

B5.3

Vegetative ground cover

Seed mixture The preferred seed mixture varies from district to district and season to season. Local advice should always be sought. There are various classes of grass as described below.

- **Care should always be taken when introducing any new vegetation near a watercourse.** This especially applies to the introduction of vines or other plants that may be locally classified as woody or environmental weeds. However, introduced grasses can also be a problem along many creeks.

When conditions allow, mat-forming grass species like couch and kikuyu should be used in medium to high velocity areas, such as floodplains and grassed channels. However, kikuyu and paspalum are very invasive and habitat modifying; couch/bermuda, rhodes and carpet grass can also dominate degraded areas. Local advice should always be taken when selecting introduced grass species.

Legumes may be introduced in conjunction with grasses. The advantage is that they tend to have deeper root systems and can add nitrogen to the soil.

Biennial grasses A biennial plant is a plant whose life cycle extends for two years. The first year it produces roots, stems and leaves. In the second year it flowers, produces fruits and seeds for future regeneration, then dies.

Cover crop A cover crop is a temporary, fast growing vegetative cover grown to provide protection for the soil during the establishment phase of slower growing plants. The latter are introduced by under-sowing and in due course provide permanent vegetative cover to stabilise the area concerned. The term can include an *Intermediate Crop* that can be removed with selective herbicides.

Cover crops are used on areas where it is uneconomical use specialised mulching equipment, where supplementary watering is impossible and/or where topsoil availability may be limited. They can also provide temporary erosion control on stockpiles.

Perennial grasses A plant whose life cycle extends for more than two years and continues to live from year to year.

Native grasses Native grasses have many desirable ecological attributes compared to



exotic species (Hunt 1992):

- natives generally use less soil moisture;
- some of the most common native grasses are deep-rooting perennials and are therefore more drought resistant;
- they do not require applied fertilisers for maximum growth and are suitable for low fertility soils;
- they are less prone to weed invasion when planted in low fertility soils;
- native grasses are generally slower growing and require less maintenance;
- the flowers and leaves of many native grasses provide a wide range of colours and textures suitable for general landscaping use; and
- native grasses provide food and habitat for a variety of indigenous animals and insects.

Seed and turf placement

There are eight basic methods used for seed or turf placement of grass:

1. *hand seeding*: includes hand broadcasting, spot seeding and sprig planting;
2. *drilling*: the direct placement of seeds into the soil;
3. *broadcasting*: dry-spreading seeds over the soil surface;
4. *sprigging*: mechanical spreading of turf or grass sod;
5. *hydroseeding/hydromulching*: jetting of seeds in a water-based slurry;
6. *seed mats*: specially prepared mats of seed and mulch;
7. *turfing or sodding*: blocks or strips of grass, including roots and soil, laid directly onto a prepared surface.
8. *viro-cell native grass planting*: for establishment of low maintenance native grasses.

Rolling greatly benefits seed germination, a roller that leaves the surface corrugated or indented is required rather than the compaction type. The roller weight should not exceed 90 kg/m.

As a general rule, when fully established, at least 70% of the soil surface should be covered with grasses or herbaceous plants in order to obtain suitable erosion control. Similarly, the lateral root system should occupy more than 60% of the surface area.

Hand *Hand seeding* is suitable for small areas or when introducing different species in selected areas. Hand seeding or planting may require the additional work of soil conditioning whereby the excavated soil is mixed with ameliorants such as compost, manure, water-retaining polymer or slow-release fertiliser, before being backfilled around the seed or roots system. Couch seed should be mixed with an equal quantity of loam before spreading to prevent uneven distribution.

Hand sprig planting is labour intensive and suitable only for small areas. It may be used to establish grasses such as kikuyu or buffalo that do not reproduce easily from seed. If the turf or grass sod is already well mixed within the topsoil, it may be spread and cultivated without the need for manual labour.

Sprigs should be spread in two equal applications in transverse directions over the area to be grassed. Immediately rotary hoe the area to a depth of 75 mm to mix the sprigs thoroughly into the topsoil. The surface should be lightly raked to provide an even grade.

