

WOOD IDENTIFICATION USING MACROSCOPIC FEATURES

INTRODUCTION

For many people, the identification of timbers is carried out simply by just looking at their colours, appearance and some specific features on the timber. However, the identification of timber by the method mentioned has its limitation as most timbers may eventually look alike (especially tropical timbers) after having been exposed to the weather for some times. Therefore, the identification of timber should be based on the examination of features that are known to be reliable, rather than on the features mentioned above.

Every timber or a group of very closely related timbers possesses a characteristic end surface, that is, the cells are so arranged as to produce a distinctive pattern. Thus, the identification of timber requires memorizing these distinctive patterns. It is of course, not an easy task to memorize the various patterns and features of so many types of timber in the market unless he or she is doing it on a regular basis. As such, there is a need to provide some kinds of guidance on the identification of timber based on some important key features of the timber.

This wood identification portal is to provide some key features or spot characters of 54 commonly available timbers in Malaysia. The programme will be upgraded to include lesser-known timbers in the future.

For better understanding of the steps required in carrying out wood identification, the users are advised to read the explanation below:

Methods and procedure in wood identification

This programme is designed for those who would like to carry out wood identification using only simple tools like a hand lens and a pen knife (Figure 1). The characteristic and features mentioned in the programme are those that can be observed by the naked eye or the use of a x10 magnifier. As such, users of the portal are required to key in the more prominent features of the timber so that other unrelated timber groups will be systematically eliminated in the process.



Figure 1. Magnifier and a sharp pen knife

When a specimen is obtained, two important observations are carried out simultaneously, they are: (i) **Weight of the timber**: whether the timber is very heavy, heavy, medium or light in weight (Table 1). The weight of the wood is based on the density of the timber and as such, it is possible to find that some timbers may be found in one or more classifications e.g nyatoh (density 400-1075 kg m⁻³ at 15% m.c. and (ii) **Colour of wood** : some are characteristic brown e.g keruing whereas others may be white e.g ramin or reddish e.g dark red meranti. Some timbers have very distinctive colour e.g rengas (blood-red), terentang (greyish) and they are normally very easy to be identified. However, for the purpose of this programme, only four main categories of colour are considered, they are (a) white or creamy (b) Yellow-brown, light brown, straw or gold coloured (c) Pink, Reddish-brown and (d) other colours: grey, black, greenish (olive) etc (Table 2). Similar to weight, some timbers may be found to belong to more than one categories of colour.

Table 1 Weight of wood

No	Classification and Weight	Timber
1	Very heavy woods (>880 kg m ⁻³ at 15% m.c)	Balau, red balau, bitis, chengal, giam, kekatong, kempas, keranji, mata ulat, rusak , tembusu, tualang, merbau, punah, nyatoh, kasai, kelat, keledang, keruing, rengas,
2	Heavy woods (720-880 kg m ⁻³ at 15% m.c.)	Balau, Red balau, kapur, kasai, kelat, mengkulang, merbau, merpauh, punah, keledang, kempas, keruing, kulim, rengas, simpoh, tembusu, tualang, mata ulat, medang, rusak, keranji, kekatong, white meranti, dark red meranti, nyatoh, durian, gerutu, kedondong, chengal, bitis, giam, rusak, bintangor, kungkur, medang, melunak, mempising, meranti bakau, light red meranti,

		white meranti, yellow meranti, merawan, mersawa
3	Moderately heavy woods (560-720 K kg m ⁻³ at 15% m.c.)	Bintangor, durian, gerutu, kedondong, kungkur, machang, medan, melantai, melunak, mempising, meranti bakau, dark red meranti, light red meranti, white meranti, yellow meranti, merawan, mersawa, nyatoh, penarahan, perupok, punah, ramin, rubberwood, sepetir, kapur, kasai, kelat, mengkulang, merpauh, keledang, keruing, kulim, rengas, simpoh, geronggang, red balau, merbau, resak, tembusu,
4	Light woods (< 560 kg m ⁻³ at 15% m.c.)	Dammar minyak, geronggang, jelutong, machang, medan, melantai, light red meranti, penarahan, pulau, sesendok, terap, terentang, durian, bintangor, gerutu, kedondong, melunak, mempising, dark red meranti, nyatoh, perupok, ramin, rubberwood, keledang, keruing, kungkur, melunak, meranti bakau, white meranti, mersawa, sepetir

