

Naturalised pasture legumes

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Introduction

There are a wide variety of pasture legumes that are naturalised in pasture systems in NSW, and that contribute to overall pasture and animal productivity. The majority of these are annuals, originating primarily in Eurasian countries with Mediterranean or temperate climatic conditions.

The occurrence of these species is often sporadic, both in terms of where they appear in the landscape and their density in pastures from year to year. While generally not as productive as commercially available species, naturalised legumes are usually very well adapted to the areas in which they grow, and may contribute significant quantities of nitrogen to pasture systems, enhancing overall pasture productivity and quality.

This Primefact outlines the most common naturalised legumes found in New South Wales pasture systems.

Cluster clover

Cluster clover (*Trifolium glomeratum*), also known as ball clover, is an annual legume, widespread on the slopes and tablelands of NSW. It does not frequently occur in soils of very low fertility, or on very coarse textured soils. It is one of the most productive naturalised clovers, providing moderate quantities of high quality forage prior to the commencement of flowering.

Cluster clover is a relatively prostrate species, rarely exceeding 20 cm in height. Leaflets and

stems are hairless. Leaves are a moderate size, with individual leaflets measuring 10–15 mm in length and 10 mm in width. Cluster clover is reasonably late maturing, flowering in mid–late spring in low and medium rainfall areas, and late spring–early summer in higher rainfall areas. Flowers are pink, cylindrical (up to 10 mm in diameter) and held close to the stem of the plant. Seeds are very small and yellow to light brown, with approximately 2,000,000 seeds/kg (smaller than balansa clover, at 1,400,000 seeds/kg).

Analysis of cluster clover collections held at the Australian Trifolium Genetic Resource Centre (ATGRC) shows that the hardseed content ranges from 51%–100% at maturity, with most lines containing 91%–100% hardseed. This high hardseed content makes cluster clover very persistent, meaning it will often be seen re-invading paddocks that have been cropped for several years. Research by Dear et al. (2003) found that the productivity of cluster clover was lower than sub clover, and fixed only low quantities of nitrogen (Figure 2a and 2b). Nevertheless, it is a valuable component of low input pastures.

Cluster clover is often confused with nodding clover (*Trifolium cernuum*); however, the flowers of nodding clover are much smaller, borne on stalks and appear to droop.



Figure 1. Cluster clover. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

Nodding clover

Nodding clover (*Trifolium cernuum*), also known as drooping-flower clover, is an annual legume, commonly found in higher rainfall slopes and tablelands regions of NSW. Results from limited research (Dear et al. 2003) indicate that the productivity and ability to fix nitrogen is similar to that of cluster clover, and significantly lower than that of commercially available species (Figure 2). Nevertheless, nodding clover is often an important component of low input pastures, and is tolerant of waterlogging.

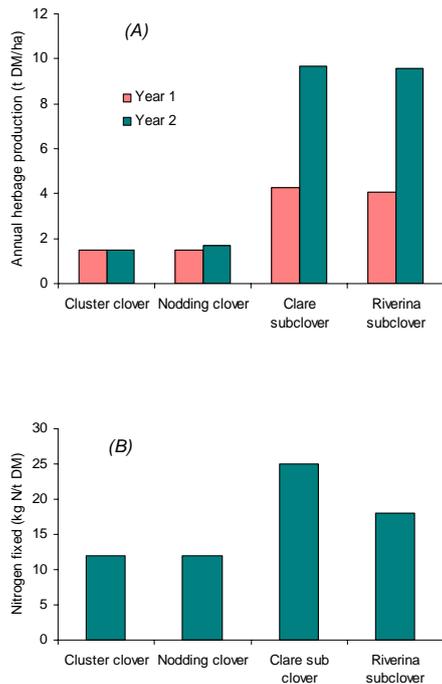


Figure 2. Herbage production over two years (A) and quantity of nitrogen fixed in the first year (B) by cluster clover, nodding clover and two sub clover varieties at Grogan, NSW.

Nodding clover plants rarely exceed 20 cm in height. Leaves are very similar in appearance to cluster clover. Flowers are very small (usually 2–3 mm), and pink in colour. The flowers are borne on a stalk and tend to droop downwards. Seeds are yellow and very small, with approximately 2,000,000 seeds/kg. Analysis of lines held by the ATGRC has found that the hardseed content of newly set seed ranged from 91%–98%. This characteristic ensures good survival, even after extended drought periods.

