



Lespedeza cuneata - Poor man's Lucerne

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Lespedeza cuneata is a shrubby, non-bloating leguminous pasture (Figure 1). *Lespedeza* is available as summer grazing, but it dies back in winter and is consequently of very little use as a winter forage. In addition to its nitrogen-fixing abilities, *Lespedeza*'s drought resistance and adaptability to low fertility soils characterize it as a low-cost pasture on poor soils where little success with other legumes can be achieved.

Lespedeza is endemic to the eastern parts of Asia where it is known as Chinese bush clover. Originally, it was exported to the USA and used in soil rehabilitation works, but gained popularity around 1940 when it was "discovered" by poor farmers as a low-cost pasture that was able to grow on acidic and low phosphorus soils, and hence acquired the name "poor man's lucerne".

General description

Lespedeza cuneata is an upright-growing, semi-woody shrub with an extensive taproot that makes it drought tolerant. New stems develop from the root crown buds in spring, which increase in number each year, resulting in large stands. The plants are also prolific seed producers (up to 900 kg seed ha⁻¹), but seeds are nearly impervious to water so they must be scarified to enhance germination. Without scarification, germination rates tend to be only 10 - 20%. The seed can easily be spread to other areas through the dung of animals or hay feeding.

Lespedeza cuneata is a tannin-containing plant. Tannins are a natural defence mechanism to protect

the plant against defoliation and pathogens, which is achieved by lowering the palatability of the plant (tannins have a bitter, unpleasant taste and leave a dry feeling in the mouth). Tannins also have negative effects on digestion of the consumed material, such as a slowdown in digestion, which leads to lower intake due to gut fill.



FIGURE 1: *L. cuneata*, a semi-shrub with multiple slender densely-leaved stems

When the tannin concentration [more specifically the condensed tannins (CT)] in the forage exceeds 55 g CT kg⁻¹ DM, palatability is compromised. However, moderate concentrations of condensed tannins (20 - 40 g kg⁻¹ DM) can enhance digestion by increasing the amount of bypass protein in the feed, thus encouraging more efficient use of protein during digestion. The tannins are also responsible for the prevention of bloat, which is a typical constraint in the grazing of many other legumes. Goats, due to their natural browsing habits, produce more protein-rich saliva during eating than sheep and are generally more tolerant of condensed tannins.

Cultivation

- **Environmental requirements**

Generally, 600 mm rainfall year⁻¹ can be taken as the lower cut-off point for successful cultivation. The lower the rainfall, the more important the choice of soils for cultivation; this is related to the water holding capacity of the soils to mitigate drought. *Lespedeza* can tolerate poor soils, ranging from very acidic to slightly alkaline and low in nutrients (such as phosphorus), but it will produce better on well-drained, fertile soils. Although *Lespedeza* is a legume, it has, compared to lucerne, a relatively low nitrogen-fixing rate but can supply itself sufficiently. It has been shown to raise the nitrogen content of associated grass.

- **Cultivars**

Older cultivars are known for their low palatability due to a high tannin content. Newer cultivars have been bred to contain a lower tannin content and are therefore associated with better animal performance. Although lower tannin-containing cultivars have, on average, a lower tannin content, tannin content varies between individual plants within a cultivar. More importantly, environmental conditions such as high temperatures and moisture stress will result in increasing tannin levels in plants, inducing lower palatability for the duration of such conditions. The low-tannin cultivars, without their natural defence mechanism against defoliation, are sensitive to overgrazing, which can eventually kill the sward.

AU Lotan and AU Grazer are the most popular cultivars in South Africa in de-hulled form. The cultivar AU Lotan is a lower tannin cultivar. Other cultivars that are sometimes locally available include Arlington, Serala, Gasyn and AU Donnelly, amongst others.

- **Seed and establishment**

It is important to procure de-hulled seed from a registered seed supplier. Seed must be inoculated before planting with the appropriate inoculant

containing nitrogen-fixing bacteria, otherwise the plant will be unable to fix nitrogen. Seed should be planted in a fine and firm, weed-free seedbed at a depth of 5 mm (never on top of the soil) at a seeding rate of 15 to 30 kg ha⁻¹. Rolling before and after planting supports germination. No-till establishment can be an alternative if the existing plant cover can be suppressed and good seed-soil contact is ensured.

