

# Consol lovegrass

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## Introduction

The Consol cultivar of African lovegrass (*Eragrostis curvula*) is a hardy perennial grass with special attributes as both a pasture plant and a soil binder. Its main growing season is from mid spring to mid autumn.

Consol (mature seed head shown right) was developed in the 1980s by the Soil Conservation Service of NSW for revegetating sites which were too harsh for other perennial grasses. Trial plantings have persisted in areas where the climate and soil types are unsuitable for species such as lucerne, phalaris and pigeon grass. The results showed that Consol can make a valuable contribution to sustainable land use.

Consol is best suited to areas in New South Wales with a 400–700 mm average annual rainfall. It is sown more widely in northern and central NSW than in the south, mainly because Consol responds well to summer rainfall which occurs more reliably in these districts. During drought Consol stays green longer than buffel grass, Rhodes grass and lucerne, and unlike most other summer grasses, its top growth survives frosting. It is not permissible to sow Consol in areas of NSW where African lovegrass is a declared noxious weed (see under '[Sowing approval needed](#)').



Figure 1. A mature Consol lovegrass seed head (Photo: W Johnston)

Consol grows best in lighter soils but is suited to a range of others, from sands to loams. It is particularly useful where the soil is too acid for grasses such as phalaris and cocksfoot, or too impoverished for species like buffel grass, Rhodes grass and lucerne. It has performed well where pH(CaCl<sub>2</sub>) is as low as 4.1 and where aluminium levels are high (up to 30% of cation exchange capacity).

Consol is not suited to soils that crack open after they dry, such as black earths or heavy clay soils, because cracking disrupts the fine surface root system of Consol, which can kill established plants.

Consol is suitable for grazing by sheep, cattle and horses. Its fresh growth is highly palatable, and its nutritive value is moderate to good, but for grazing use it requires at least moderate soil nitrogen. This can be supplied by fertiliser or, preferably, by growing it with a companion pasture legume such as serradella, medic or subterranean clover. Although Consol needs high levels of soil nitrogen for maximum growth, it does not require high rates of applied phosphorus. However, for legumes to grow successfully with Consol, soil deficiencies such as phosphorus, sulfur and molybdenum must be corrected.

### Description

Consol lovegrass forms a compact tussock which, over several seasons, increases in diameter to form a ring of independent plants with independent root systems.



**Figure 2. The tussock formation that is characteristic of early growth (Photo: W Johnston)**

In peak growing conditions the stems and leaves growing from the tussock base will eventually obscure it, much as the tussocks of an unmown lawn are hidden. When the stems and leaves die off, either because of drought or at the end of the growing season, new buds form in the tussock. These grow as conditions become increasingly favourable.

Consol is easily recognised by its flowering stems, which are short (300–600 mm), erect and stiff, and by its conical flower heads consisting of stiff lateral branches and heart-shaped florets, which are the flower parts that hold the seeds. Its leaves are also stiff and somewhat erect, 150–250 mm long, tapering to a point which may curl and die in extremes of temperature.

The leaves, stems and seed heads are dull green to blue-green. In summer, the leaves and stems become waxy blue-green in response to moisture stress and high temperatures, and the leaves roll inwards to reduce water loss.

Consol seeds are very small (3.5 million to 5 million per kilogram), oval, golden to orange coloured and translucent. A ripe seed breaks easily and cleanly from the husk. The seed of Consol is similar to most other lovegrass seeds, although the seeds of some native and annual varieties are smaller.

Pollen produced by Consol during flowering may cause an allergic reaction ('hayfever'), thus when harvesting seed or handling hay it is advisable to take precautions against pollen and dust.

