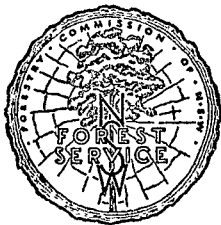


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FIELD IDENTIFICATION OF SEEDLINGS

OF

THE MAJOR TREE SPECIES

IN THE

BLACKBUTT AND FLOODED GUM AREAS

AUTHOR

A. G. FLOYD, B.Sc. For.



FIELD IDENTIFICATION OF SEEDLINGS OF THE MAJOR TREE SPECIES IN THE BLACKBUTT AND FLOODED GUM FOREST TYPES

A. G. FLOYD, B.Sc.For.

SUMMARY

Two dichotomous field keys are provided for the identification of seedlings at different stages of the 10 major tree species in the Blackbutt and Flooded Gum forest types. Seedlings from 1 month to 12 months old can be identified. The characteristic features of the 10 species are also listed for ready comparison.

INTRODUCTION

As the silvicultural treatment of the North Coast hardwood forests assumes increasingly greater importance, the Foresters in charge will of necessity require to be able to recognise regeneration of the major species when still in the seedling stage. The success or failure of any regeneration work is governed by which species appears following treatment, which in turn will govern any future treatment. As instances of the pitfalls besetting the Forester are dense seedling regeneration following Flooded Gum broadcast sowing which may in fact be only Blue Gum from neighbouring trees. On Blackbutt areas it is easy to regard White Mahogany and Red Mahogany seedlings as being the favoured species—Blackbutt. In order to clarify the identification of these seedlings, their diagnostic features are here listed and two simple keys compiled to assist the Forester to rapidly identify the seedlings he may encounter in the field.

EXPLANATION OF TERMS

However it might be advisable to refresh the memory of those who have had little recourse to Botany in recent years in regard to the terms used when discussing seedlings.

I. COTYLEDON

All Eucalypts and allied genera have a pair of "seed leaves" or cotyledons which are the first leafy organs to appear in the newly germinated seedlings. Their shape is invariably very different from that of the later leaves, often being two-lobed. When the seedlings reach a height of 4-12 inches these cotyledons fall off and are therefore only of value in identifying young seedlings. Some cotyledons, such as those of Blackbutt have 3 veins extending to each lobe and to the centre of the notch between them. This is a valuable diagnostic feature as the veins are obscured on most species.

The stalk or petiole of the cotyledon is also useful in respect to whether the cotyledon tapers gradually into it (medium tapering), tapers quickly (short tapering) or is not tapered at all.

2. FIRST PAIR OF LEAVES

This refers to the first pair of leaves produced above the cotyledons and may be either stalked (petiolate) or not stalked (sessile).

3. SUBSEQUENT PAIRS OF LEAVES

All pairs of leaves from the first pair to the last pair of leaves before the alternate leaves are known as the "subsequent pairs of leaves". The number of pairs is a useful feature and even if the lower leaves have been shed, the pairs can still be counted by feeling the small swellings left at each leaf joint. As each leaf pair is usually born at right angles to the pair above and below (*i.e.*, decussate) their position can be anticipated. Where these young leaves are not stalked, the number of pairs without stalks is of importance.

4. INTERMEDIATE LEAVES

Those leaves which are above the last pair of leaves up to the adult type of leaf are termed "intermediate leaves". In the individual species descriptions for the seedling stage (*i.e.*, plants from 12-48 inches high), the leaves are not separated into subsequent pairs of leaves and intermediate leaves as leaf shape and colour gradually alter through both types.

5. LIGNOTUBER

When the seedlings of many species exceed 12 inches in height, swellings develop in the axils of the cotyledons or where they were originally attached to the stem. These may be felt with the fingers as two little balls near ground level on all species dealt with except Blackbutt and Flooded Gum. Later these swellings fuse into an irregular knobby structure known as a "lignotuber".