Table 2. Colour of wood

No	Colour	Timber
1	White or creamy-white	Jelutong, pulau, ramin, rubberwood, sesendok, terap, white meranti, tembusu, dammar minyak
2	Yellow-brown, light brown, straw or gold coloured	Balau, chengal, dammar minyak, gerutu, giam, keledang, keranji, machang, mata ulat, mempising, yellow meranti, merawan, mersawa, perupok, punah, resak, tembusu, melantai, gerutu, kasai, keranji, merbau, medan, white meranti, nyatoh, penarahan, ramin, rubberwood, sepetir, terap
3	Pink, Reddish-brown	Red balau, bitis, merbau, kapur, kasai, kempas, keruing, mengkulang, rengas, tualang, bintangor, durian, geronggang, kedondong, kungkur, dark red meranti, light red meranti, melunak, merpauh, nyatoh, simpoh, meranti bakau, kelat, mata ulat, punah, bintangor, durian, balau, keranji, geronggang, gerutu, medan,

		melantai, merawan, penarahan, sepetir
4	Other colour: grey, black, greenish (olive)etc	Kelat, terentang, perupok, medang, merpauh, kulim, simpoh, red balau, bitis, chengal, kekatong, giam, keranji, merbau, resak, tembusu, kapur, kasai, kelat, keledang, kempas, keruing, kulim, mata ulat, merpauh, punah, rengas, simpoh, tualang, bintangor, durian, gerutu, machang, mempising, yellow meranti, merawan, mersawa, nyatoh, penarahan, perupok, sepetir, terap, terentang

In preparing the wood for the macroscopic examination, there is a need to obtain a clean and clear cross-sectional area of the wood. This is carried out by cutting the wood with the Knife blade nearly parallel with the end surface of the wood to ensure the surface cut is truly parallel and not oblique (Figure 2). It is important to note that the cut must be made along the ray (Figure 3) and as such, a preliminary cut may be necessary to establish the direction of the rays and the cut must be made in one action and not a series of small jab.



Figure 2. Cutting the wood with the knife nearly parallel with the end surface

Direction of cut



Figure 3. Direction of cut – along the rays

When the cross section is ready for examination, steps have to be taken to ensure that adequate lighting is available. Proper examination of the wood is by placing the hand lens as close to the eye as possible and the specimen is then adjusted until it is properly focused (Figure 4 a & b).

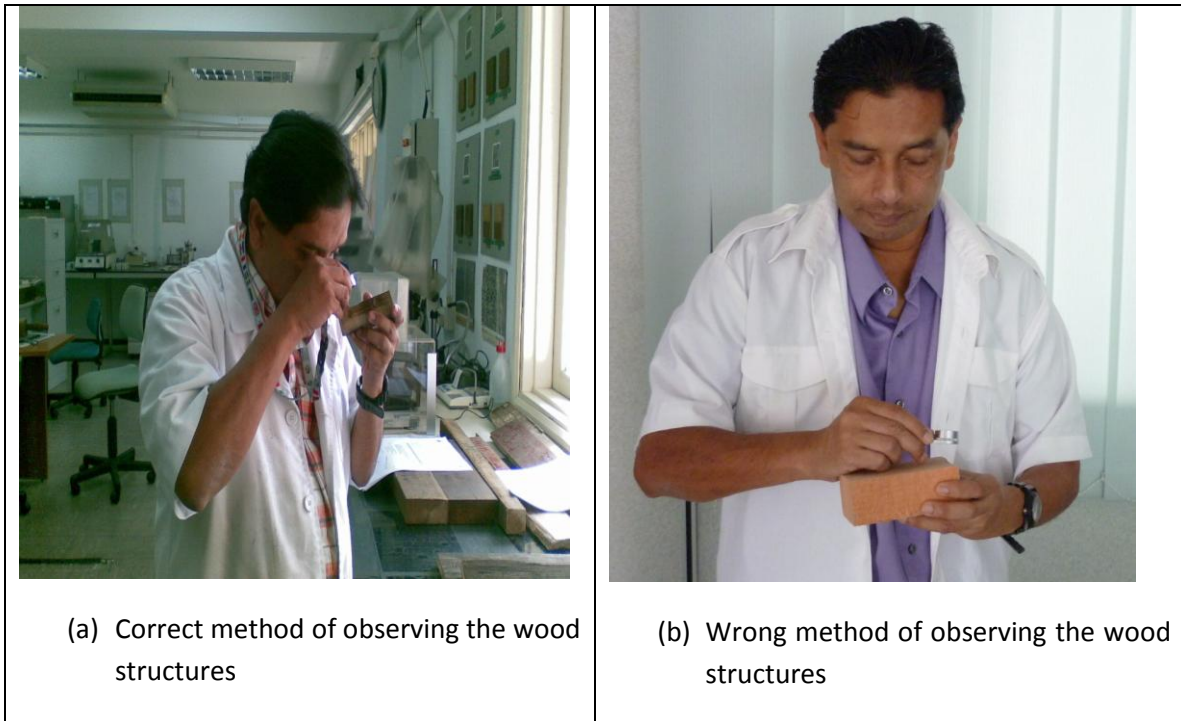


Figure 4. Observation of wood structure (a) correct and (b) wrong

Examining the transverse section with a hand lens

- (i) First observation includes noting whether vessels are present or absent? (Figure 5 a and b)