### Uses

#### Stock use

Consol is palatable to most classes of livestock. Normally grown with companion cool-season legumes, Consol provides good summer pasture (pictured below) for sheep, cattle and horses. Observations from trial sowings of Consol in New South Wales indicate that the performance of both sheep and cattle is equal or superior to that of stock grazing other summer pastures. At Binnaway (Central West, 600 mm annual rainfall), a landholder with a 500 ha trial sowing recorded a 20% improvement in animal productivity over four seasons. Grazing experiments at Wagga Wagga in southern NSW have shown that during summer, the carrying capacity and liveweight of wethers grazing Consol were similar to those for grazing lucerne, and superior to grazing phalaris.



**Figure 3. A close-up of Consol lovegrass pasture**

Consol will also add substantially to spring and autumn feed. In medium rainfall areas in New South Wales, the total feed yield over the three seasons has been recorded at over 6000 kg of dry matter per hectare per year.

Grazing promotes the cycle of nutrients, particularly nitrogen. The nutrients keep the sward active, promote new growth and maintain feed value, and grazing controls the leaf area, keeping the sward actively growing for longer into the summer.



Figure 4. Consol summer pasture at Coonabarabran

Like most summer-growing grasses, if Consol forage is allowed to build up and mature, its feed value and palatability declines markedly. Studies in southern NSW have shown that 4-week-old forage is much more acceptable than material accumulated for more than 6 weeks. To make the most of Consol, it should be grazed when the total pasture mass reaches about 2000 kg/ha. It should then be grazed down to about 800 kg/ha over a period of about 2–3 weeks. Forage accumulated to meet an autumn feed gap should be grazed heavily in late February so that its feed value is maintained for mid to late autumn, and to encourage early germination of annual grasses and legumes.

Continuous grazing should be avoided. Prolonged overgrazing can uproot the plants, so it is important to check that newly established plants are well anchored before grazing them. Avoid grazing pastures to less than 800 kg dry matter per hectare. It is often noted that cattle and sheep will selectively graze seed heads in early summer. This may reduce seed yields considerably. Although Consol plants are long-lived, it is a useful strategy to allow Consol to set seed occasionally in order to maintain seed reserves in the soil. Closing off paddocks for 6–8 weeks in mid spring is enough to allow seed set. Seed will set throughout summer and until the first frost.

Consol also serves as a pasture after a cropping sequence.

Lovegrass varieties have been used since the 1930s for livestock production in South Africa, Argentina and the USA, especially in western areas of Texas and Oklahoma. Overseas results indicate weight gains as high as 1.0 kg per beast per day for cattle fed on nitrogen-fertilised lovegrass.

#### Soil conservation and weed control

Consol is a persistent plant in difficult environments such as roadside embankments, contour banks, mine sites and gravel pits. It will grow on shallow skeletal soils or sites where the soil is disturbed, on sand ridges, and in horticultural rotations where windblown sand is a problem. It persists on 'hard' country, such as stony ironbark ridges.

It will also serve as a ground cover for an established crop, for example, an orchard or vineyard, or as a ground cover for pastures which are degraded, overgrazed or fire-ravaged.

Consol controls invasion by weeds. A vigorous grower, it competes successfully against spiny burrgrass and broadleaf summer-growing weeds such as blue heliotrope or caltrops.

Consol allows for a more flexible revegetation schedule, as its seed may be sown at most times of the year.

#### Reduced soil acidity

Unlike most other pasture species, Consol tolerates soil acidity. Acidification of lighter soils is common, for example, with legume-based pasture improvement; the inclusion of a hardy perennial such as Consol, with its deep rooting habit and appetite for nitrogen, should slow the acidification rate.

#### Water use and salinity control

Consol's deep roots and summer growth rhythm give it a water use ability similar to lucerne. Controlling salinity is related to the capacity of pastures to dry the soil before the onset of the winter wet season in southern and central districts, and while the evaporation rates are high in northern areas. The main advantage of Consol compared to lucerne is that it will grow and persist in areas where lucerne could not be recommended, either because of soil or climatic limitations, or due to lack of control over grazing.

#### Sowing

Because Consol seed cannot be easily identified from the seed of unpalatable naturalised lovegrass, it is essential to use only certified seed. Certification is the only protection growers have against impure seed. Some lovegrasses are highly unpalatable.