Lespedeza is known to establish relatively slowly, having a rather weak, vulnerable seedling stage. It is preferable to plant *Lespedeza* during the cooler times of the growing season. Recommended planting times are in spring, thus avoiding the risk of late winter frost damage, or in late summer, when temperatures are cooler but allowing enough time for germination and establishment of seedlings before the occurrence of frost. Optimum temperatures for germination and growth are between 20 and 30 °C.

Weed control, especially broadleaf weeds and weed grasses, is of utmost importance during the establishment period and, if well-controlled, will shorten the period from planting to full production. The preparation of the seedbed well ahead of planting and targeted weed control (especially of the perennial grass, *Cynodon dactylon*, which can provide serious competition to young establishing seedlings) is valuable in this regard. Where weed control is a challenge, late summer planting may be the preferable planting time, when summer weeds are less competitive. Post-planting follow-up with chemical herbicides might be needed (enquire about registered herbicides for use on leguminous pastures).

Dry matter yield and quality

Total rainfall, and also the favourable distribution of rainfall over the growing season, will greatly affect dry matter (DM) yield. During wet years DM yields of up to 8 t ha⁻¹ are not uncommon, but mean yields of 5 t DM ha⁻¹ are the standard (Table 1).

TABLE 1: The mean DM yield of *L. cuneata* (t ha⁻¹) under different cutting regimes at Dundee and the Cedarville Flats. Both locations have an annual precipitation of ±700 mm and sandy soils.

Frequency of cutting during growing season	Yield (t DM ha ⁻¹)	
	Cedarville Flats	Dundee
6 weeks	Not available	4.16
8 weeks	5.7	5.76
12 weeks	7.1	6.71

Small stock tend to “browse” the plant and concentrate on the leaves (Figure 2).



FIGURE 2: Sheep selectively “browse” *L. cuneata*

As a result, ruminants select a diet better represented by leaf analysis than by whole-plant analysis, as illustrated in Figure 3. The leaf quality of *Lespedeza* shows an acceptable range for ruminants. However, the crude protein (<10%), ADF (>42%) and NDF (>60%) levels in the mature material (12 weeks and older) and especially whole plant analysis, are marginal.

During unfavourable climatic conditions, the condensed tannin (CT) levels in the plants increase, to above 100 g CT kg⁻¹ DM, inducing decreased palatability, unrelated to feed value.

Pasture management and animal production

The aim of management must be to maintain strong plants and to plan utilization around optimum palatability and feed quality. Due to the tannin content, livestock needs a few days to adapt to the pasture. They often show a preference for grasses when first exposed to *Lespedeza*, but, within a day or two, will readily start grazing. In a rotational grazing system, at least six weeks of rest between grazing cycles should be allowed, depending on weather conditions. Carrying capacity figures of 15 small stock units (SSU) ha⁻¹, with average daily gains of up to 90 g day⁻¹ SSU⁻¹, has been reported in sheep grazing systems.

Commencement of grazing in spring will depend on rainfall, but can start when regrowth reaches a height of 200 to 300 mm. Grazing too early will influence the long-term persistence of the sward. The more mature the material gets, the poorer the quality and the more selectively animals will graze, resulting in a high percentage of declined material. Due to the increased CT levels during moisture stress and the resultant lower palatability, *Lespedeza* is not a good option for grazing during dry spells.

