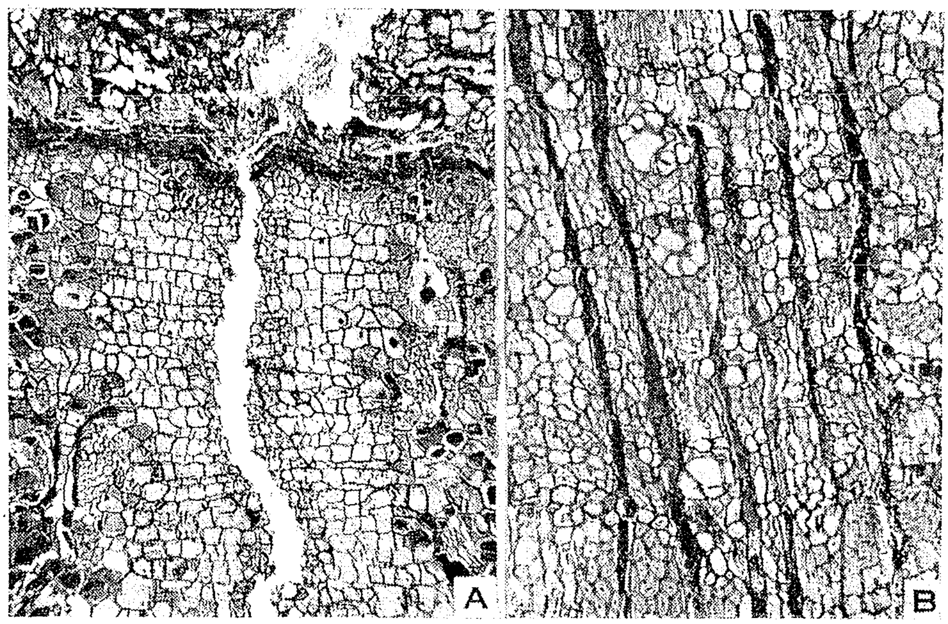


Fig. 1.—Cross sections of bark of one of the parent trees, E. robertsoni. A, × 50; B, ×81.

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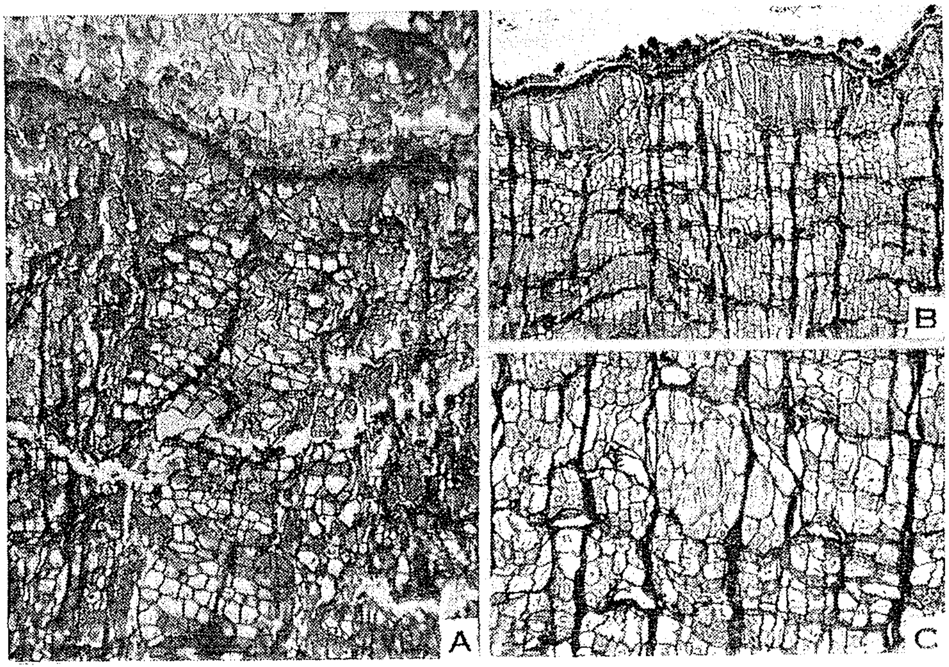


Fig. 2.—Cross sections of bark of hybrids. A, *tree* 11, *near* E. robertsoni, ×47; B *and* C, *tree* 18, *near* E. rossii, B ×47, C ×75.

The result of the anatomical examination of the 10 hybrids is given in the table, in which the inheritance of the bark features from the two parents is assessed. The sender's assessment is also recorded for comparison.

In trees 11 (Fig. 2*A*), 25, 12, and 15, the agreement between the two assessments is absolute; in trees 13, 14, and 18 (Fig. 2*B* and 2*C*) it is very close, the bark structure showing in two cases a greater tendency towards the *E. rossii* parent and in one slightly more *E. robertsoni* features. In trees 17 and 22 there is a greater discrepancy between the two assessments, the bark features of *E. robertsoni* in tree 17 and of *E. rossii* in tree 22 being more marked than the morphological assessment suggests. In only one instance, tree 16, does the bark structure reverse the morphological tendency, the tree in question having more *E. robertsoni* features in the bark than the morphological assessment suggests. In Figure 3 two other hybrids are illustrated. Tree 18 (Fig. 2*B*) shows its *E. rossii* inheritance in the occasional occurrence of radially elongated phelloderm cells and tree 22 (Fig. 3*B*) in the frequency of the bundles of fibres with enlarged cross section.

Seedlings from these trees have been grown. It will be interesting to see how far the progeny reflect the characters of the parent trees.