USE OF THE KEYS

Two keys are provided to enable identification of the major species in the following stages of development:—

A. COTYLEDON STAGE

As great skill is required to positively identify a seedling when only the cotyledons are in evidence, the first key is based on the cotyledons and the first two pairs of subsequent leaves. This stage of development might be reached from 4-8 weeks after germination. The key can then be used for more advanced seedlings up to the time the cotyledons are shed. At this stage the second key can be used.

B. SEEDLING STAGE

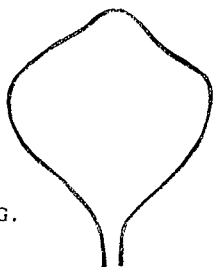
This second key is based on a minimum seedling height of 12 inches, as a rapidly growing seedling would have produced lignotubers at that stage. However, as lignotubers are a function of age rather than height, this second key may be used for smaller plants on poorer sites.

It is of the greatest importance when using these keys, to examine at

least *four typical plants* for each feature used, particularly where dimensions are used. This procedure will minimise the effect of extreme characters such as could be caused by natural variation within a species or occasional hybrids. No dichotomous key will be effective when dealing with widespread hybridisation such as is found between *E. grandis* and *E. saligna* on parts of the coastal plateaux; and only by systematically checking the characteristics provided for each species can the true identity be obtained.

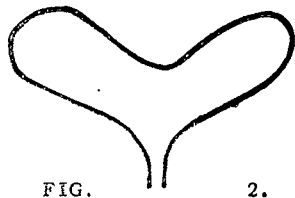
A. KEY TO SEEDLINGS IN THE COTYLEDON STAGE

1. Leaf stalk exuding a milky sap when cut..... 10. *Tristania conferta*
 Cotyledons shovel shaped (See Fig. 1). (Brush Box)
 Leaf stalk not exuding a milky sap and
 Cotyledons not shovel shaped 2

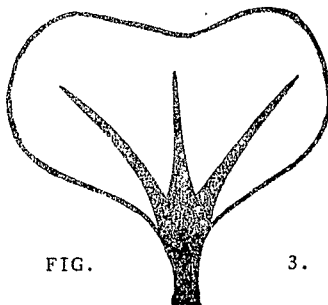


Cotyledon of Brush Box
 (*Tristania conferta*). 10 N.S.

2. Stem covered with rigid red glandular hairs.... 5. *E. gummifera*
 (Red Bloodwood)
 Stem not covered with red hairs..... 3
3. Cotyledons 2-lobed with the depth of the notch
 at least half the width of each lobe. (See Fig. 2) 4
 Cotyledons not 2-lobed or the depth of the notch
 less than half the width of each lobe. (See
 Fig. 3) 6



Two-lobed cotyledon of Flooded Gum
 (*Eucalyptus grandis*). 10 N.S.



Cotyledon of Blackbutt
 (*Eucalyptus pilularis*). 5 N.S.

4. First pair of leaves not more than $2\frac{1}{2}$ times as long as broad. Purplish white beneath .. 7. *E. grandis*
(Flooded Gum)
- First pair of leaves more than 3 times as long as broad 5
5. First pair of leaves purplish white beneath, margin not red, gradually tapering into the petiole 8. *E. saligna*
(Blue Gum)
- First pair of leaves reddish purple beneath, margin red, abruptly narrowing into the petiole 4. *E. resinifera*
(Red Mahogany)
6. Growing tip and expanding leaves clothed in white silky hairs 9. *Syncarpia glomulifera*
(Turpentine)
- Growing tip and expanding leaves not hairy.. 7
7. Second pair of leaves sessile..... 8
Second pair of leaves distinctly petiolate..... 9
8. Cotyledons 3-veined (See Fig. 3), Cotyledons and first pair of leaves reddish purple beneath 1. *E. pilularis*
(Blackbutt)
- Cotyledons not 3-veined, cotyledons and first pair of leaves green to purplish green beneath 2. *E. carnea*
E. acmenioides
(White Mahoganies)
9. First pair of leaves green with a purple midrib beneath, shiny above 3. *E. microcorys*
(Tallowwood)
- First pair of leaves green beneath, dull above .. 6. *E. decepta*
(Grey Ironbark)

