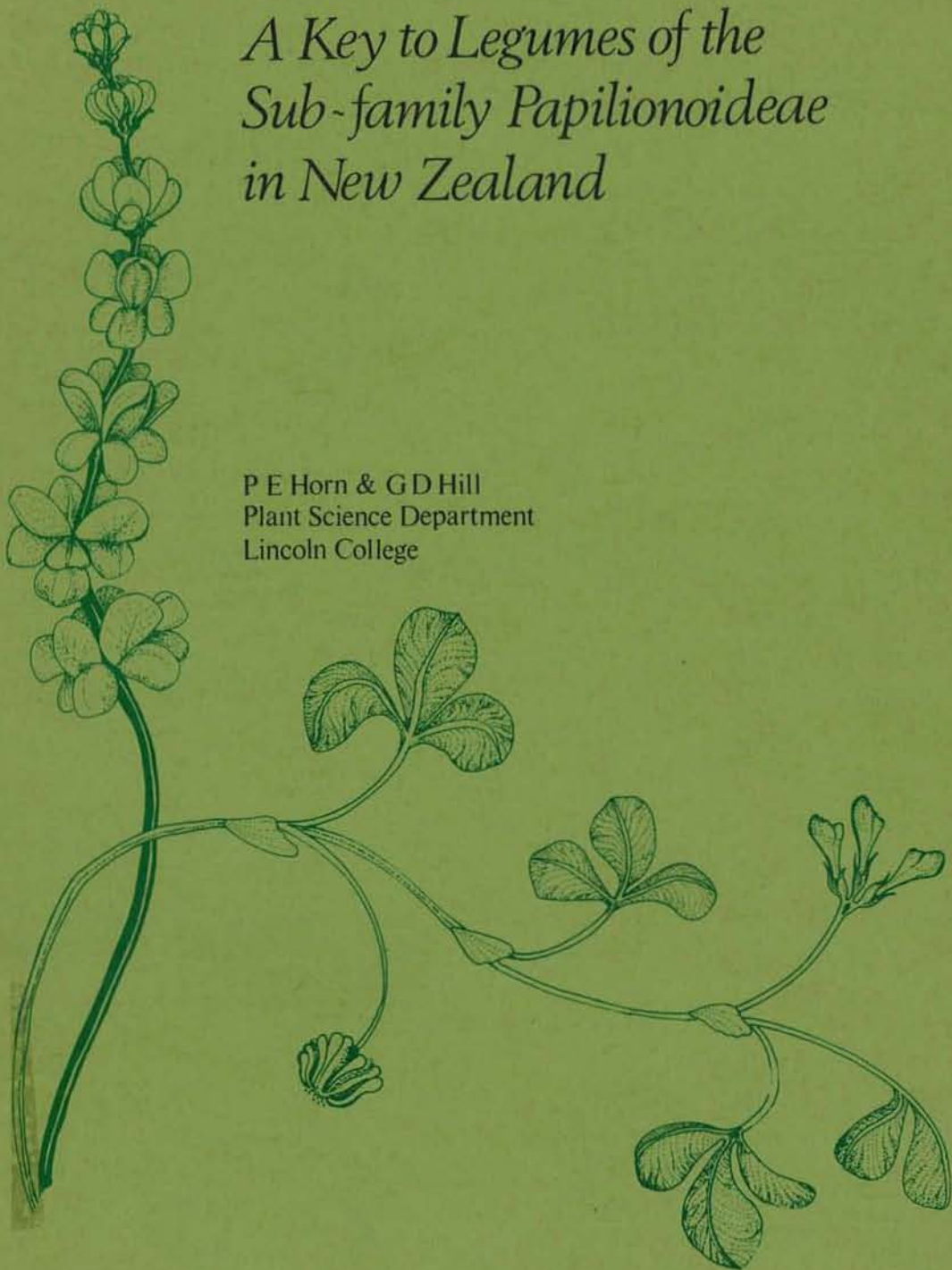


*A Key to Legumes of the
Sub-family Papilionoideae
in New Zealand*

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A KEY TO LEGUMES OF THE SUB-FAMILY PAPILIONOIDEAE
IN NEW ZEALAND

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Illustrations by S.F. Cape and A. Keate.

A course requirement for most undergraduate students at Lincoln College is a basic plant collection. When undertaking such a task the lack of suitable, simple keys for the non-botanist rapidly becomes apparent.

Allan (1961) contains a key to the native legumes. Healy and Mason (1976) also contains a key for a limited number of small herbaceous legumes normally found in pastures.

There is at present no New Zealand key available which enables the identification of common pasture, crop, ornamental or weed legumes, whether native or exotic. This key endeavours to fill this gap for the common papilionate genera. As it does not require specialised botanical knowledge, it should also be suitable for use by farmers and amateur botanists. Trifolium species keyed by Healy and Mason (1976) which were said to be rare, and have not been reported for many years, have been omitted.

The key has been tested over six years by large classes of undergraduate students at Lincoln College, and is intended as the first of a continuing series of plant identification keys.

The authors would be pleased to hear of suggestions for improvements from users.

Introduction

The family Leguminosae is one of the largest families of flowering plants with members widely distributed throughout the world. The characteristic feature of the family is the fruit which is a pod. The family is divided into three sub-families (Mimosoideae, Caesalpinoideae and Papilionoideae) according to the form of the flower.

This key deals with the sub-family Papilionoideae members of which have pea-like flowers with five sepals, five petals, ten stamens and one carpel (see diagrams P.2) In many genera flowers are gathered together into groups or inflorescences. For example clover "flowers" consist of many individual papilionate flowers.

Common plants of the Papilionoideae in New Zealand include clovers, medics, peas, beans, gorse, broom, lupins and the Kowhai.

Key Use

The key divides the plants into 5 groups, according to leaf form.

To identify a legume examine the leaf form of the plant and decide to which of the five groups it belongs. If the plant has trifoliate or pinnate leaves (groups III or IV) it must be further allocated, in a similar way, to a sub-group. Each group (or sub-group) is arranged in paired statements (except group III which has five sub-groups). In each case start at the first pair of statements (1a and 1b) and decide which best describes the plant. A number in the right hand margin will direct the user to another pair of statements. A series of such steps will enable the user to reach a point where the plant can be identified with reasonable certainty.

N.B. Some plants vary considerably, especially in leaf form. Such plants will key in more than one group.

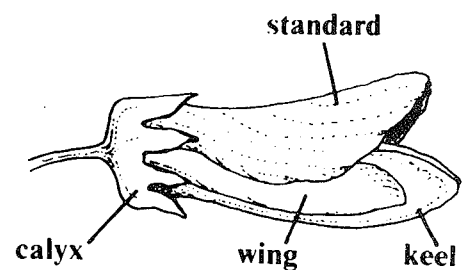
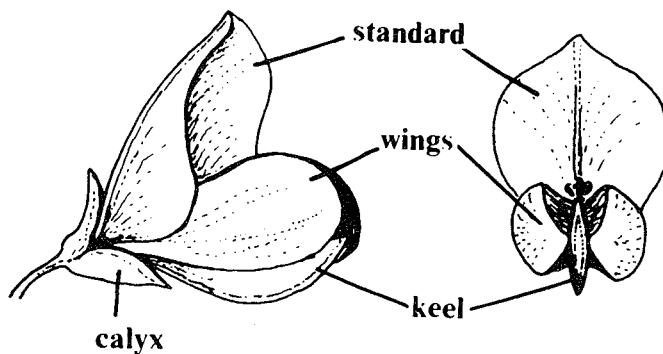
Terms used in the key

Most of the terms used in the key are illustrated either at the point of use or in the diagrams on pages 3 - 4.