Knotted clover

Knotted clover (*Trifolium striatum*) is an annual legume, occurring most commonly in tablelands and slopes areas. It is similar in appearance to both cluster and nodding clover, but the leaves and



Figure 3. Nodding clover. Photo courtesy of Richard Snowball, Department of Agriculture and Food Western Australia – Pasture Science Group.

stems are covered in fine hairs, whereas both other clovers are hairless.

Knotted clover has pink, oblong-shaped flowers, usually measuring up to 10 mm in length. It is capable of moderate levels of production, but is usually present in pastures at lower densities than either cluster or nodding clover.

Seed is light brown in colour, with approximately 670,000 seeds/kg (seed size is similar to lucerne). Only a few lines of this species are held by the ATGRC. The hardseed content of these lines averages 40%.



Figure 4. Knotted clover. Photo courtesy Richard Snowball, Department of Agriculture and Food Western Australia – Pasture Science Group.

Haresfoot clover

Haresfoot clover (*Trifolium arvense*) is an annual legume. It is commonly found in NSW, from very low rainfall areas of the western division through to high rainfall tableland pastures. Its year-to-year occurrence is highly sporadic. In some years at some sites, it can be one of the most dominant species present, while in other years its density is very low. Haresfoot clover is well adapted to low fertility conditions and very coarse textured soils. It is not a highly productive species, but provides reasonable quality forage in late winter and early spring, if present in dense enough stands.



Figure 5. Haresfoot clover. Photo courtesy Richard Snowball, Department of Agriculture and Food Western Australia – Pasture Science Group.

Haresfoot clover is an erect-growing species, reaching heights of up to 25 cm. Leaves are small, with individual leaflets usually measuring no more than 15 mm long and 5 mm wide. Leaves and stems are hairy. While the plant has a favourable leaf to stem ratio in the vegetative stage, this rapidly declines once flowering commences, with the plant becoming woody. Flowers are very pale pink to cream in colour, cylindrical in shape, and measure up to 25 mm long and 10 mm in diameter. Flower heads appear fluffy. Seeds are very small and yellow, with approximately 2,000,000–3,330,000 seeds/kg. Testing of lines held at the ATGRC found that hardseed levels of newly set seed ranged from 88%–98%.

Hop clover

Hop clover (*Trifolium campestre*) is an annual legume found commonly throughout slopes and tablelands, and less frequently in drier western division areas of NSW. It is generally only found at low densities in pastures, and is not a very productive species. Hop clover is more common on roadsides than in grazed pastures. It is often found growing in coarse-textured soils of low fertility.

Hop clover is a prostrate plant, rarely growing taller than 10 cm. Leaves are quite small, with individual leaflets generally not exceeding 10 mm in length and 8 mm in width. The stalk of the centre leaflet is usually longer than the other two, and for this reason the plant is often mistakenly called a medic.

Flowers are dense, oval in shape and yellow in colour, usually not more than 10 mm in diameter. Seeds are very small, and yellow to light brown in colour, with approximately 5,000,000 seeds/kg (this makes it approximately one-third the size of white clover seed). Testing of lines held by the ATGRC found that hardseed content of newly set seed ranged from 88%–98%.

Hop clover is often confused with suckling clover (*Trifolium dubium*); however, hop clover flowers are larger and generally a paler yellow than those of suckling clover.



Figure 6. Hop clover. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

Suckling clover

Suckling clover (*Trifolium dubium*) is an annual legume, most commonly found on the tablelands and higher rainfall slopes of NSW. It is a prostrate plant, rarely exceeding 10 cm in height. While it may occur at reasonably high density in some pastures, productivity is low to moderate, and it has a high proportion of stem to leaf. Nevertheless, it is a palatable species that can provide useful feed in spring.

Suckling clover is similar in appearance to hop clover. As with hop clover, the central leaflet is on a longer stalk than the other two; thus, suckling clover is often mistakenly called a medic. The main feature distinguishing suckling clover from hop clover is the size and shape of the flower. Suckling clover flowers are very small (usually no more than 5 mm in diameter) and much more open than hop clover flowers. Flowers are yellow. Seed is light brown, with approximately 2,000,000 seeds/kg. Only a few lines of this species are held by the ATGRC. The hardseed content of these lines ranged from 26%–34%.



Figure 7. Suckling clover. Photo courtesy Brother Alfred Brousseau © 1995, St Mary's College of California, CalPhotos, University of California, Berkley.

Narrowleaf clover

Narrowleaf clover (*Trifolium angustifolium*) is an erect-growing annual legume that can grow up to 60 cm tall. It is most commonly found on roadsides in the slopes and tableland areas of NSW. It is also often found growing in pasture paddocks, but generally only on coarse-textured soils of low fertility.