B. KEY TO SEEDLINGS 1-4 FEET HIGH

1. Leaf stalk exuding a milky sap when cut and squeezed 10. *Tristania conferta*
(Brush Box)
- Leaf stalk exuding a red brown sap when cut and squeezed 9. *Syncarpia glomulifera*
(Turpentine)
- Leaf stalk not exuding a milky or red-brown sap 2
2. Lignotubers absent 3
Lignotubers present 4
3. Leaves sessile for the first 9-15 pairs..... 1. *E. pilularis*
(Blackbutt)
- All leaves petiolate 7. *E. grandis*
(Flooded Gum)

- | | |
|---|---|
| 4. Leaves sessile for the first 5-12 pairs | 2. <i>E. acmenoides</i>
<i>E. carnea</i>
(White Magohanies) |
| All leaves petiolate | 5 |
| 5. Leaf stalks of the first 6 pairs of leaves with red hairs | 5. <i>E. gummifera</i>
(Red Bloodwood) |
| Leaf stalks not hairy | 6 |
| 6. Young stem and leaves covered with a white bloom | 8. <i>E. saligna</i>
(Blue Gum) |
| Young stem and leaves not covered with a white bloom | 7 |
| 7. Young stem angular (<i>i.e.</i> , top 6 inches)..... | 8 |
| Young stem round and not angular | 3. <i>E. microcorys</i>
(Tallowwood) |
| 8. Leaf margin red, leaves lanceolate.
Intramarginal vein not conspicuously removed from the leaf edge | 4. <i>E. resinifera</i>
(Red Mahogany) |
| Leaf margin green, leaves rhomboid*, Intra-
marginal vein conspicuously removed from the leaf edge | 6. <i>E. decepta</i>
(Grey Ironbark) |

* Rhomboid—bluntly diamond shaped. See Figure 4.

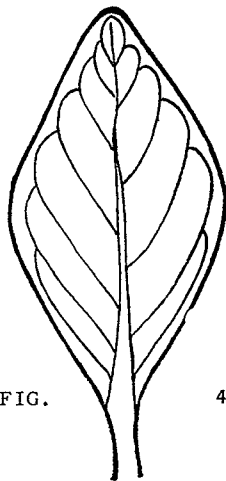


FIG.

4.

Intermediate leaf of Grey Ironbark
(*Eucalyptus decepta*). 1/2 N.S.

CHARACTERISTICS OF SEEDLINGS BY SPECIES

1. *E. pilularis*—Blackbutt

A. COTYLEDON STAGE (See Figure 3)

1. Cotyledons deep reddish-purple beneath green above.
2. Cotyledons distinctly 3-veined.
3. Cotyledons very large 5-15 x 4-12 mms.
4. Cotyledons "D" shaped or slightly 2-lobed.
5. Cotyledon petiole medium-tapering from the cotyledon, purple.
6. First pair of leaves lanceolate, shortly petiolate, purple beneath.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers absent.
2. Leaves purplish to white beneath, glossy above.
3. Leaves petiolate after 12 sessile pairs (9-15 pairs), although the first pair are often petiolate, but the remainder are stem-clasping.
4. Leaves lanceolate, 5-6 times longer than broad. Young leaves red-brown.
5. Leaves opposite for 14 pairs (11-18 pairs).
6. Top 12 inches of stem red, rounded, smooth and shiny.
7. Venation sparse irregular at 40-50° to the midrib.

2. *E. acmenioides* and *E. carnea*—White Mahogany

A. COTYLEDON STAGE

1. Cotyledons green on both sides or slightly purplish beneath.
2. Cotyledons not 3-veined.
3. Cotyledons medium size 4-5 x 2-3 mms.
4. Cotyledons "D" shaped or slightly 2-lobed as in Blackbutt.
5. Cotyledon petiole medium-tapering from the cotyledon, purplish.
6. First pair of leaves broad lanceolate, shortly petiolate, green or only slightly purplish beneath.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present when 4-12 inches high.
2. Leaves green beneath, glossy above.
3. Leaves petiolate after 8 sessile pairs (5-12 pairs), although the first pair are often petiolate, but the remainder are stem clasping as in Blackbutt.
4. Leaves broad lanceolate, 3 times longer than broad. Young leaves red brown.
5. Leaves opposite for 9 pairs. (7-10 pairs).
6. Top 12 inches of stem red, round, smooth and shiny.
7. Venation sparse irregular at 35-55° to the midrib.