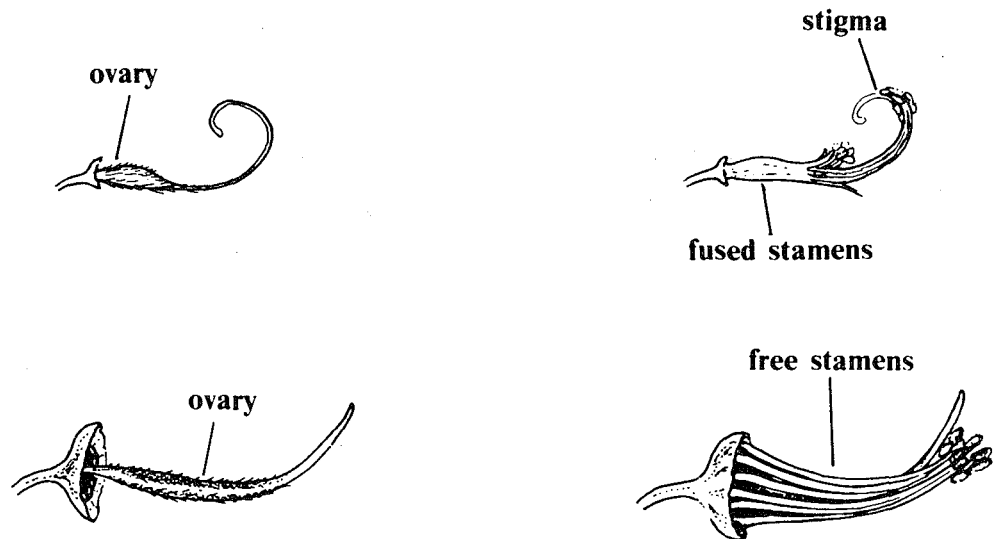
Family features

Flowers are pea-like (papilionate) and consist of five petals, one standard, two wings, two keels, ten stamens, one carpel. Seeds are formed in a pod. The leaves are variable as illustrated in the following diagrams

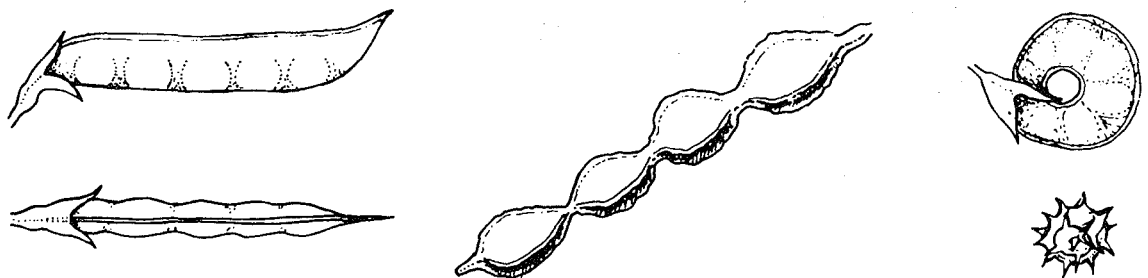
Flowers



Essential organs and pods



Above & right—Flowers with petals removed
left—Petals and stamens removed

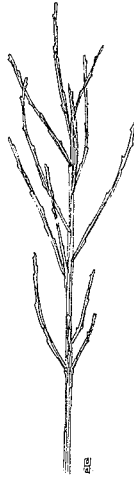


Above—Pods

KEY

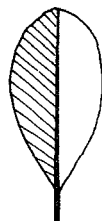
Leaves absent or much reduced, less than 1 cm in length.

GROUP I
(Page 7)



Leaves simple, greater than 1 cm in length.

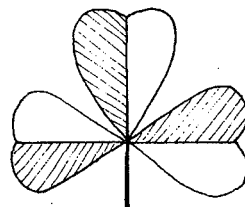
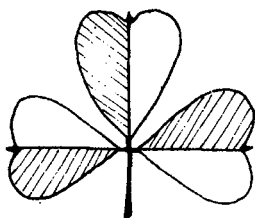
GROUP II
(Page 10)



Simple leaves

Leaves trifoliate.

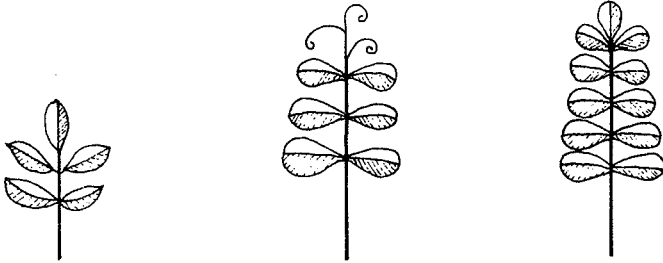
GROUP III
(Page 13)



Trifoliate leaves

Leaves pinnate with 2-many
leaflets. Some leaflets may be
modified as tendrils.

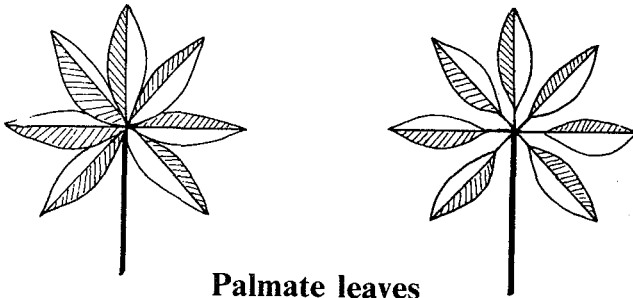
GROUP IV
(Page 37)



Pinnate leaves

Leaves palmate.

GROUP V
(Page 46)



Palmate leaves

GROUP I

LEAVES ABSENT OR MUCH REDUCED
-LESS THAN ONE CENTIMETRE IN LENGTH

1a. Stems bearing spines.

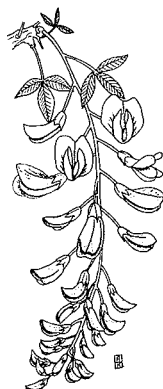
Ulex europaeus
(gorse)

1b. Stems without spines. 2

2a. Stems cylindrical. 3

2b. Stems flattened or 'square' 4

3a. Flowers yellow, 2-3 cm long, in
racemes (see diagram) of 5-20
flowers. Pods 2-6 cm long,
containing up to 8 flattened,
heart-shaped, brown seeds.
A shrub to 3 m.



Spartium junceum
(Spanish broom)

3b. Flowers smaller than above,
cream, pink, blue, mauve or
yellow. 6

4a. Stems flattened. Flowers cream,
pink, blue, mauve or yellow 6

4b. Stems 'square', ribbed. Flowers
1-4 cm long. Small leaves may
be present. 5

5a. Flowers white, 1.5 cm long.
Pods 1-3 cm x 0.3-0.5 cm. 3-8
seeds per pod, occasionally
more. A shrub to 2 m.