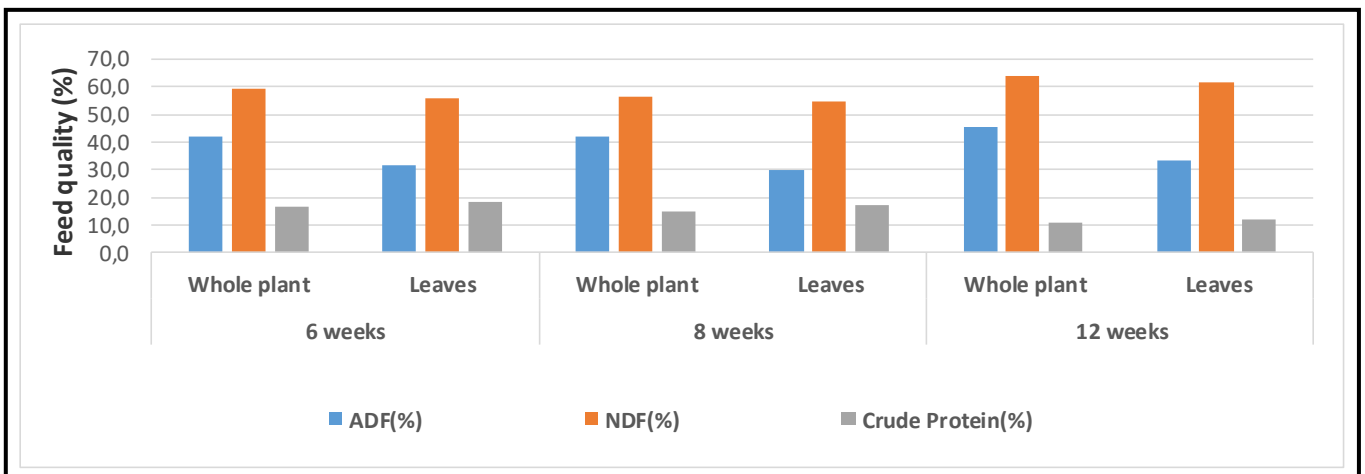


FIGURE 3: The mean feed quality of both the whole plant and the leaves of *L. cuneata*, measured by acid detergent fibre (ADF) %, neutral detergent fibre (NDF) % and crude protein %, as affected by different cutting frequencies.

For haymaking, cutting heights must not be lower than 100 mm. Due to the slender stems and leaves, it is possible to cut and bale on the same day if climatic conditions are favourable. The value of the hay lies in the leaf portion of the material. If baling is delayed, unwanted leaf loss is likely to happen. Mature material has an unfavourable leaf: stem ratio (up to 60% or more stem), resulting in very coarse hay. Sheep will readily select and consume the leaf portion in hay and refuse the coarser part, which results in wastage. It can be an option to open up *Lespedeza* bales, instead of feeding in a hay ring, to give sheep more freedom to select the leaves. Milling of hay is possible to decrease wastage, but this will decrease quality.

Anthelmintic properties

Tannin-rich forages, like *Lespedeza cuneata*, have proven anthelmintic properties with significant results reported regarding the reduction of gastrointestinal nematodes/parasites (GIN) numbers, egg output, and hatchability of GIN, when small stock consume these forages. Especially during wetter periods, when GIN challenges are high, *Lespedeza* grazing will suppress parasite infection in small stock.

The mode of action of condensed tannins on GIN is both direct and indirect.

The direct effect involves:

- CT bonding with the cuticle that covers the nematode body, causing the inhibition or delaying of the exsheathment processes of the larvae, after ingestion by the host.
- Lining certain parts of the digestive tract and reproductive system of the nematode resulting in repressed reproductive activity.

The indirect effect of CT on GIN involves the replenishment of the extensive endogenous protein losses that occur during gastrointestinal parasitism,

through the enhancement of the amount of bypass protein, therefore improving host homeostasis.

The shrubby growth form of *Lespedeza* limits the reinfection of livestock by internal parasites during the same grazing cycle. The infectious parasite larvae migrate from the protective soil level layers during favourable climatic conditions, moving up and down plants to position themselves at the most advantageous spots for ingestion by feeding animals. Due to the shrubby structure of *Lespedeza*, the larvae cannot reach the “grazing height” at which animals browse the leaves of the *Lespedeza* plant, therefore limiting reinfection.

Conclusion

Despite some constraints, *Lespedeza* has significant potential as a dryland pasture, by its being a legume, which implies lower fertilizer costs, and its adaptation to poor quality soils. Strategic incorporation into a fodder flow plan can also exploit the valuable anthelmintic properties.

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