## Sowing time

Consol can be sown successfully at any time in areas where winters are mild, even if rainfall is highly variable — for example, in north-western New South Wales.

In the southern part of the state the best sowing time is early spring, when the store of soil moisture is at its best, rainfall is reliable and soil surface temperatures are rising. Also, competition from cool-season plants can be better controlled if preparations for sowing commence in late winter.

In areas of high summer rainfall, for example on the Northern Tablelands and adjacent slopes, Consol is most commonly sown in late summer to early autumn.

It is common for seed not to germinate with the first rain after sowing. In trial sowings, seed has been dormant for up to 2 years. Storing seed for 6–18 months may assist early germination and uniform growth.

Consol sown in spring or summer should be oversown with an annual legume the following autumn, while autumn-sown Consol should be concurrently oversown: in the Coonabarabran district (north-western New South Wales), mixed Consol and legume pastures have been sown in early autumn.



**Figure 5. A mixed pasture of Consol lovegrass and sub-clover, at Wagga (Photo: W Johnston)**

The autumn-sown clover, shown here at early germination stage, provides winter feed and boosts nitrogen levels in the soil (Consol thrives on nitrogen). By late winter or early spring the clover will dominate.

Alternatively, autumn-sown Consol may be oversown with a cereal crop. While some seed may establish and survive from early autumn sowings, low temperatures will prevent seed used in mid to late autumn sowings from germinating until spring. If sowing with cereals, ensure sowing depth is satisfactory for lovegrass seed (see 'Sowing, germination and establishment' below).

## Seeding rates

The recommended Consol seeding rate is 0.3 to 1.0 kg/ha. Rates lower than 0.3 kg/ha are applicable only in ideal, weed-free growing conditions. A rate greater than 1.0 kg/ha can produce a stand of grass that is too dense, in which individual plants compete against each other; they will not grow to full size and will suffer moisture stress earlier because of competition for a limited supply of moisture.

## Sowing, germination and establishment

Direct drilling, or broadcasting and harrowing, is generally effective in uncultivated, relatively weed-free, loose soil. Establishment will be slowed if there is shading and competition from other plants. For example, if broadcasting seed into killed pastures the stubble must be heavily grazed.

Sowing depth is a major factor affecting establishment. Most establishment failures have been due to sowing too deeply. It is important not to bury seed deeper than about 5 mm in sandy soils, and 2–3 mm in loamy or clayey soil. The most critical factor in accurately setting the sowing depth is to set it in the paddock, remembering that most sowing equipment 'digs in' when the soil is soft and friable. The best technique is to drop the seed mixture onto a fairly even soil surface and cover it using light covering harrows or press wheels. (Turning the harrows upside down may often give a better result on loose sandy soils.) A band seeder adjusted to ensure shallow sowing can also be used. Press wheels or rollers may be useful in loose soil, but sow on the contour as far as is practicable.

A seed carrier such as single superphosphate, dry coarse sand, cracked wheat, moist sawdust, or cracked sorghum helps to achieve uniform distribution during sowing. The carrier must contain a fair proportion of fine particles, otherwise the Consol seed will quickly separate. Rather than sowing large areas at a time, if separation is observed, the machine should be refilled often. Sowing equipment should be calibrated to deliver the correct proportions of seed and carrier, thoroughly mixed.

Consol is best sown in rows 10–30 cm apart — use narrow rows in spiny burrgrass country.

Seed requires a minimum soil temperature of about 10°C (to be read at 7 cm depth, at 8 am EST). Higher average temperatures increase the rate of germination. The rate peaks at about 20°C.

In the first few weeks, Consol seedlings grow very slowly, developing their root systems and preparing to tiller. When they tiller at 6–8 weeks, the seedlings should be well established and drought hardy. Under reasonable conditions, the first seed heads show in 10–12 weeks.