Cytisus multiflorus
(white broom)

5b. Flowers 1-3 cm long, yellow, or
a mixture of yellow, red or
brown. Formed singly in the axils
of upper 'leaves'. Pods 2-6 cm
x 0.5-1 cm, each with 5-10 brown
seeds when mature. Small leaves
may be present, those subtending
the flowers frequently more rounded
than the others. A shrub to 2 m.

Cytisus scoparius
(broom)

6a. Stems rigid, erect with deep
vertical grooves. Plants up
to 1m tall, greyish-green
in colour. Flowers cream
to very pale pink.
Calyces and pods furry.

Corallospartium crassicaule
(coral broom)

6b. Stems weeping or erect. If
erect without vertical grooves. 7

- 7a. Weeping shrub or small tree
with cylindrical branches.
Young branches marked with
vertical lines or shallow
grooves. Flowers mauve to
pink in elongated heads
(racemes) up to 9 cm long.

Chordospartium stevensonii

(weeping broom)

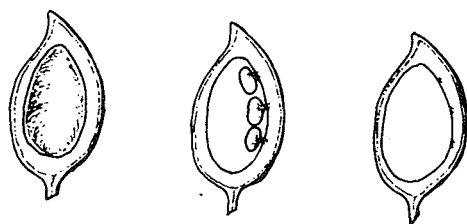
- 7b. Branches not as above, flowers
in smaller heads than above. 8

- 8a. Branches compressed or flattened.
Flowers pink in elongated heads
(racemes) up to 5 cm long. Pods
contain 2-3 seeds. Pods not
opening to release seeds
(indishiscent).

Notospartium spp.
(N.Z. broom)

- 8b. Flowers pink, mauve or yellow. Pods
contain 2-5 seeds. Sides of pods
drop off when seeds mature leaving
an open structure (see diagram).

Carmichaelia spp.
(N.Z. broom)



GROUP II

LEAVES SIMPLE, GREATER THAN ONE CENTIMETRE IN LENGTH

- 1a. Plants bearing spines at end of lateral branches. Leaves 1-1.5 cm long with winged petioles. Leaf margin serrated. Flowers solitary, 1 cm long, purple with cream markings.
- Ononis spinosa*
(restharrow)
- 1b. Plants without spines. 2
- 2a. Leaves small. 1-1.5 cm x 0.2-0.5 cm. Occasionally mixed with small trifoliate leaves. Stems 'square' ribbed. Flowers formed singly in axils of upper leaves. Flowers yellow, or a mixture of yellow, red, and brown. Pods 2-6 cm x 0.5-1 cm, with 5-10 brown seeds when mature.
- Cytisus scoparius*
(See 5b, Group I)
- 2b. Leaves larger than above. 3
- 3a. Flowers red, (to 3 cm long) occurring singly or in pairs.
- Templetonia retusa*
- 3b. Flowers not red. 4
- 4a. Flowers yellow. 5
- 4b. Flowers not yellow. 6

- 5a. Flowers yellow 2-3 cm. Flowers borne in racemes of 5-20 flowers. Stems green (same colour as the leaves) cylindrical, smooth. Leaves, few, linear 2-5 cm x 0.5-1 cm, short (0.3 cm) petioles. Pods 2-6 cm long, bearing up to 8 flattened, heart shaped brown seeds. A shrub to 3 m.

Spartium junceum
(See 3a, Group I)

- 5b. Flowers smaller than above.

Eutaxia sp.

- 6a. Flowers white or pale pink, solitary, approx 1 cm long. Leaves sessile, unevenly lobed, bearing deeply and evenly lobed stipules at base. Stems short (30 - 40 cm long) 1.5 - 2 cm long x 0.8 - 1 cm wide bearing 2 (occasionally 3) seeds.

Cicer arietinum
(chick peas)

- 6b. Leaves and flowers not as above. 7

7a. Plant climbing or scrambling.

Flowers mauve, pink or white in elongated heads (racemes).



Hardenbergia spp.

7b. Flowers pink, white or mauve, 2-4cm long. Leaves many, obovate (see diagram) 1.5-4 x 1-2 cm, petioles 0.5 cm. Leaves arranged alternately.

A tree to 3 m.



Podalyria sp.

GROUP III

LEAVES TRIFOLIATE

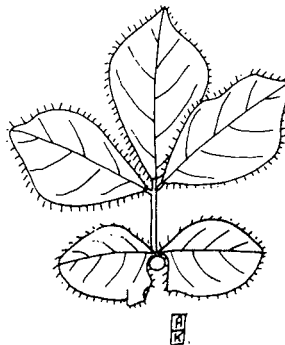
Plants with climbing or scrambling stems usually more than 1 m in length. (N.B. The stems twine around support. No plants in this sub-group have leaf tendrils.)

Sub-group A
(page 15)

Plants, woody trees, or shrubs greater than 1 m in height.

Sub-group B
(page 16)

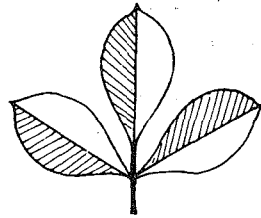
Plants not woody, less than 1 m in height. Leaves trifoliate, stipules similar in shape to leaflets giving the appearance of a pinnate leaf with 5 leaflets. Main (central) veins of the 2 lateral leaflets do not divide the leaflet in equal halves (see diagram).



Sub-group C
(page 20)

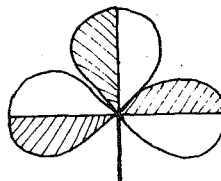
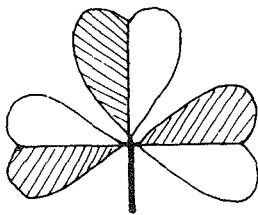
Plants not woody, usually less than 1 m in height. Stalk (petiolule) of central leaflet distinctly longer than stalks of two lateral leaflets. (See diagram below).

Sub-group D
(page 22)



Plants not woody, usually less than 1 m in height. Stalk (petiolule) of central and two lateral leaflets approx. equal or absent (see diagram above).

Sub-group E
(page 24)



SUB-GROUP A. Plants with climbing
or scrambling stems.

- 1a. Flowers in distinct racemes
(elongated flower heads). 2



- 1b. Flowers not arranged in elongated
flower heads. 3

- 2a. Flowers scarlet, up to 2 cm in
length. Pods up to 30 cm in
length.

Phaseolus coccineus
(runner bean)

- 2b. Flowers mauve, white or pink,
smaller than above.

Hardenbergia spp.

- 3a. Flowers red.

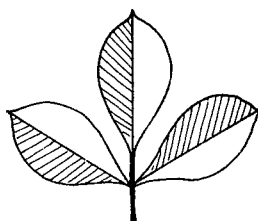
Kennedia rubicunda
(dusky coral pea)

- 3b. Flowers black.

Kennedia nigra
(black coral pea)

SUB-GROUP B. Plants woody. Greater
than 1 m in height. (rarely 0.8 m).