Figure 8. Narrowleaf clover. Photo courtesy Eduardo Aguayo, Verdurbano Project, Chile.

Narrowleaf clover produces very little leaf, and is therefore of low grazing value. It becomes very woody with maturity.

Leaflets of narrowleaf clover generally measure 30–50 mm long, and usually no more than 5 mm wide. Leaves and stems are hairy. It produces spike-like flowers that measure up to 8 cm long and are very pale pink in colour. Seeds are light yellow, and measure approximately 2.5 mm long and 2 mm wide. Hardseed content is unknown.

Woolly clover

Woolly clover (*Trifolium tomentosum*) is a prostrate annual legume, found mainly in lower rainfall slopes and western division areas of NSW, especially on alkaline soils. It is not a highly productive plant, but produces palatable forage. It is most commonly found on soils that are prone to waterlogging.

Generally, leaflets do not exceed 10 mm in length and 8 mm in width. The tips of the leaflets are pointed. Leaves and stems are hairless. The most distinguishing feature of woolly clover is the flowers, which are initially pink, and become white and woolly with maturity. Seeds are green or yellow and small, with approximately 1,400,000–2,200,000 seeds/kg. Testing of lines held by the ATGRC indicates that hardseed levels of newly set seed range from 69%–100%, with most lines having 80%–100% hardseed.



Figure 9. Woolly clover. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

Spotted medic

Spotted medic (*Medicago arabica*) is a prostrate annual legume, which may grow up to 60 cm tall under good seasonal conditions. It can be found in low, medium and high rainfall regions, but is most common in higher rainfall areas. It is unusual for spotted medic to be found in heavily grazed

pastures. It is a common weed of lawns and gardens.

Spotted medic is a productive, late maturing plant that can tolerate some waterlogging. Field evaluation in southern NSW found that it was at least as productive as some commercially available medic species on poorly structured soils subject to periodic waterlogging (Figure 10). Spotted medic can also contribute significant quantities of nitrogen to pasture and cropping systems. Dear et al. (2003) found that it fixed an average of 22 kg N/t herbage produced across three sites in southern NSW. This was similar to the amount fixed by sub clover.

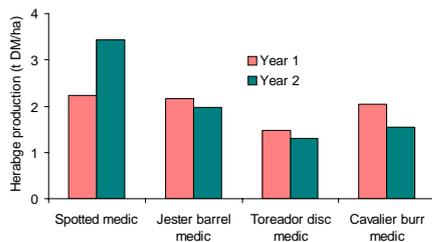


Figure 10. Herbage production of spotted medic and several commercially available medic species over two years at Cookardina, NSW (NB: herbage production of spotted medic is the average of 14 experimental lines).

The leaves of spotted medic can vary greatly in size, depending on growing conditions. Leaflets commonly range from 10–25 mm long, and are of a similar width. The central leaflet has a longer stalk than the other two. The upper surface of the leaflet is hairless, and most have a prominent dark spot. Flowers are yellow and quite small – generally no more than 5 mm. The seed pod (burr) is spherical and appears coiled, measuring 5–7 mm long with a similar diameter. Spines interlock the coils. Seed is light brown, with approximately 405,000 seeds/kg. Hardseed levels of spotted medic lines held by the



Figure 11. Spotted medic. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

Australian Medicago Genetic Resource Centre (AMGRC) averaged 95% in summer and 55% by late autumn.

Spotted medic burrs can cling to wool, increasing vegetable matter contamination; however, it generally does not occur in dense enough stands to cause serious contamination problems.

Spiny burr medic

Spiny burr medic (*Medicago polymorpha* var *polymorpha*) is a prostrate, early maturing annual legume that may grow to 50 cm tall under good seasonal conditions. It occurs commonly throughout NSW, and is especially common in low and medium rainfall areas with alkaline soils. Burr medic is a moderately productive species, and a valued pasture component in many areas, where it provides high quality forage, particularly in autumn and early spring.

In pastures dominated by spiny burr medic, burrs may contaminate wool, which can cause problems during processing.

Outbreaks of photosensitisation have been reported in pastures dominated by burr medic, particularly in early spring, when pasture is most actively growing.