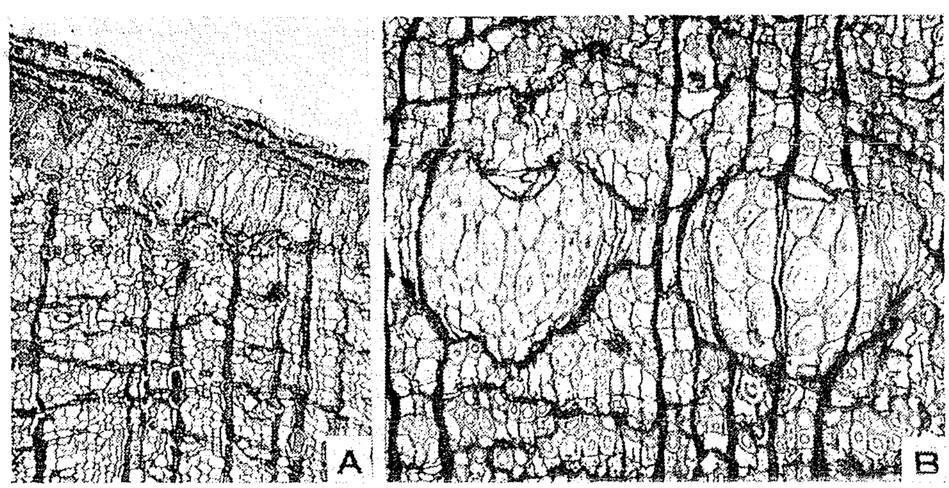
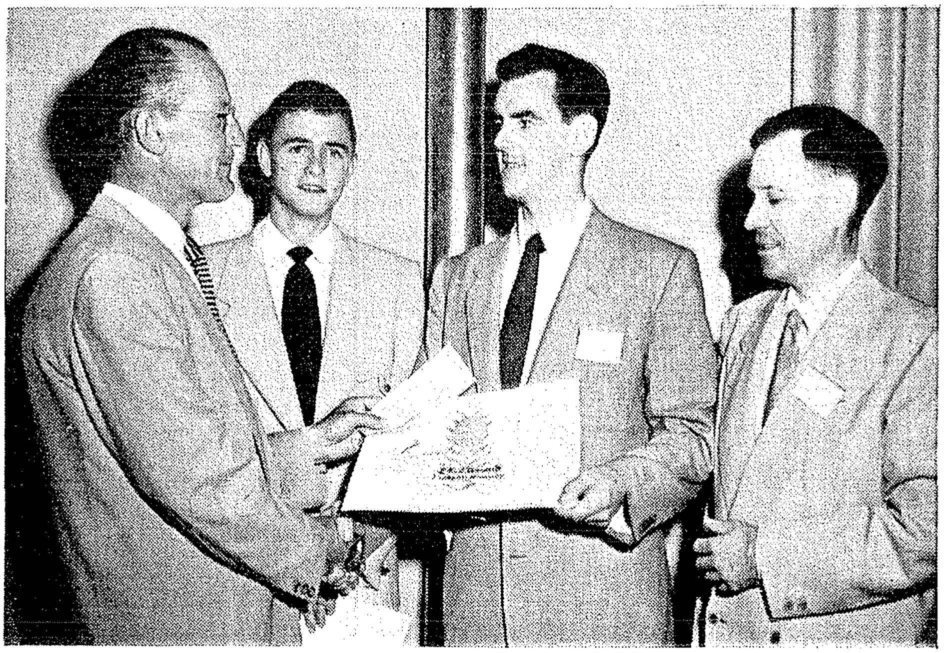


Fig. 3.—Cross sections of bark of hybrids. A, *tree* 15, *intermediate tree with features derived from* E. rossii, ×53; B, *tree* 22, *near* E. rossii, ×84.



Mr. Eric L. Ellwood (third from left), of the C.S.I.R.O. Division of Forest Products, receiving the 1953 Wood Award for the best paper submitted by a graduate student.

Wood & Wood Products Presents Annual Research Award

Two awards for outstanding research in the forest products industry were made by *Wood & Wood Products* at the annual meeting of the Forest Products Research Society held in Memphis, Tennessee, June 15-17. Presentation of the 1953 "Wood Awards"—one of $350 for the best paper submitted by a graduate student and one of $150 for the best undergraduate paper—was made by Mr. J. F. Koellisch, editor and manager of *Wood & Wood Products*, Chicago, at the annual luncheon of the Society. The purpose of the awards, founded in 1947 by Mr. Herbert A. Vance, publisher, is primarily to encourage able young men to make careers in the forest products industry.

The winner of the Graduate Division award was Mr. Eric L. Ellwood, of the C.S.I.R.O. Division of Forest Products, who had just concluded two years' graduate study on a fellowship under the Fulbright programme at Yale University's School of Forestry. Mr. Ellwood was on leave from the Division, where he has now resumed his work on timber preservation.

Ten colleges and universities in the United States and Canada sponsored entries for this year's awards, which were judged by subcommittees of the Society's Committee on Education, headed by R. W. Wellwood, University of British Columbia.

Power Saw Chains

A 16-mm sound film has been produced by C.S.I.R.O. to demonstrate good practice in the maintenance and sharpening of power saw chains. The Division of Forest Products invites inquiries from bodies interested in obtaining copies for their own use. A small charge will be made.

This Newsletter is prepared for general circulation by the Division of Forest Products, C.S.I.R.O., 69-77 Yarra Bank Road, South Melbourne, S.C.4, and will be supplied free on request to members of the timber trade and timber users who wish to keep abreast with current developments in the field of forest products.

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