- 1a. Stalk (petiolule) of central leaflet
distinctly longer than stalks of the
two lateral leaflets. 2



- 1b. Stalks (petiolules) of central and
two lateral leaflets approx equal
or absent. 4

- 2a. Leaflets 3-6 cm long x 2-4 cm wide,
oval with acute (pointed) tips.
Petioles frequently bear spines.
Flowers large, scarlet, 3-8 cm long,
prominent standard, wings much
reduced. Stamens diadelphous
(i.e. 9 fused, 1 free). Sepals
scarlet. Plant a tree up to 6m
in Auckland, smaller (to 3 m) in
Canterbury.

Erythrina sp.
(flame tree)

- 2b. Leaflets smaller than above. Plants
without spines. Flowers not scarlet. 3

- 3a. Plant hairless, stiffly erect, up to 2.5 m in height. Flowers white in elongated heads 7-21 cm long.

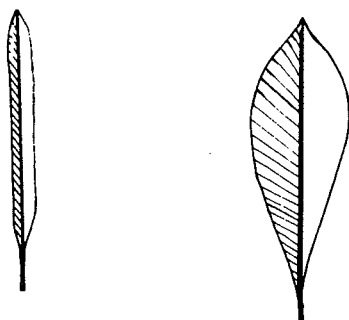
Melilotus alba
(sweet clover)

- 3b. Plant hairy. Hairs vary from short velvety hairs to long silky hairs. Flowers golden-yellow, 1-1.5 cm long. Seed pods smooth, coiled.

Medicago arborea
(tree medic)

- 4a. Flowers white 1.5-2 cm long. Flowers prolific, nearly always present. Pods 3-6 cm long, hairy. Leaves 3-5 cm long. Leaflets linear to oval (see diagram), tips acute (pointed). A shrub to 4 m.

Chamaecytisus palmensis
(tree lucerne)



- 4b. Flowers not white. 5

- 5a. Flowers large, to 6 cm long,
yellow-green. Pods seldom formed
in South Island. Leaves 6-12 cm
long: petioles 4-7 cm long;
leaflets oval to orbicular
(i.e. 'circular').
A shrub to 2 m.

Crotolaria agatiflora
(canary bird bush)

- 5b. Flowers smaller than above,
bright yellow. 6

- 6a. Plants with spines at end of
lateral branches.

Calycotome spinosa
(spiny broom)

- 6b. Plants without spines. 7

- 7a. Flowers in racemes with (usually)
more than 9 flowers / raceme. 8

- 7b. Flowers in groups of 1-6, usually
in axils of leaves, not in
distinct heads or inflorescences. 9

- 8a. Flowers in long (8-20 cm) racemes.
 Flowers 1-2 cm long. Pods 3-6 cm
 with 2-8 seeds. Leaves 3-10 cm;
 leaflets oval, 1-6 cm x 0.5-3 cm.
 Stipules small, hairy.
 A shrub or tree to 3 m.

Laburnum anagyroides
 (laburnum)

- 8b. Racemes shorter, (less than 10cm).
 Leaves and leaflets smaller than
 above. Leaves and leaflets
 hairy.

Teline stenopetala

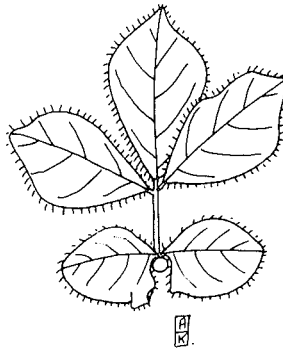
- 9a. Flowers 1-2 cm long, yellow. Pods
 1-2.5 cm x 0.5 cm with 4-6 seeds.
 Seeds small, 2 mm diameter, heart
 shaped, dark brown to black.
 Leaves oval to oblate, hairy.
 A shrub to 2 m.

Teline monspessulanus
 (Montpellier broom)

- 9b. Flowers 1.5-3 cm long. Pods
 2-7 cm x 0.5-1 cm with 8-15
 seeds. Seeds pale brown to
 black, oval 4 x 2 mm. Leaves
 on long (1 cm) petioles, or
 where flowers are formed in the
 axils, often sessile (i.e. without
 stalks). Leaves often sparse.
 Leaflets oval 0.5-1 cm x 0.2 cm.

Cytisus scoparius
 (See 5b, Group I)

SUB-GROUP C. Plants not woody, less than 1 m in height. Leaves trifoliate, stipules similar in shape to leaflets, giving the appearance of a pinnate leaf with 5 leaflets. Flowers yellow, in umbellate heads with 1-12 flowers/flowerhead.



- 1a. Flower heads with 1-2 flowers, on short stalks. Pods linear, not wrinkled up to 6 times as long as calyx. Leaves hairy.

Lotus angustissimus
(slender birdsfoot-trefoil)

- 1b. Flower heads with 2-12 flowers/head.
Leaves hairy or hairless. 2

- 2a. Flower heads with 3-4 flowers /head. Pods wrinkled, round in cross section, 1.5-3 times longer than calyx. Leaves hairy.

Lotus subbiflorus
(lotus subbiflorus)

- 2b. Plants not as above. 3

- 3a. Leaflets narrow, (3 - 4 times longer than broad, with pointed tips. Flower heads with approx 4 flowers/head. Pods long, slender.

Lotus tenuis
(lotus tenuis)

- 3b. Leaflets broader than above. 4

- 4a. Leaflets obovate, long hairs may be present on underside and on leaflet margins. Flowerheads with 5-12 per flowers / head. Calyx teeth spreading in the bud. Stems often hollow. Older plants rhizomatous.

Lotus pedunculatus
(lotus major)

- 4b. Leaflets obovate - lanceolate. Often glabrous, but sometimes slightly hairy. Flowerheads with 2-6 flowers per head. Calyx teeth press close to bud (i.e. not spreading). Stems seldom hollow.

Lotus corniculatus
(birdsfoot trefoil)

SUB-GROUP D. Plants not woody,
usually less than 1 m in height.
Stalk (petiolule) of central leaflet
distinctly longer than stalks of two
lateral leaflets.

1a. Leaflets 5-10 cm x 4-8 cm. Flowers
1-2 cm long. 2

1b. Leaflets and flowers smaller than
above. 3

2a. Plant covered in short white hairs.
Flowers scarlet, pink, mauve, or
white. Pods 12-30 cm long, seeds
kidney-shaped, spherical 1-1.5 cm long.
Plants small (0.5 m tall) or climbers.

Phaseolus vulgaris
(French bean)

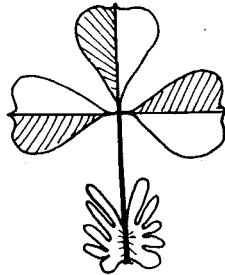
2b. Plant covered in brown hairs. Pods
6-10 cm long, hairy. Seeds
spherical-egg shaped. Plant
0.4 - 2 m tall.

Glycine max
(soya bean)

3a. Plants distinctly hairy. 4

3b. Plants hairless, or occasionally
plants may have a few
inconspicuous localised hairs. 9

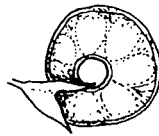
- 4a. Leaflets with conspicuous dark blotch; pod burr-like, stipules with evident teeth on margins (see diagram).



Medicago arabica
(spotted burr medic)

- 4b. Leaflets lacking dark blotch. 5

- 5a. Flowers purple or bluish-white, plant perennial with stout crown; pods spirally coiled or sickle-shaped, not spiny (see diagram).