3. *E. microcorys*—Tallowwood

A. COTYLEDON STAGE

1. Cotyledons green on both sides.
2. Cotyledons sometimes 3-veined.
3. Cotyledons small, 3 x 1.5 mms.
4. Cotyledons "D" shaped or kidney shaped.
5. Cotyledon petiole not tapering from the cotyledon, purple.
6. First pair of leaves short, broad lanceolate, rounded, petiolate, green beneath with a purple midrib. 3-8 x 2-3 mms.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present.
2. Leaves green beneath, dull on both surfaces.
3. Leaves always petiolate.
4. Leaves broad lanceolate, 2-3 times longer than broad. Young leaves yellow green.
5. Leaves opposite for the first 5 pairs (4-7 pairs).
6. Top 12 inches of stem red-brown to yellow-brown, rounded and dull.
7. Venation sparse at 60° to the midrib.

4. *E. resinifera*—Red Mahogany

A. COTYLEDON STAGE

1. Cotyledons red beneath, green above.
2. Cotyledons not 3-veined.
3. Cotyledons small 3-4 x 1-2 mms.
4. Cotyledons distinctly 2-lobed as in *E. grandis* (see Fig. 2).
5. Cotyledon petiole shortly tapering from the cotyledon.
6. First pair of leaves linear, 4 times as long as broad, petiolate, red to white beneath.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present.
2. Leaves whitish beneath with red veins and margin.
3. Leaves always petiolate.
4. Leaves lanceolate, 4-6 times longer than broad. Leathery.
5. Leaves opposite for the first 7 pairs. (5-8 pairs).
6. Top 6 inches of stem quadrangular, toothed and red.
7. Venation sparse, irregular at 70-80° to the midrib.

5. *E. gummifera*—Red Bloodwood

A. COTYLEDON STAGE

1. Cotyledons green on both sides.
2. Cotyledons distinctly 3-veined.
3. Cotyledons large, 6-7 x 3-4 mms.
4. Cotyledons kidney shaped.
5. Cotyledon petiole not tapering from the cotyledon, reddish green.
6. First pair of leaves, ovate, 8-9 x 4 mms, petiolate, green on both sides with reddish purple hairs on the veins on the underside.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present.
2. Leaves green beneath, margin pale green.
3. Leaves always petiolate. Petioles red and hairy on the first 8 pairs. (6-10 pairs).
4. Leaves oblong—lanceolate, 3-4 times longer than broad.
5. Leaves opposite for 12 pairs. (9-16 pairs).
6. Top 12 inches of stem red-brown, rounded, smooth and shiny. Stem often hairy at 6-12 inches above ground on plants 12-36 inches high.
7. Venation numerous parallel regular at 70-80° to the midrib.

6. *E. decepta*—Grey Ironbark

A. COTYLEDON STAGE

1. Cotyledons green or sometimes purplish green below, green above.
2. Cotyledons not 3-veined.
3. Cotyledons small 2-5 x 2 mms.
4. Cotyledons "D" shaped or slightly notched.
5. Cotyledon petiole long-tapering from the cotyledon, purple.
6. First pair of leaves oblong lanceolate, petiolate, pale green beneath.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present.
2. Leaves lighter green below, glossy above.
3. All leaves petiolate.
4. Leaves broad lanceolate to rhomboid.
5. Leaves opposite for 5 pairs (3-7 pairs).
6. Top 12 inches of stem red-brown, quadrangular, dull.
7. Venation sparse irregular at 35-45° to the midrib. Intramarginal vein conspicuously removed from the edge of the leaf. Main veins are distinctly translucent.