## Weed control

Established stands of Consol are relatively weed free; however, weed control may be a problem in the sowing year as Consol seedlings are not as competitive or fast-growing as most annual weeds.

In favourable growing conditions with adequate soil fertility, good moisture and warm temperatures, good spring growth of sub. clover and ryegrass can severely suppress Consol pastures as they compete for moisture and light. Grazing management should aim to keep the temperate species under control.

For spring-sown pastures, broadleaf weeds are more likely to be a problem than grass weeds. Autumn-sown pastures may have to compete with ryegrass and clover.

Grazing can control weeds during establishment of the seedlings. Heavy stocking for short periods reduces pasture damage and minimises selective grazing of the seedlings.

No herbicide is registered for controlling weeds in lovegrass pastures in New South Wales.

## Sowing approval needed

African lovegrass (*Eragrostis curvula*) is a declared noxious weed (category W2 or W3) in many areas of New South Wales.

Consol is a registered cultivar, and is palatable when well managed. It can be distinguished from unpalatable naturalised strains of the species, and is not known to cross or hybridise with other native or naturalised lovegrasses.

However, it cannot be sown without approval in some local government areas of the state. Before sowing Consol, ensure that the location in which it is to be sown is not in a local government area where African lovegrass is a declared weed.

## Seed production

Consol lovegrass is a long-lived perennial seed crop; if well managed the stand should persist.

Yields in the first year are often low, stands may thin considerably and there may be significant weeds present. If plant density is reasonable (about 10 per square metre), the plants will compensate by growing larger and will quickly fill in bare areas. Seed crops in following years should be more productive.

Soils should be well drained, light textured and non-cracking, with pH of about 6 or less. Soil fertility is usually not a major problem provided sufficient fertiliser is applied.

Management of the crop should aim to have the seed crop maturing as evenly as possible. This is achieved by correct timing of burning, slashing, irrigation and fertilising operations.

## Burning

Lovegrass seed crops are often burnt as a management strategy. Burning will remove the bulk of dead residue from the previous season and stimulate initiation of flowering stems. Ninety per cent of spring flowering seed heads are initiated in the autumn, and timing of burning should aim to leave as many of these as possible. For environmental reasons burning should be restricted to every couple of years in cool periods when the risk of uncontrolled fires developing is low. Lovegrass is highly tolerant of burning and highly flammable. Burning will help to control winter weeds.

Seed crop management should aim to produce seed heads with uniform maturity. Good seed crops are about 90 cm high with more than 800 seed heads per square metre. However, successive rainfall events usually stimulate more tillers and the seed crop may vary in maturity from mature seed heads to newly emerged tillers.

Seed in early tillers will most likely shatter before harvest, while seed in late seed heads will be immature and high in moisture at harvest time. Late tillers contribute little to the harvested yield.

## Irrigation

Irrigation is beneficial for high yields and reliable seed production, although most seed production is based on dryland stands. Avoid areas subject to overwatering and poor drainage as it can lead to plant death, thin stands and weed invasion. Irrigate to provide a full soil moisture profile for at least 1.2 m. Under dry seasonal conditions, more than one irrigation may be required to fill the profile. Following irrigation, allow the seed crop to exhaust the soil moisture reserve, by which time the crop should have finished flowering.

Usually one irrigation is sufficient to grow the crop. Further irrigations will stimulate more tillers and uniformity of the seed stand will suffer.

## Fertiliser

**Irrigated.** For optimum yields, under irrigated conditions apply adequate nitrogen fertiliser. At least 50–150 kg/ha of nitrogen is recommended, applied in one application in early spring after burning in the autumn or winter.

**Dryland.** Apply about 50 kg/ha of nitrogen to dryland stands after burning. Higher rates of nitrogen on dryland stands may promote excessive vegetative growth and the plants may use too much soil water before seed has filled, causing seed quantity and quality to decline.

Applications of other fertilisers like phosphorus, potassium and sulfur should be based on soil and crop requirements and previous paddock history.