Medicago sativa
(lucerne)

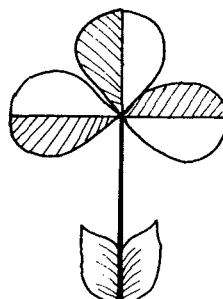
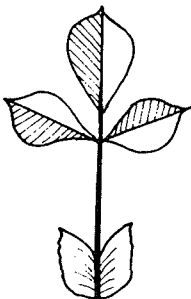
- 5b. Flowers yellow or white. 6

- 6a. Stipules toothed or lobed on margins. Pods large, spirally coiled, smooth, snail like.

Medicago scutellata
(snail medic)

- 6b. Stipules entire or with inconspicuous teeth on margins. (see diagram)

7



- 7a. Plant upright, up to 0.8 m high,
 shrub-like in appearance.
 Hairs vary from short and velvety
 to long and silky.
 Upper surface of leaves hairless.
 Flowers golden yellow 1-1.5 cm long.
 Seed pods smooth, coiled.

Medicago arborea
 (tree medic)

- 7b. Plants prostrate, not shrub-like.
 Upper and lower surfaces of leaves
 hairy. Flowers small, up to 0.5 cm long..... 8

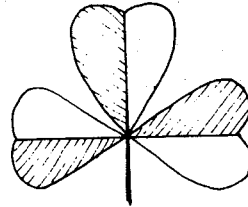
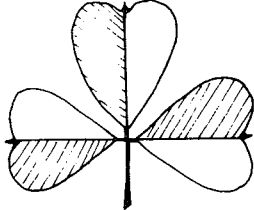
- 8a. Flowers 1-8 per head; pod spirally
 coiled, burr-like.

Medicago minima
 (woolly burr medic)

- 8b. Flowers many, in compact heads on
 long stalks, pods small,
 kidney-shaped, smooth, black when
 ripe.

Medicago lupulina
 (black medic)

- 9a. Notch at top of leaflet without mucronate; pod small, concealed in brownish withered flower (see diagram below). 10



- 9b. Notch at top of leaflet with mucronate, pod not concealed in withered flower (see diagram above). 11

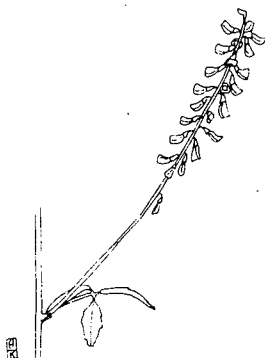
- 10a. Flowers 25 to 50 per head, usually yellow.

Trifolium campestre
(hop trefoil)

- 10b. Flowers 5 to 20 per head, usually yellow.

Trifolium dubium
(suckling clover)

- 11a. Leaflets thick and more or less fleshy, with strong odour when crushed, margins toothed nearly to base; flowers yellow or white, in elongated heads (racemes 1.5-21 cm long, pods small, egg-shaped, strongly wrinkled or veined; see diagram). 12



- 11b. Leaflets thin, not fleshy, lacking strong odour when crushed, margins toothed, often in upper half only; flowers purple, blue, lilac, yellow or bluish-white; pods small and more or less kidney-shaped, or sickle-shaped, or spirally-coiled and smooth, or spirally coiled and spiny (burr-like). 14

- 12a. Flowers white; in elongated heads (7-21 cm long) plants 0.75-3 m tall.

Melilotus alba
(sweet clover)

- 12b. Flowers yellow; plant smaller. 13

- 13a. Flowers 0.4 cm long or less; pods strongly veined, stems simple or sparingly branched up to 0.6 m tall.

Melilotus indica
(King Island melilot)

- 13b. Flowers 0.4cm long; pods with distinct cross-wrinkles, stem branching low down, giving a bushy plant, 0.6-1 m tall.

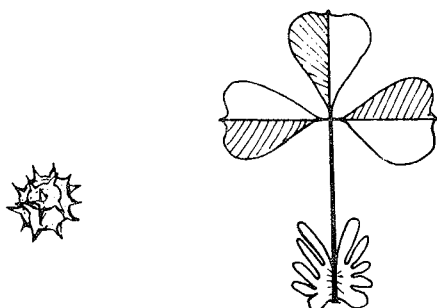
Melilotus officinalis
(yellow sweet clover)

- 14a. Flowers purple, blue or bluish-white, plant perennial, with stout crown: pods spirally coiled or sickle-shaped, not spiny.

Medicago sativa
(lucerne)

- 14b. Flowers yellow or yellowish white; plant annual or perennial; pods of various shapes. 15

- 15a. Leaflets with conspicuous dark blotch; pod burr-like, stipules with evident teeth on margins (see diagram below).



Medicago arabica
(spotted burr medic)

- 15b. Leaflets lacking conspicuous dark blotch; fruits various. 16

- 16a. Pod sickle shaped or nearly straight; perennial.

Medicago falcata
(lucerne)

- 16b. Stipules deeply cut into narrow segments. Pods spirally coiled, burr-like.

Medicago polymorpha
(burr medic)

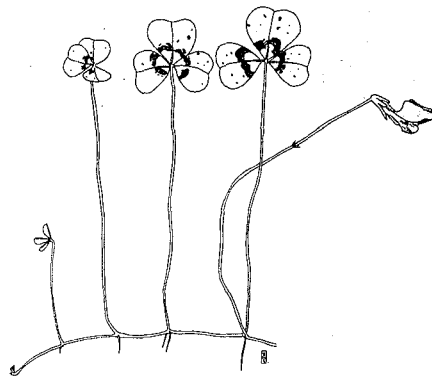
SUB-GROUP E. Plants not woody, usually less than 1m in height. Stalk (petiolule) of central and two lateral leaflets approximately equal or absent.

- 1a. Plants with rhizomes (under ground stems). Leaflets long, narrow linear-oval. Leaflet margin serrated.

Trifolium ambiguum
(Caucasian clover)

- 1b. Plants without rhizomes. 2

- 2a. Stems, rooting at the nodes (stolons). 3



- 2b. Stems not rooting at the nodes. 5

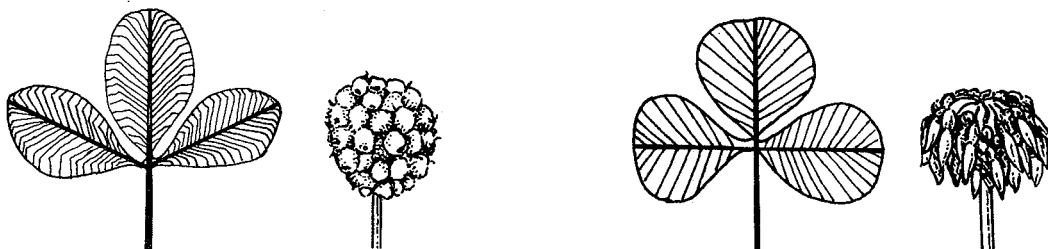
- 3a. Leaflets with light crescent
-shaped mark in lower half,
and with dark flecks; flowers
cobalt-blue, 1-1.5 cm long,
pea-like in form, 1-2 per head.