The leaflets of spiny burr medic are generally hairless, and measure 10–20 mm long and 10–15 mm wide. They usually have serrations towards the tip. The central leaflet has a longer stalk than the other two. Stems are hairless, and often square



Figure 12. Spiny burr medic. Photo courtesy Ann Dennis © 2002, CalPhotos, University of California, Berkley.

in cross-section. Flowers are yellow and small. Burrs are disc-like or cylindrical, with 1½–5 coils. The burrs have prominent hooked spines. Seeds are yellowish brown and quite large, measuring up to 4 mm long, with 260,000 seeds/kg. Hardseed levels of spiny burr medic held by the AMGRC averaged 99% in summer, falling to 82% in late autumn. The high levels of hardseed make spiny burr medic a very persistent species.

There are commercial cultivars of spineless burr medic (*Medicago polymorpha* var *brevispina*) available, including Santiago, Scimitar[®] and Cavalier. These cultivars do not cause the wool contamination problems associated with spiny burr medic.

Cutleaf medic

Cutleaf medic (*Medicago laciniata*) is a prostrate annual legume, most commonly found in low rainfall areas that experience mild winters and have fine-textured soils. Cutleaf medic is very early maturing, and is capable of completing its full life cycle (from germination through to seed production and senescence) in 12 weeks. Cutleaf medic is not as productive as spiny burr medic, but is highly palatable to livestock.

Cutleaf medic is a very distinctive plant. Leaflets are wedge-shaped, usually with notched tips, and often with irregular edges that make them look as though they have been eaten by insects. Flowers are yellow, and usually less than 5 mm in diameter. Seeds are light brown, with approximately 640,000 seeds/kg. Hardseed content is high; testing of lines held by the AMGRC indicates that an average of 99% of newly set seed is hard in summer, declining to 65% by autumn.

Burrs are barrel-shaped, and up to 5 mm in diameter. The burr usually has 5–6 coils, and its surface is covered in hooks, which can adhere to



Figure 13. Cutleaf medic. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

the fleeces of sheep, reducing wool value.

Black medic

Black medic (*Medicago lupulina*) is a prostrate, spreading legume with stems that can measure up to 1 m long. It is found throughout NSW, and favours soils with neutral to alkaline pH in moderate to high rainfall areas. It can also occur in low rainfall regions, but in these instances it is usually only found in moist areas, such as drainage lines, irrigation ditches and road verges. It is generally an annual plant, but may behave as a short-lived perennial under favourable conditions.

Black medic is not a highly productive plant, and rarely forms a major component of pastures; however, the herbage it produces is readily eaten by livestock. Black medic has been suspected of causing photosensitisation in sheep if it forms a major component of pastures.

Black medic leaflets are generally 10–20 mm long, and can be pointed or slightly indented at the tip. The underside of the leaflet is hairy, and the upper surface may be hairy or hairless. Flower heads are yellow, generally less than 10 mm long, and made up of many small flowers clustered closely together. Flower heads become dark brown to black in colour as the plant matures. Pods are disc-like and contain a single oval to kidney-shaped seed. Seeds are relatively large, with approximately 475,000/kg.



Figure 14. Black medic. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

Woolly burr medic

Woolly burr medic (*Medicago minima*) is a very prostrate annual legume that is commonly found in medium and lower rainfall areas of NSW, particularly on neutral to alkaline soils. It is an early maturing species which, once germinated, is able to grow and set seed without follow-up rain.

Woolly burr medic is a very prolific producer of seed. Seed is smaller than that of other medic species, with approximately 810,000 seeds/kg.

Woolly burr medic is often seen re-invading paddocks that have been cropped for several years. It is able to do this due to its very high hardseed content (95% at maturity, 55% in late autumn) and ability to complete its life cycle quickly and produce abundant quantities of seed.

Woolly burr medic is not as productive as spiny burr medic, but the foliage it produces is highly palatable and readily eaten by livestock. Cases of photosensitisation have been reported in animals grazing pastures dominated by woolly burr medic.

Woolly burr medic has very small leaves; individual leaflets are usually 5–8 mm long and 2–5 mm wide. Flowers are yellow and very small, averaging about 3 mm in diameter. Burrs are cylindrical in shape, with 3–5 coils, and are covered in hooks. Burrs can cling to the fleeces of sheep, and, where high densities of woolly burr medic occur, this can result in a significant increase in vegetable matter content of wool, causing a reduction in wool value.



Figure 15. Woolly burr medic. Photo courtesy Steve Hughes, South Australian Research and Development Institute.

References and further reading

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Warnings

Pasture improvement may be associated with an increase in the incidence of certain livestock health disorders. Livestock and production losses from some disorders are possible. Management may need to be modified to minimise risk. Consult your veterinarian or adviser when planning pasture improvement.

Legislation covering conservation of native vegetation may regulate some pasture improvement practices where existing pasture contains native species. Inquire through your office of the Department of Natural Resources for further information.

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