## Harvest

Consol lovegrass produces seed heads over a protracted period and if additional rainfall stimulates more tillers to grow, it can be difficult to decide when to harvest the crop. If management has enabled a single flush of seed heads, harvest should begin when seed in most of the seed heads has changed to light brown. The seed should be easily rubbed out by hand, and loss from shattering should be less than 10%. The plant is still green and actively growing when seed matures. Ripening takes 8–10 days and the seed head darkens to an olive-green colour from the tip downwards. Seed colour changes from white to whitish-brown, to orange and finally to light brown. Seed should be harvested immediately. Maximum yields occur about 21–28 days after flowering.

Delayed harvest, winds and rain can cause considerable shattering and cause seed to fall from the head.



**Figure 6. Agronomist Kevin Morthorpe examines a Trangie seed crop ready for harvest, as indicated by the olive-green seed heads and height of the crop (about 90 cm).**

Consol lovegrass seed crops are normally direct headed with a conventional header. Rotary headers generally produce seed with higher seed quality than those headers with transverse drums. Seed heads are normally well extended 45 cm above the last leaf and the crop is easily harvested.

Consult the manufacturer's manual for harvester settings. As a guide, start with a high drum speed with the concave well closed. Close the air inlets to the fan, as sufficient light air flow is normally provided by the drum. The header operator should be prepared to adjust these settings during the day depending upon moisture of the crop, humidity and temperature of the air. Harvester ground speed should be low. Harvesting during early morning should reduce losses caused by shattering.

The harvester will not separate seed from crop residue. Due to the high moisture of the harvested

seed and crop residue it may be difficult to empty the header box. To prevent blockage of the augers, seed should be emptied from the header box at regular intervals during the day, preferably before the box is about one-quarter full.

Crops may be windrowed and picked up by a header with a draper front attachment. This strategy will avoid potential seed losses by windstorms and heavy rainfall, resulting in more seed. However, other grass and weed seeds such as couch could be picked up. Seed purity of windrowed crops is normally lower than for direct headed crops, and for this reason the procedure is rarely followed.

If seed crops are windrowed, they should be cut about 21–28 days after flowering or about 52 days after slashing.

Immediately following harvest, the seed and crop residue should be dried to prevent seed quality deterioration. In inland areas with low humidity, seed is often dried on tarps on the ground by spreading the seed and residue about 100 mm deep and turning it every 2 hours for the first day and then regularly thereafter to avoid any hot spots developing. Turning the seed can be as simple as raking or using an engine-driven rotovator.

Forced-air drying is commonly practised in more humid environments.

The simplest form of forced-air drying is aeration using a fan to move air at normal humidity and temperature. Turning the seed is still necessary to avoid heating of the seed. Most air dryers will begin drying using ambient air temperatures for the first couple of hours. Often inland humidity of 30%–40% and temperatures of 20°C are sufficient for drying if the seed is turned regularly. Using this method, drying normally takes about 7–10 days.

## Seed yields

Most commercial seed is produced from dryland stands, and average yields are in the order of 50–150 kg/ha. The highest recorded commercial yield (at Rylstone in Central West NSW) has been 238 kg/ha from 12 ha under irrigated conditions.

## Seed quality

Seed losses can be high if there are heatwave conditions at flowering or during seed formation prior to harvest.

Consol lovegrass seed usually has seed dormancy with moderate levels of fresh ungerminated seed in a seed test immediately after harvest. Dormancy may be reduced by placing seed in a cooler at 7°C for 7 days (called vernalisation). Seed test results quote the percentage of fresh ungerminated seed.

## Further information

Further information and advice is available from the district agronomist at your local office of NSW Department of Primary Industries (NSW DPI).

### Note: Livestock health disorders

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.

### Native Vegetation Act 2003

The *Native Vegetation Act 2003* restricts some pasture improvement practices where existing pasture contains native species. Inquire through your office of the Department of Natural Resources for further details.

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