Paroetus communis
(shamrock pea)

- 3b. Flowers not blue. 4

- 4a. Veins of leaflets curving
towards margins, close spaced;
fruiting heads inflated,
strawberry-like in aspect (see
diagram below left).

Trifolium fragiferum
(strawberry clover)



- 4b. Veins of leaflets straight
wide-spaced; fruiting
heads not inflated
(see diagram above right).

Trifolium repens
(white clover)

- 5a. Leaflets distinctly hairy,
on one or both surfaces. 6

- 5b. Leaflets hairless or sparingly
hairy. 10

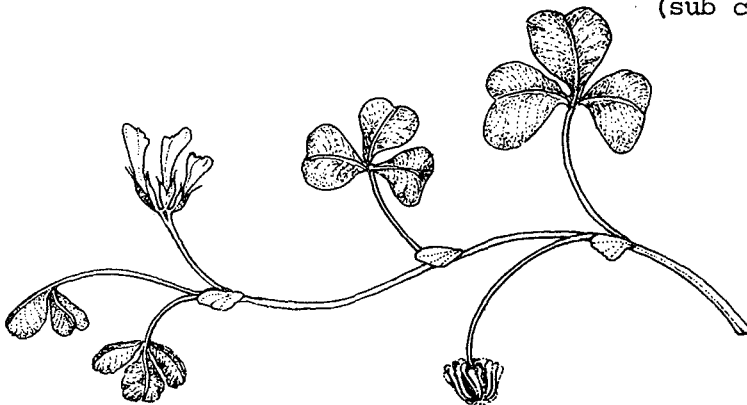
- 6a. Leaflets grey, hairy, narrow, seldom more than 5 mm broad, notched at the tip. Fruiting heads cylindrical, 2-3 cm long, soft, hairy.

Trifolium arvense
(haresfoot trefoil)

- 6b. Leaflets wider than 5 mm. 7

- 7a. Flower heads with 2-6 white-pinkish flowers up to 1.5 cm long. Leaflets triangular, with distinct notch. Stems prostrate; fruiting heads curved downwards, pods forming burrs and anchoring in the soil (see diagram).

Trifolium subterraneum
(sub clover)



- 7b. Flower heads with more than 10 flowers. Leaflets oval to obovate to diamond-shaped. 8

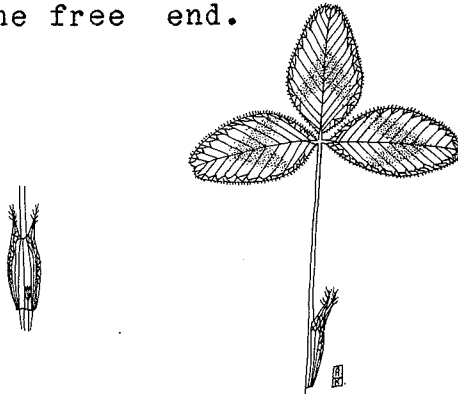
- 8a. Flower heads not stalked,
cylindrical to egg-shaped to
2 cm long. Flowers pink.
Leaflets pale green, obovate
to diamond shaped, densely hairy.

Trifolium striatum
(striated clover)

- 8b. Flowerheads stalked. 9

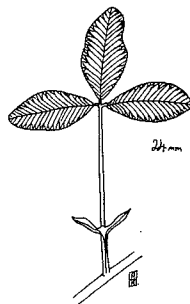
- 9a. Flower heads stalked, globe
shaped, 1-2.5 cm in diameter.
Flowers pink-purple (rarely
cream). Leaflets oval, often
with a pale green-white crescent-
shaped marking in the lower half.
Stipules with a spreading tuft of
hairs at the free end.

Trifolium pratense
(red clover)

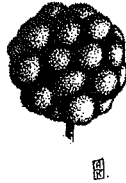


- 9b. Leaflets hairy on margins and
lower surface. Free part of
stipule long and narrow (linear)
hairy. Stem having a zig-zag
appearance. (See diagram below).

Trifolium medium
(zig-zag clover)



- 10a. Calyces (fruiting heads) hairy.
 Pods almost totally enclosed
 in swollen calyces (see diagram). 11



- 10b. Calyces not hairy. Calyces not
 swollen (see diagram above
 right). 12

- 11a. Fruiting heads pink to brown,
 woolly, flower stalks shorter
 than leaves; nerves of fruiting
 calyces indistinct, teeth at
 tip concealed or nearly so in wool;
 not burr-like.

Trifolium tomentosum
 (woolly clover)

- 11b. Fruiting heads not woolly,
 flower stalks (except those of
 uppermost heads) longer than
 leaves; nerves of fruiting
 calyces distinct; teeth at tip
 clearly visible and
 projecting; head burr-like.

Trifolium resupinatum
 (Persian clover)

- 12a. Flowers bright yellow. 13

- 12b. Flowers not yellow. 14

- 13a. Heads large, dense with 40 or more flowers; standard grooved with age. Plant erect, strong-growing.

Trifolium aureum
(Yellow clover)

- 13b. Heads small, 1-6 flowers, minute. Plant small, prostrate.

Trifolium micranthum
(lesser suckling clover)

- 14a. Flower heads not stalked, or stalks less than 4 mm. 15

- 14b. Flower heads distinctly stalked. 16

- 15a. Corolla pink, distinctly
longer than calyx, flower head
small, globe-shaped, sessile
(i.e. not stalked) in leaf axil;
upper leaves short-stalked; plants
prostrate, stems radiating to
give circular mat-like form without
raised centre, size variable,
depending on location.

Trifolium glomeratum
(clustered clover)

- 15b. Corolla whitish, approximately same
length as calyx; flowerheads in leaf
axils, with or without short
stalks; if stems elongate,
upper leaves long-stalked; plants
small, prostrate, stems many
and radiating to give a circular
form, with raised centre.

Trifolium suffocatum
(suffocated clover)

- 16a. Flower heads small, up to 0.7 cm
diameter, stalks of heads
shorter than leaves.. Plants usually
spreading, or prostrate.

Trifolium cernuum
(drooping flowered clover)

- 16b. Flower heads at least 1 cm in
diameter, usually larger. 17

- 17a. Leaflets oval-linear, at least twice as long as broad. Leaflet margins serrated; lateral veins extended to form teeth. Free part of stipule less than half the length of leaflets.

Trifolium ambiguum
(Caucasian clover)

- 17b. Leaflets oval, usually less than 1.5 times as long as broad. Leaflet margins distinctly serrated in lower half only. Stipule extended in a long, tapering point. Free part of stipule at least half the length of leaflets, often longer. Flowers white.

Trifolium hybridum
(alsike clover)



GROUP IV

LEAVES PINNATE, SOME LEAFLETS MAY BE REPLACED BY TENDRILS

Woody plants or trees, greater than 1m
in height. No plants in this group
have leaflets replaced by tendrils.

SUB GROUP A
(page 37)

Plants not woody, usually less than 1m
in height, some leaflets may be
replaced by tendrils.

SUB GROUP B
(page 40)

* * * *

SUB GROUP A. Woody plants or trees, greater
than 1m in height. No plants in this
group have leaflets replaced by tendrils.

