The growing points of grasses are protected against defoliation.

Broad-leaved plants have to resprout from growing points further down the stem.

Grasses of some species can live for many years if not defoliated

The 3 'P's of the best grasses— perennial, productive, palatable

Grasses and grazing — basic ecology

The main native grasses are summer-growing species that have evolved under conditions of strongly seasonal rainfall, low to moderate fertility, light grazing and regular natural fires.

The most important grasses for the northern pastoral industry are tussock species, such as Mitchell grass, bluegrasses and ribbon grass, with each tussock made up of many separate shoots or tillers. Spinifex is regarded as a hummock species; creeping grasses invade in higher rainfall regions under heavy grazing. Some introduced grasses have naturalised over large areas, for example Cloncurry buffel and birdwood grass on red country around Mt Isa and Halls Creek.

Grasses are nature's selection of plants that can tolerate defoliation. Their growing points, at the base of each leaf, are well protected when the plant is grazed or burned.

Broad-leaved plants, on the other hand, grow from the tips of their shoots, and have to form new shoots when these are removed. Shrub and trees are woody broad-leaved plants; the non-woody ones are called 'forbs'.

Forbs may make up 20–40% of the diet of cattle on native pasture, and can be a valuable source of minerals. They include native and naturalised legumes that provide high protein feed. Some forbs are poisonous.

How long do grass plants live?

Some grasses, such as those colonising scalds or bare spots, are ephemeral or short-lived. They can germinate, flower and seed within six weeks.

Annual plants live for one growing season only; they seed heavily and then die. Some (mainly small) annuals invade overgrazed pastures from which the perennial plants have disappeared. Others are plants well adapted to the strongly seasonal pattern of rainfall; annual native sorghum grows during the intense wet season, but survives the long dry period as seed in the ground.

The most valuable grasses for grazing are the perennials which have variable life spans. Mitchell grass tussocks can live for decades whereas bluegrass plants may live for less than four years. The individual tillers and roots of a perennial may come and go, but the tussock remains. All perennials must accumulate reserves of carbohydrate so that they can send up new shoots after a period of dormancy during the long dry season.

Pastures containing perennial grasses are more stable under grazing.

What controls grass growth?

In the north, growth is obviously controlled mostly by moisture—low temperature is of minor importance.

Growth starts rapidly once the wet arrives, and grasses shoot away using their reserves or from seed. They grow rapidly on nitrogen mineralised in the soil during the dry season but, on poor soils and in very wet years, this is soon exhausted. Growth slows, and the protein levels in the plant are diluted. When the plant averages 0.6% N, growth stops. The result can be a 'green desert'—it looks good but is actually a great bulk of low-quality, poorly digested, feed.

The grass plant sends up a flower head that needs protein; from this point, protein levels in the leaf drop even more rapidly. To support the weight of the developing seed, the seed stalk lignifies or becomes woody.

The turning point for pasture growth and quality depends on the season but is often around mid-February. However with low stocking rates, cattle can select better quality shoots and continue to gain weight well into the dry season.

Great bulk, but a 'green desert' of poor quality herbage.

When do grasses flower?

Some grasses can flower at any time following a growing period. However, in many annual and perennial native species flowering is triggered by certain lengths of day in autumn—or even in late spring if there has been sufficient early rain. All native grasses must be allowed to drop seed periodically for regeneration.

Another product of dry, indigestible fibre.

All native grasses must be allowed to drop seed periodically to regenerate.

How long can seed survive in the soil?

Seed of many grasses is dormant for several months after it is shed; this 'protects' the species from a late or untimely germination.

Seeds rarely last for more than three years in the soil—usually for less than one. Some pointed seeds with twisting awns, such as those of kangaroo grass and black speargrass, can bury themselves point-down into the soil and avoid surface fires. Fluffy seeds of the bluegrasses and long-awned seeds of the wiregrasses that rest on the soil surface are more likely to be destroyed by fires. Many seeds are taken by seed-harvesting ants, while others rot under moist conditions in the next wet season.

Hard-coated seeds of forbs, including those of legumes, can survive for years. Legume seeds often have impermeable coats that allow water uptake only after they have been scratched or heated.

Annual grasses must drop seed to come back next year.

Changes under heavy grazing

When are grasses most susceptible to grazing?

A grass is most susceptible to grazing when resprouting after the dry season or after a fire.