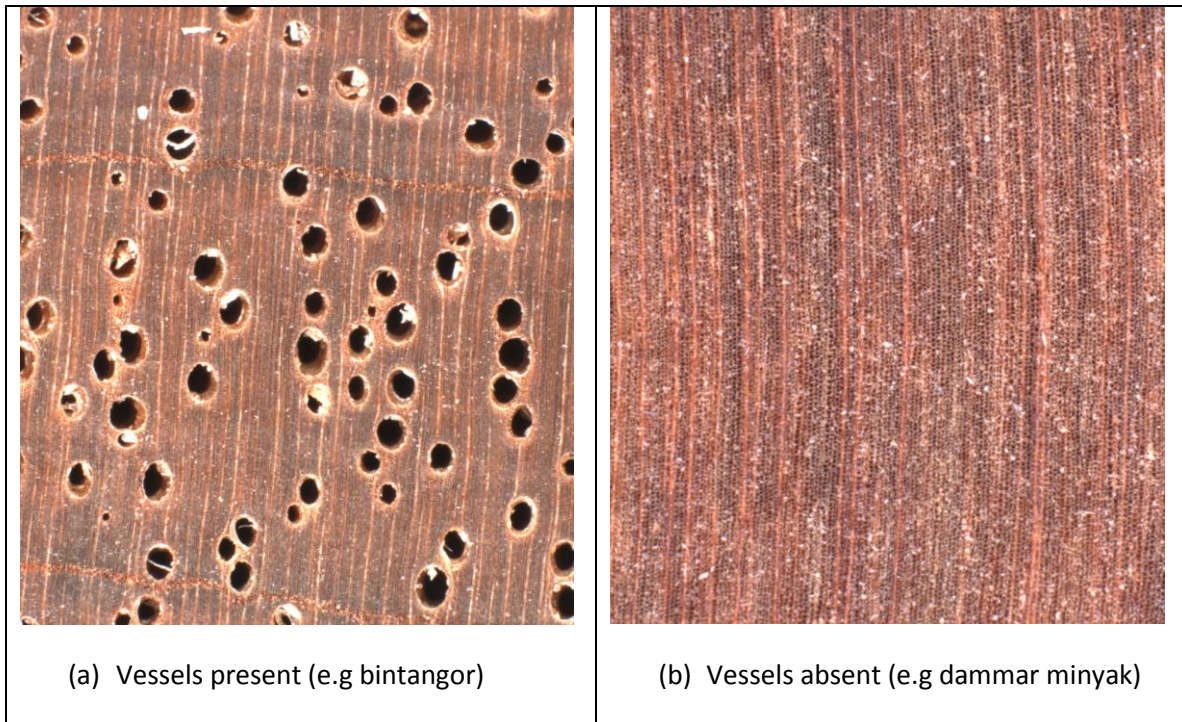


Figure 5. (a) Vessels present and (b) vessels absent

- (ii) The timber is confirmed as a softwood timber if vessels are absent : laboratory investigation is necessary to confirm the species in most cases
- (iii) For timbers with vessels, whether it is ring porous or diffuse porous (Figure 6 a & b)?