- 1a. Leaves less than 2 cm long with
5-7 leaflets, each 1-2 mm x 2-3 mm,
notched. Flowers pale blue-mauve,
or yellow, approx 0.5 cm long.

step 6, Group I, page 8

- 1b. Leaves, leaflets and flowers
larger than above. 2
- 2a. Flowers yellow. 3
- 2b. Flowers not yellow. 4

- 3a. Flowers up to 5 cm long, not in umbellate heads. Petals and stamens not fused. Pods 5-15 cm long, constricted between seeds giving the appearance of a string of beads. Pods non-shattering, and persist on the trees for 12-18 months (see diagram below). Leaves 5-15 cm long with up to 45 oval leaflets.

Sophora spp.
(kowhai)

- 3b. Flowers less than 4 cm long, in umbellate heads of 2-10 flowers. Pods straight, 2.5 cm long, not constricted between seeds.

Coronilla spp.
(crown vetch)

- 4a. Flowers red or white, 4-7cm long. Prominent standard and keel, wings reduced, stamens diadelphous (i.e. 9 fused, 1 free) Pods 5-12 cm, white, woolly on the inside, with many (up to 30) seeds in each pod. Leaves 5-15 cm long, distinct stipules. Leaflets 15-25 per leaf, linear to oval.

Clanthus punicus
(kaka beak)

- 4b. Flowers 1-2.5 cm long, mauve, pink or white. 5

- 5a. Stems woody, climbing, twisting round any available support, often twisting round itself. Flowers in long racemes, with 10-30 flowers in each inflorescence. Leaves 10-30 cm with 9-11 oval leaflets, each 3-7 cm x 2-4 cm. Petioles markedly swollen at base.

Wisteria sinensis
(wisteria)

- 5b. Plants without climbing stems. 6

- 6a. Stems bearing spines or thorns.

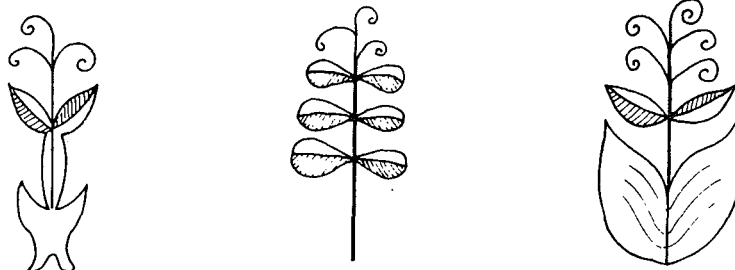
Robinia pseudoacacia
(false acacia)

- 6b. Stems without spines or thorns.

Virgilia spp.
(virgilia)

SUB-GROUP B. Plants not woody, usually
less than 1m in height, some leaflets
may be replaced by tendrils.

- 1a. Some leaflets replaced by
tendrils (see diagram below). 2



- 1b. No leaflets replaced by
tendrils (see diagram below). 4



- 2a. Stipules large and conspicuous.
Leaflets (not tendrils), 2-6 per
leaf. Leaflets usually longer
than 2 cm - frequently 3-8 cm. 3

- 2b. Stipules inconspicuous, leaflets
(not tendrils) 10-14 per leaf.
Leaflets usually 0.5-2 cm x 0.2-5 cm,
each with a conspicuous mucronate
tip. Flowers purple, dark red, pale blue.

Vicia spp
(vetch)

- 3a. Leaflets (not tendrils) usually two per leaf. Leaflets linear to oval, 3-8 cm x 0.8-2 cm. Stipules conspicuous. Petiole winged (see diagram below left). Flowers 1.5-4 cm long.

Lathyrus spp.
(wild and sweet peas)



- 3b. Leaflets oval-ovate often four per leaf (occasionally 2-6). Stipules almost completely surrounding stem at petiole base (see diagram above right). Flowers 1.5-3 cm long. White or blue.

Pisum spp.
(peas)

- 4a. Five leaflets per leaf. 5
- 4b. Two or more leaflets per leaf,
but not five. 6

- 5a. Five leaflets per leaf.
Flowers yellow, in umbellate
flower heads with 1-12
flowers/head.

See Group III,
sub-group C, page 20

- 5b. Stems flattened or cylindrical,
smooth, green. Flowers white,
purple striped or purple approx
0.5 cm long. Leaves less than 1 cm
long. Leaflets 1-2 mm x 2-3 mm notched.
Seed pods 0.5 x 0.3 cm, 2-4 seeds per
pod. Sides of pod drop off at maturity
leaving an open structure.

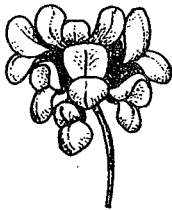
Carmichaelia spp.
(see Group 1 page 9)

- 6a. Stems flattened or cylindrical,
smooth, green. Flowers white, purple
striped or purple, less than 1cm long.
Leaves less than 1 cm long, with up to
7 leaflets, 1-2 mm x 2-3 mm notched.
Seed pods 0.5x0.3 cm, 2-4 seeds per pod.
Sides of pod drop off at maturity,
leaving an open structure.

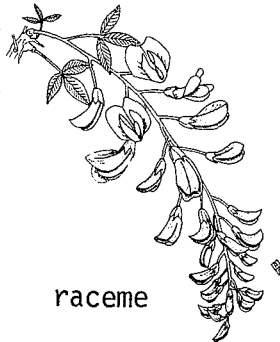
Carmichaelia spp.
(see Group 1 page 9)

- 6b. Leaves, leaflets and flowers
larger than above. Stems
seldom flattened. 7

- 7a. Flowers yellow, pink or blue
in umbellate heads of 2-10
flowers. (See diagram). 8
- 7b. Flowers in racemes or singly, or
in small numbers in the axil of
leaves. Not in umbellate
heads. Leaves frequently longer
than above. (See diagram). 9



umbellate head



raceme

- 8a. Pods 1-2.5 cm x 1.5-3 mm,
constricted between seeds.
Flowers yellow. Plants herbaceous.

Ornithopus spp.
(serradella)

- 8b. Pods 2-5 cm long, straight, not
constricted between seeds.
Yellow flowered types usually
shrubs to 2 m. Pink and blue
flowered types usually scrambling
herbs.

Coronilla spp.
(crown vetch)

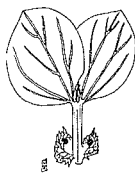
- 9a. Leaflets and stipules
distinctly toothed.
Flowers white or pale pink.

Cicer arietinum
(chick peas)

- 9b. Leaflets and stipules not as above. 10

- 10a. Stipules prominent, triangular
with a distinctive black or pale
green marking towards the centre.
(See diagram). Leaves 8-20 cm long
with 2, 4 or 6 (rarely 8) leaflets.
Leaflets 3-9 cm x 1.5-5 cm, oval.
Flowers white or blue with
(frequently) black markings on the
keel. 1-3 flowers in leaf axils;
flowers 2-3 cm long. Pods large,
8-25 cm x 1-3 cm. Inside pods
white, woolly. Stems 'square'
ribbed. A plant up to 1.5 m.

Vicia faba
(broad or field bean)



- 10b. Stipules, if present, not as
above. Leaves usually with more
than 9 leaflets. 11

11a. Flowers deep red (occasionally white).

Hedysarum coronarium
(French honeysuckle)

11b. Flowers pink or blue. 12

12a. Flowers blue.