A grass plant is most susceptible to damage when relying on its reserves to produce new green leaves—'green pick'. Until it has enough leaf for productive photosynthesis, a plant will be weakened by grazing.

In the monsoonal tropics, this stage usually lasts for only a short time because the grass grows quickly and stocking rates are low. However, pasture can be damaged if stock concentrate on a small area that has been burnt or that has received rain from a local storm. Stock can clean up green pick over a large area if it has received little follow-up rain.

Stock may also concentrate on certain 'sweeter' pasture or land, often on some lighter soils carrying annual species.

Under continued heavy grazing, the tops and root systems of palatable perennial grasses become smaller, the rate of growth slows, and fewer tillers produce less seed. Persistent heavy grazing for just two years can kill some plants; less palatable grasses or weeds will invade the open space.

The root system, as well as the top growth, of a grass becomes much smaller under constant heavy grazing. This small root can not respond well to rainfall.

The new unpalatable grasses grow larger, taking more and more of the soil moisture and nutrients, and setting more seed.

Cattle seek out the few remaining good grasses, further increasing the grazing pressure on them. The pasture gradually changes its composition with more unpalatable perennial grasses (such as wiregrass), or more annual grasses (such as Kimberley couch).

Another major change results from the lack of fuel to carry a hot fire.

How does fire affect grassland?

A hot fire will remove the old dead leaf of grasses, but generally will not destroy the growing points. Conversely if a fire destroys the top growth of a shrub, the plant loses all its growing points and has to send up new suckers from the undamaged base or roots, or to regenerate from seed.

Thus, fire tends to keep vegetation as grassland or open woodland. Regular hot grass fires will stop trees and shrubs encroaching or thickening—but they are always waiting to return.

What happens without fire?

Without periodic hot fires, seedlings of shrubs and trees tend to keep growing. They soon compete strongly against the remaining grasses for soil moisture, often resulting in bare soil under and around shrubs. This puts further pressure on the remaining grasses, and the downward spiral progresses.

Ungrazed grass becomes rank and is avoided by stock; this old growth ties up plant nutrients so that eventually the pasture ceases to grow and becomes moribund. Cattle concentrate on the grazed areas with more green shoot.

What sort of pasture is best?

You should try to manage your grazing to keep the '3P' grasses—perennial, productive and palatable.

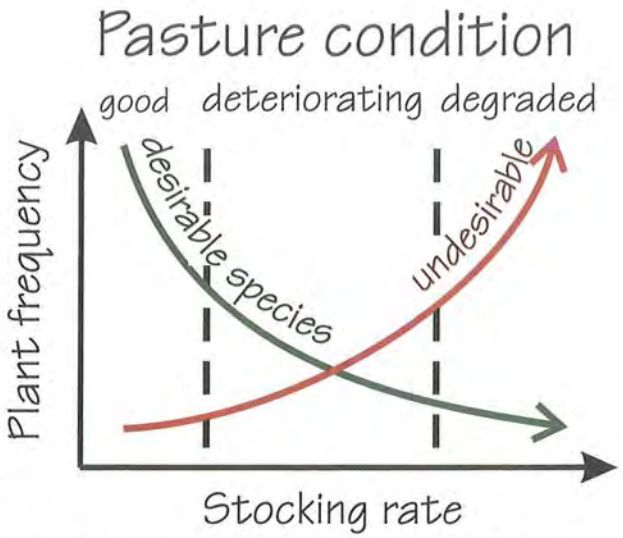
You tend to lose these species if you are heavily stocked; so lower stocking rates are likely to benefit the the pasture, the land and the cattle.

The best quality native pasture grazing is where good soils, moderate rainfall and few trees ensure good production, for example on the Mitchell grass downs of the southern VRD, the Barkly Tableland and the Kimberley.

Which species do cattle prefer?

The preferences of stock may change during the year. They often prefer forbs and small annual grasses (including, in various places, chloris, limestone grass, Flinders grass) early in the season, then the taller grasses before they flower. The bluegrasses, with fine leaf and stem, and Mitchell grass are preferred during the dry season.

Cattle may graze annual grasses and soft spinifex on the hills during the wet, leaving seasonally flooded or waterlogged flats for grazing during the dry season.



The condition of a pasture declines as the 3P species are lost and less desirable species increase.

Without defoliation, grass leaves become blackened and inedible after one wet season.

Savannah grassland in the Victoria River District provides some of the best grazing in the north.