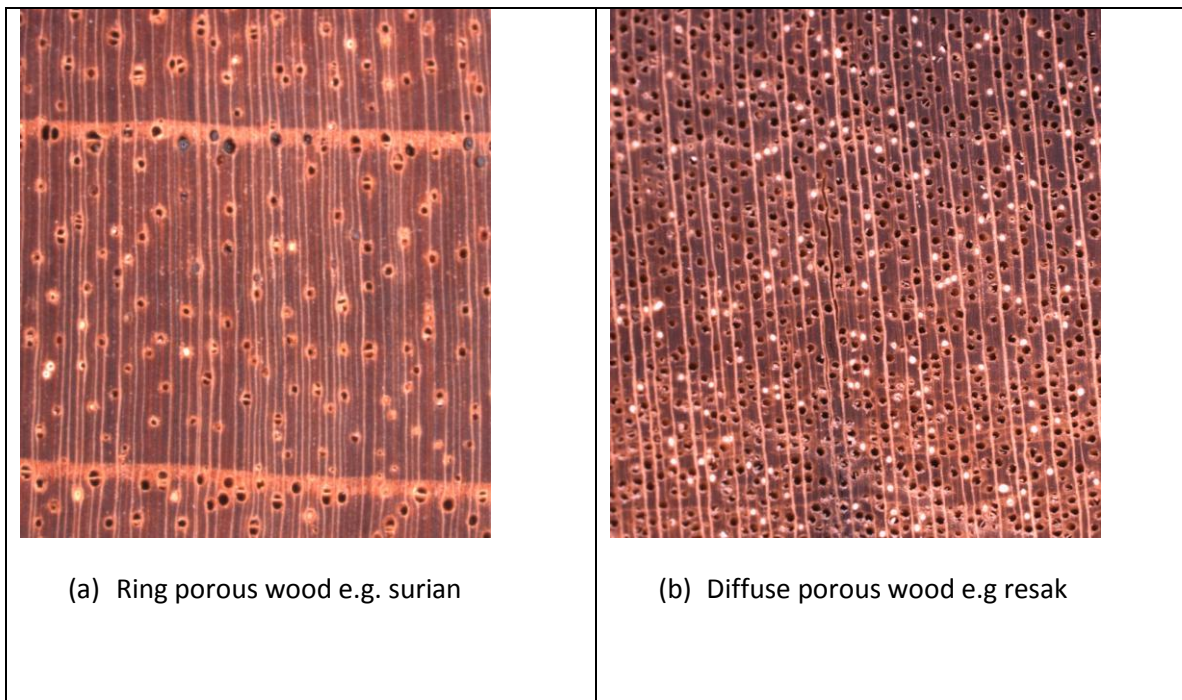


Figure 6 (a) ring porous wood (b) Diffuse porous wood

- (iv) Ring porous timbers – not many in the country except a few e.g. angkana (*Pterocarpus indicus*), surian (*Toona* spp.), sungkai (*Peronema canescens*), etc.
- (v) Note the size of vessels - large vessels timbers e.g. tualang, durian, kempas, merbau; small vessels timbers e.g. resak, ramin, chengal etc. (Figure 7 a & b)

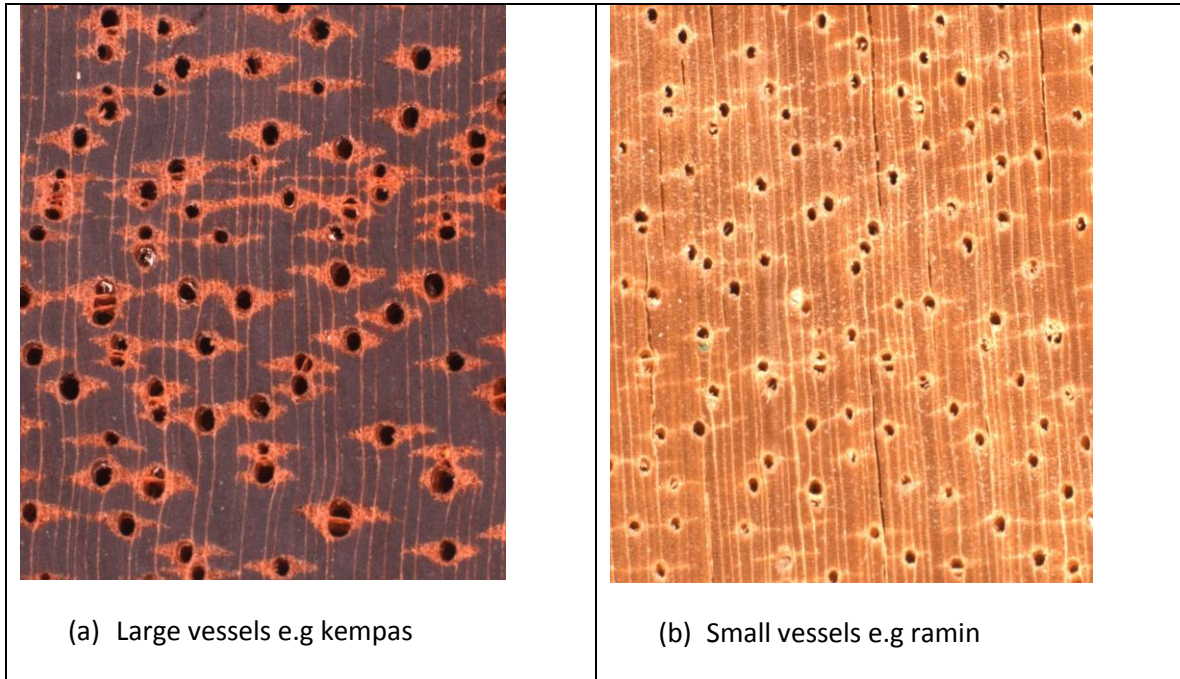


Figure 7 (a) Large vessels timber e.g kempas (b) small vessels timber e.g ramin.

- (vi) Arrangement of vessels - Some timbers may have pores in solitary e.g. resak (Figure 6b), simpoh, keruing, kapur, resak etc whereas others may have radial pairs e.g. penarahan (Figure 8), radial multiples like jelutong, sesendok, nyatoh (Figure 9) and bitis. Unique type of pore may be present in some timbers like mengkulang where some of the pores are arranged in 'tail-like appendages' (Figure 10) and bintangor in 'festoon' or flare-like (Figure 11).