Galega officinalis
(goat's rue)

12b. Flowers pink.

Onobrychis spp.
(sainfoin)

GROUP V
LEAVES PALMATE

1a. Leaflets with equal (or absent) stalks (petiolules). Flowers blue, yellow, pink, red, white, cream, or mixtures of these, arranged in racemes or spikes. 2

1b. Leaflets, usually 5 per leaf, one leaflet having a distinctly longer stalk (petiolule) than the others. Leaflets linear to oval, 5-10 cm long. Flowers purple, white, or pink. 0.5-1 cm long racemes. Seed seldom set in Canterbury and areas further south. A climber.

Hardenbergia spp.

2a. Leaflets linear (below left). 3

2b. Leaflets obovate (above right). 4

3a. A woody shrub up to 2 m tall.

Stems frequently red.

Leaflets linear, leaflet apices acute. Flowers 1 to 1.5 cm

long, pale yellow, cream, occasionally white, in racemes

10-20 cm long. A perennial of river beds, sand dunes and waste areas.

Lupinus arboreus
(tree lupin)

3b. Plants smaller than above,

0.4-1.5 m tall. Stems not usually red. Leaflets apices obtuse.

Flowers 1-1.5 cm long, normally blue, new cultivated varieties often white.

Lupinus angustifolius
(blue lupin)

4a. A woody shrub to 2 m tall.

Stems frequently red in colour.

Flowers 1 to 1.5 cm long pale yellow, cream, occasionally white in racemes 10-20 cm.

Lupinus arboreus
(tree lupin)

4b. Plants not woody, usually less than 1.5 m in height. Stems

not red. 5

- 5a. Plant 0.2-1 m tall. Leaflets hairy on both surfaces. Flowers 1 -1.6 cm long, golden yellow, scented. Seeds smooth, 6-8 mm x 5-7 mm.

Lupinus luteus
(yellow lupin)

- 5b. Leaflets not hairy on both surfaces. 6

- 6a. Leaflets 5-9 per leaf, not overlapping. Flowers blue and white mixed. Pods large 8-12 cm long. Seeds 0.9-1.5 cm long, more or less square and flattened.

Lupinus albus
(white lupin)

- 6b. Leaflets usually more than 7 per leaf, up to 10 cm long. Leaflets crowded on petiole, often overlapping. Flowers usually multicoloured, in long (10-30 cm) inflorescences. Stems very short and inconspicuous in vegetative plants. Plants perennial, dying back to stout crown in winter.

Lupinus arboreus x *L. polyphyllus*
(Russell lupin)

Acknowledgements

Dr W. R. Scott of the Plant Science Department, Lincoln College for allowing us to use his class to test this key.

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BOTANICAL AND COMMON NAMES OF PLANTS IN THE KEY.

<i>Calycotome spinosa</i>	spiny broom
<i>Carmichaelia</i> spp	N.Z. broom
<i>Chamaecytisus palmensis</i>	tree lucerne
<i>Chordospartium stevensonii</i>	weeping broom
<i>Cicer arietinum</i>	chickpeas
<i>Cliaanthus punicus.</i>	kaka beak
<i>Corallospartium crassicaule</i>	coral broom
<i>Coronilla</i> spp.	crown vetch
<i>Crotolaria agatiflora</i>	canary bird bush
<i>Cytisus multiflorus</i>	white broom
<i>Cytisus scoparius</i>	broom
<i>Erythrina</i> sp	flame tree
<i>Eutaxia</i> sp.	
<i>Galega officinalis</i>	goat's rue
<i>Glycine max</i>	soya bean
<i>Hardenbergia</i> spp	
<i>Hedysarum coronarum</i>	French honeysuckle
<i>Kennedia nigra</i>	black coral pea
<i>Kennedia rubicunda</i>	dusky coral pea
<i>Laburnum anagyroides</i>	laburnum
<i>Lathyrus</i> spp.	wild or sweet peas
<i>Lotus angustissimus</i>	slender birdsfoot-trefoil
<i>Lotus corniculatus</i>	birdsfoot-trefoil
<i>Lotus pedunculatus</i>	lotus major
<i>Lotus subbiflorus</i>	lotus subbiflorus
<i>Lotus tenuis</i>	lotus tenuis
<i>Lupinus albus</i>	white lupin
<i>Lupinus angustifolius</i>	blue lupin
<i>Lupinus arboreus</i>	tree lupin
<i>Lupinus luteus</i>	yellow lupin
<i>Lupinus polyphyllus</i>	Russel lupin
<i>Medicago arabica</i>	spotted burr medic
<i>Medicago arborea</i>	tree medic

<i>Medicago falcata</i>	lucerne
<i>Medicago lupulina</i>	black medic
<i>Medicago minima</i>	woolly burr medic
<i>Medicago polymorpha</i>	burr medic
<i>Medicago sativa</i>	lucerne
<i>Medicago scutellata</i>	snail medic
<i>Melilotus alba</i>	sweet clover
<i>Melilotus indica</i>	King Island melilot
<i>Melilotus officinalis</i>	yellow sweet clover
<i>Notospartium</i> spp	N.Z. broom
<i>Onobrychis</i> spp.	sainfoin
<i>Ononis spinosa</i>	restharrow
<i>Ornithopus</i> spp.	serradella
<i>Parochetus communis</i>	shamrock pea
<i>Phaseolus coccineus</i>	runner bean
<i>Phaseolus vulgaris</i>	french bean
<i>Pisum</i> sp.	peas
<i>Podylaria</i> sp	
<i>Robinia pseudoacacia</i>	false acacia
<i>Sophora</i> spp.	kowhai
<i>Spartium junceum</i>	Spanish broom
<i>Teline monspessulanus</i>	Montpellier broom
<i>Teline stenopetala</i>	
<i>Templetonia retusa</i>	
<i>Trifolium ambiguum</i>	Caucasian clover
<i>Trifolium arvense</i>	haresfoot trefoil
<i>Trifolium aureum</i>	yellow clover
<i>Trifolium campestre</i>	hop trefoil
<i>Trifolium cernuum</i>	drooping flowered clover
<i>Trifolium dubium</i>	suckling clover
<i>Trifolium fragiferum</i>	strawberry clover
<i>Trifolium glomeratum</i>	clustered clover
<i>Trifolium hybridum</i>	alsike clover
<i>Trifolium medium</i>	zig-zag clover
<i>Trifolium micranthum</i>	lesser suckling clover

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coral pea	15
crown vetch	38, 43
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dusdy coral broom	8
false acacia	39
field or broad bean	44
flame tree	16
French bean	22
French honeysuckle	45
goat's rue	45
gorse	7
haresfoot trefoil	31
hop trefoil	25
kaka beak	38
king island melilot	27
kowhai	38
laburnum	19
lesser suckling clover	34
lotus major	21
lotus subbiflorus	20
lotus tenuis	21
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Montpellier broom	19
N.Z. broom	9
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Persian clover	33
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restharrow	10
runner bean	15
Russell lupin	48
sainfoin	45
serradella	43
shamrock pea	30
slender birdsfoot-trefoil	20
snail medic	23
soya bean	22
Spanish broom	7
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suckling clover	25
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white clover	30
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woolly clover	33
yellow clover	34
yellow lupin	48
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