7. *E. grandis*—Flooded Gum

A. COTYLEDON STAGE

1. Cotyledons reddish purple beneath, green above.
2. Cotyledons not 3-veined.
3. Cotyledons small 3-4 x 1.0-1.5 mms.
4. Cotyledons 2-lobed. See Figure 2.
5. Cotyledon petiole shortly tapering from the cotyledon, purplish or green.
6. First pair of leaves oblong lanceolate, petiolate, purple beneath.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers absent.
2. Leaves pale green beneath, dull above.
3. All leaves petiolate.
4. Leaves broad lanceolate, 2-2½ times longer than broad.
5. Leaves opposite for the first 6 pairs (4-8 pairs).
6. Top 12 inches of stem red, angular, rough and shiny.
7. Venation sparse, irregular, at 40-60° to the midrib.

8. *E. saligna*—Blue Gum

A. COTYLEDON STAGE

1. Cotyledons reddish purple beneath, green above.
2. Cotyledons not 3-veined.
3. Cotyledons small, 2-4 x 1-1.5 mms.
4. Cotyledons 2-lobed, similar to *E. grandis*.
5. Cotyledon petiole long-tapering from the cotyledon (compare with *E. grandis*), purple beneath.
6. First pair of leaves linear, petiolate, purple beneath. Stem glaucous when only 4 inches high.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present.
2. Leaves bluish-white beneath, dull on both surfaces.
3. All leaves petiolate.
4. Leaves broad lanceolate, 3-3.7 times longer than broad.
5. Leaves opposite for the first 7 pairs. (6-10 pairs).
6. Top 6 inches of stem covered with a whitish bloom, often angular, rough and dull.
7. Venation sparse, irregular, at 40-60° to the midrib.

9. *Syncarpia glomulifera* (Syn. *S. laurifolia*)—Turpentine

A. COTYLEDON STAGE

1. Cotyledons green on both sides.
2. Cotyledons not 3-veined.
3. Cotyledons small, 2.5-4 x 1.5-2.5 mms.
4. Cotyledons "D" shaped—not 2-lobed.
5. Cotyledon petiole long tapering from the cotyledon, purplish beneath.
6. First pair of leaves broad lanceolate to ovate, petiolate, green beneath with reddish veins.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers present.
2. Leaves green beneath, dull on both surfaces. Red-brown sap exuding from the petiole when cut and squeezed. Young leaves softly hairy beneath. Terminal lead bud red.
3. All leaves petiolate. Petiole yellow-green.
4. Leaves ovate lanceolate, 2-2½ times longer than broad.
5. Leaves always opposite.
6. Top 6 inches of stem reddish-green, shortly downy with white hairs, rounded, dull.
7. Venation sparse, irregular at 40-50° to the midrib.

10. *Tristania conferta*—Brush Box

A. COTYLEDON STAGE

1. Cotyledons green on both sides.
2. Cotyledons not 3-veined.
3. Cotyledons small, 2-4 x 2-3 mms.
4. Cotyledons shovel-shaped. (See Figure 1).
5. Cotyledon petiole shortly tapering from the cotyledon, green beneath.
6. First pair of leaves broad lanceolate to ovate, petiolate, green beneath with paler veins. White sap exuding from the petiole when cut and squeezed.

B. SEEDLING STAGE (12-48 inches high)

1. Lignotubers not formed until seedlings are over 3 feet in height.
2. Leaves green beneath, dull on both surfaces. White sap exuding from the petiole when cut and squeezed. Young leaves white felty-hairy beneath. Terminal leaf bud green.
3. All leaves petiolate. Petiole red in plants over 3 feet high, otherwise green.
4. Leaves ovate lanceolate, 2.5-3.5 times longer than broad.
5. Leaves opposite for approximately 18 pairs, then alternate or clustered close to the ends of the branchlets.
6. Top 6 inches of stem reddish-green or green with soft white hairs, rounded, dull.
7. Venation sparse, irregular at 30-50° to the midrib.