Figure 8 Vessels mostly in radial pairs e.g penarahan

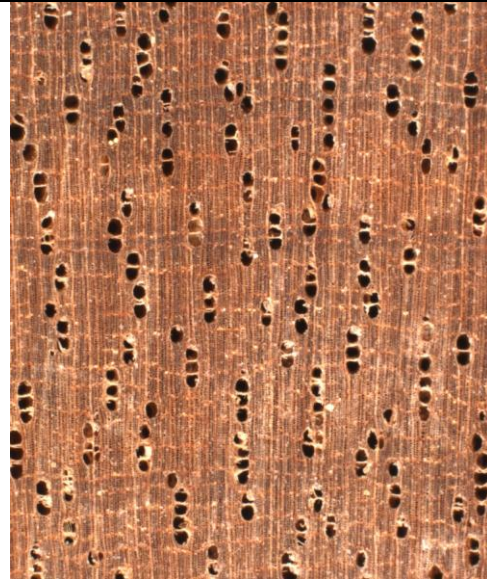


Figure 9. Vessels mostly in radial multiples e.g nyatoh

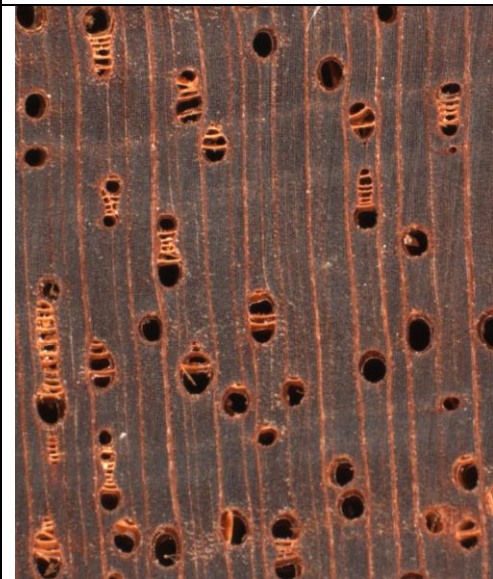


Figure 10. Vessels in tail-like appendages e.g mengkulang



Figure 11. Vessels arrangement in 'festoon' or flare-like e.g bintangor

- (vii) Scalariform perforation plates – may be characteristic to some timbers groups e.g medang, penarahan, simpoh, terentang (Figure 12).

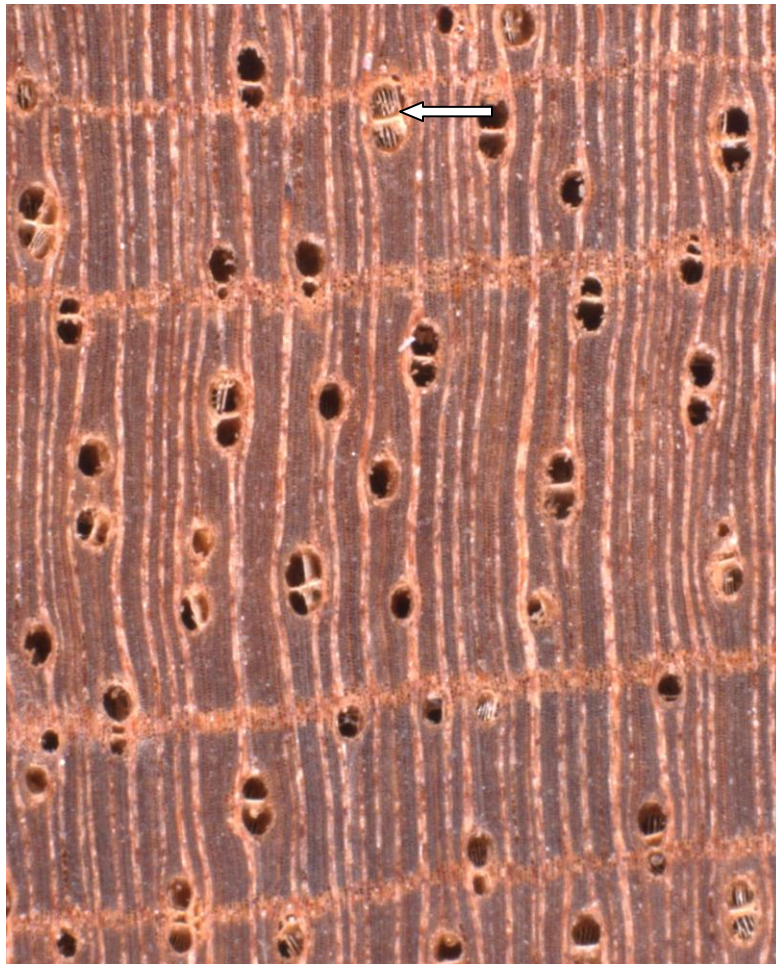


Figure 12. Scalariform perforation plates in penarahan (arrow)

- (viii) Content of vessels – **Tyloses** (Figure 13) and **deposits** (Figure 14) in vessels are very useful clues. For example, heavier timbers like chengal and balau usually contain tyloses ; **deposits** – usually confined to some specific timbers like merbau (yellow/sulphur deposit), kasai (orange-brown deposit), keledang and terap (white or milky-coloured deposit) etc.
- (ix) Resin canals – Vertical resin canals are present among members of the family Dipterocarpaceae e.g chengal, keruing, dark red meranti, light red meranti, yellow meranti, white meranti etc. except the timber of sepetir which is from the family Leguminosae. Vertical resin canals, when present, may be diffuse (Figure 15), in short tangential lines (Figure 16) and in long tangential series (Figure 17). In addition, some timber groups also contain horizontal canals e.g yellow meranti, rengas etc. (Figure 18).

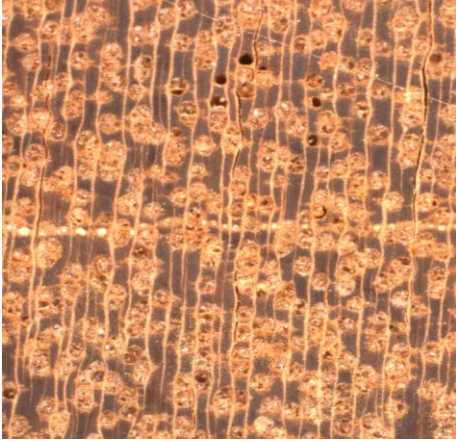


Figure 13. Tyloses in balau

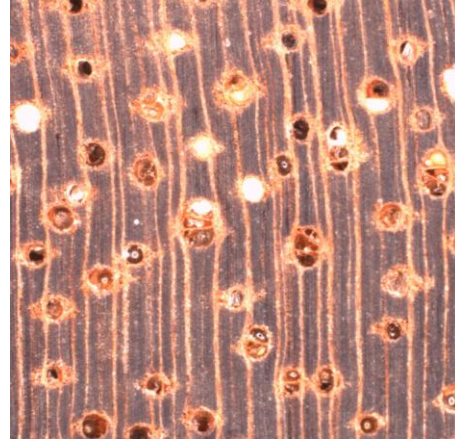


Figure 14. Deposits in keledang

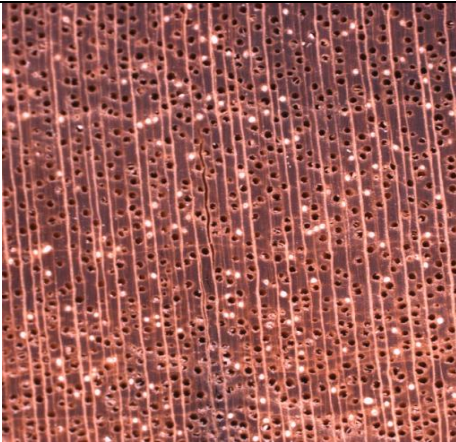


Figure 15. Diffuse vertical canals in resak

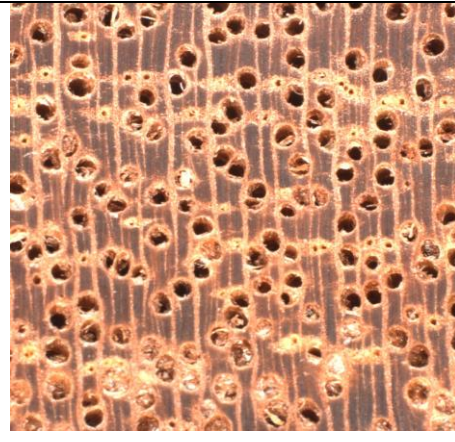


Figure 16. Vertical canals in short tangential line in keruing

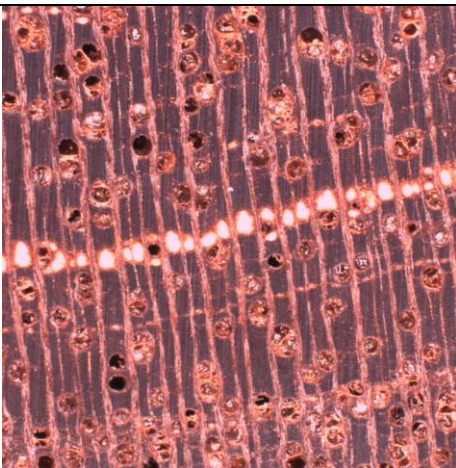


Figure 17. Vertical canals in long tangential series in dark red meranti

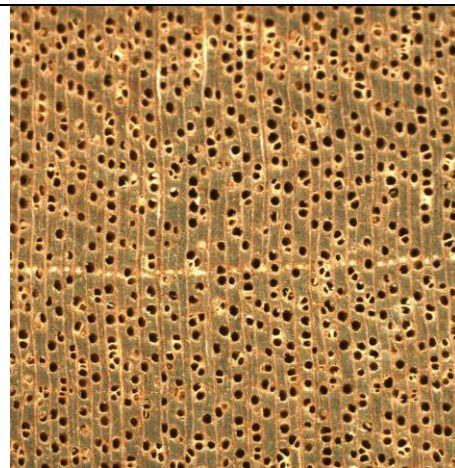


Figure 18. Horizontal canals (swollen rays) in yellow meranti

- (x) Wood parenchyma – it functions as cells that store food for the plant in a living tree. The presence of various types of wood parenchyma in wood provides some very useful clues to the identification of wood. For the apotracheal parenchyma, parenchyma may be in diffuse e.g mersawa (Figure 19), extend from ray to ray e.g chengal (Figure 20) and sometimes, so uniformly arranged to give rise to scalariform-type of parenchyma e.g mempising (Figure 21), regularly-spaced bands e.g. nyatoh (Figure 9), irregularly spaced bands e.g penarahan (Figure 12). For paratracheal type of parenchyma, it may be in the form of aliform (ramin, kempas etc)(Figures 7 a and b), vasicentric (keledang, merbau etc)(Figure 14), confluent (tualang)(Figure 22) etc. In addition to the above, some timbers may not contain parenchyma cells that are easily observed even with a hand lens e.g kedondong, and this can be used as a possible clue for identification (Figure 23).

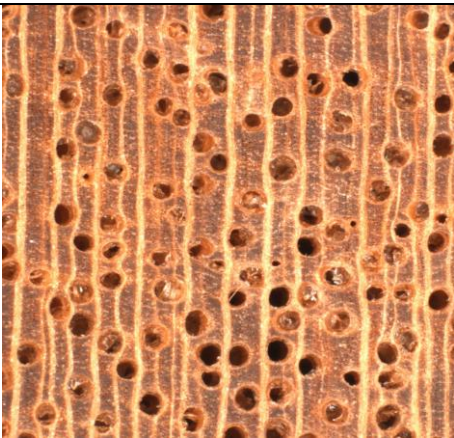


Figure 19. Parenchyma diffuse in mersawa

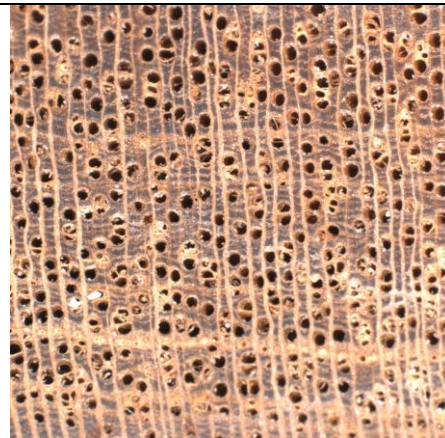


Figure 20. Parenchyma extending from ray to ray in chengal

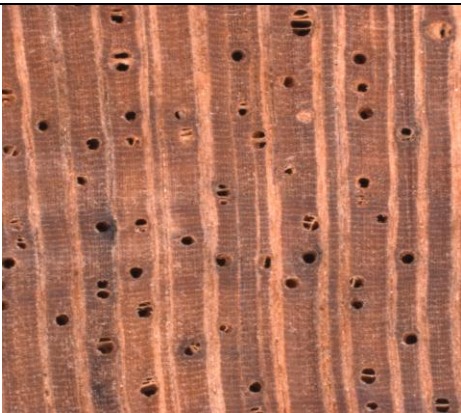


Figure 21. Scalariform parenchyma in mempising

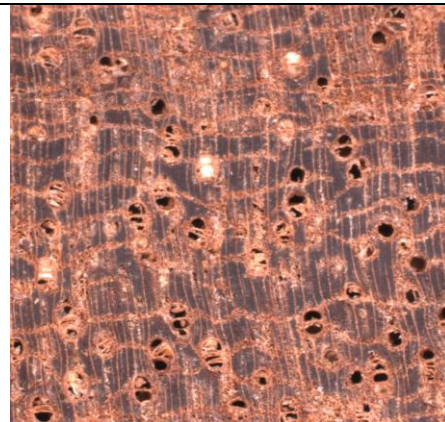


Figure 22. Confluent type of parenchyma in tualang

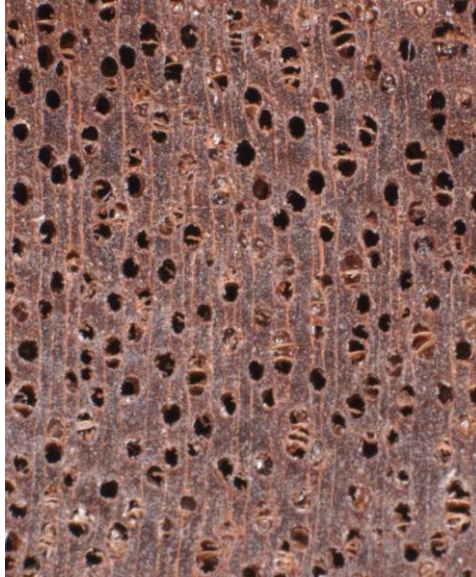


Figure 23. Parenchyma absent or not distinct in kedondong

- (xi) Rays – Ray cells also vary among different types of timber. Some may contain fine rays which are not readily observed with the naked eye e.g geronggang (Figure 24); rays in some timbers may be large and easily seen with the naked eye e.g mempising (Figure 21); for most timbers with broad rays, fine rays can be found to intersperse between two broad rays giving rise to the feature known as 'rays of two different sizes' e.g mersawa (Figure 19), mempising (Figure 21) ; in some woods, rays are arranged in regular storeys giving rise to 'ripple mark' e.g melunak (Figure 25).

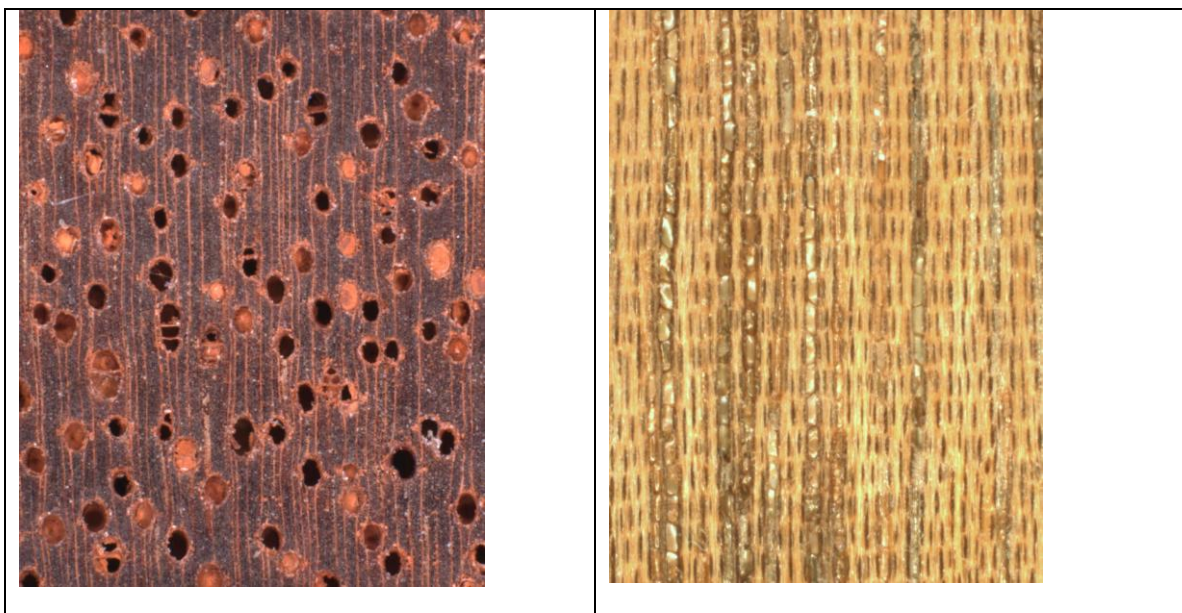


Figure 24. fine rays in geronggang

Figure 25. Ripple marks in melunak

Physical examination of the samples

Beside the examination on the cross section of wood using hand lens, other physical features of the wood can also provide a very useful clue to the identity of the wood. For example, special features that are inherent to the timber or defects that occur regularly on some timbers are useful for identification. For example, included phloem (kempas and tualang)(Figure 26), latex traces in jelutong and pulai (Figure 27) and traumatic resin canals in durian, mengkulang and kembang semangkok (Figure 28).



Figure 26. Included phloem in kempas



Figure 27. Latex traces in pulai

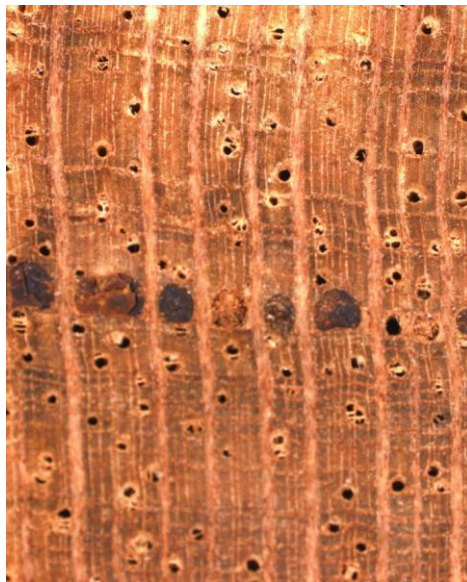


Figure 28. Traumatic canals in kembang semangkok

Explanation on the wood identification programme

This programme contains a total of 52 features of timber and the user of the programme is required to 'click on' the feature of the wood samples, one at a time. By doing so, timbers that contain the feature will be listed. By moving on to the second feature, timbers that contained both features 1 and 2 will be selected and at the same time, eliminating timbers that do not contain both features. The process of feature selection will go on until the correct timber is selected. At this stage, the user has the option of looking at the complete description of the timber, its properties and uses by clicking-on the timber name.

During the course of the selection, however, the user may suddenly realize that a mistake has been made on a certain feature, and this can be rectified by clicking on the feature selected to reverse the process.