Drilling When topography, terrain (slope $< 15^\circ$) and soil characteristics (non-stony or heavy soils) permit, seeding can be carried out with conventional agricultural seed drills. Although slower, this technique offers three major advantages over broadcasting:

- seed is placed directly into the soil, increasing the potential for germination;
- fertiliser is placed below the soil surface, reducing the possibility of nutrient wash-off into an adjacent watercourse; and
- precision planting with minimum seed usage is achieved.

Broadcasting Broadcasting is a cheap and convenient method of seeding on most areas accessible to wheeled tractors. The soil surface should be roughened before seeding. Mulch may be applied afterwards. Fertilising is usually a separate operation.

If a tail mounted spinner is used, the fertiliser, cover crop seed and perennial grass seeds should be spread in three separate passes to prevent segregation. It may be advantageous to spread the bulk of the fertiliser immediately before the initial cultivation to reduce possible wash-off. The fertiliser will also have broken down into a form more readily available for plant uptake. The area to be sown should be cultivated on the contour.

Deep ripping on the contour with a single tined ripper, spaced one tractor width apart, will assist infiltration and storage of soil moisture. This will provide additional insurance against poor germination and establishment caused by a lack of moisture in hardsetting soils.

Sprigging Revegetation can also be achieved by mechanical *sprigging*, the spreading of topsoil containing turf, grass sod or broken runners of grasses such as couch and kikuyu. The technique is normally used in conjunction with over-sowing of suitable species, which ensures that a more uniform cover develops.

The source area should preferably have a dense cover of couch or kikuyu with excess leaf litter removed. The turf or sod is broken into pieces - which measure approximately 100 x 100 mm - by ploughing at right angles.

If sowing is to follow the spreading operation, it should be into freshly disturbed soil. If it is delayed, or compaction occurs, a light harrowing is recommended to prepare the ground.

Hydroseeding or hydromulching

Hydroseeding and hydromulching are techniques used for the rapid application of seeds and fertilisers onto an area where - for reasons of access, speed of application, or ground conditions - conventional techniques cannot be used (also see Mulches, section B5.1). It is not an alternative to topsoiling or proper surface preparation. Hydroseeding slurries typically include:

1. seeds;
2. legume inoculum;
3. soluble fertiliser;
4. slow release fertiliser;
5. mulch - bulk material to act as a carrier for other constituents, to protect seeds, reduce soil moisture loss and provide initial erosion protection; and
6. soil stabiliser/binder - to provide added erosion control and to tack down seeds and mulch.

Seed mats Seed mats are a variation to mulching where a pre-seeded geotextile mat is rolled out and pegged directly onto the ground. Prior to placement, the ground is fertilised then raked to remove all surface irregularities. It is very important that the mat is installed and fixed (anchored) in good contact with the ground over all its area.

Turfing and sodding or plugging

Grass turfing (sodding - US) is the most effective technique to use when a rapid establishment of ground cover is required.

Turf should be:

- placed on a minimum 75 mm bed of fertilised topsoil;

- laid with the strips firmly butted together in a staggered arrangement parallel to the contour on sites with steep slope gradients, or normal to the direction of flow within overland flow paths;
- reinforced with a geotextile mat (approx. 20 mm openings) or mesh if located in a high velocity stream flow area;
- rolled or tamped then watered immediately it is laid; and
- where necessary, pegged to the soil at 1 to 2 metre centres.

Turf should be delivered to the site within 24 hours of being cut and should contain a minimum topsoil thickness of 25 mm for Queensland Blue Couch and Green Couch, or 30 mm for Kikuyu. The turf should be rolled with a smooth wheeled roller weighing not more than 90 kg per metre of width (Brisbane City Council, 1990).

Plugging is the application of small pieces of turf around 75 mm square. This process is only recommended on level areas or during the dry season when rain and runoff damage is not expected. Plugs may be planted at 225 mm centres followed by a light top dressing, then rolled.

Watering

Watering should start immediately after turfing, sprigging or plugging; or in the case of seeding or hydroseeding, as soon as possible after planting, but in any case not later than 48 hours after.

Watering will depend on the weather and soil conditions, however, a possible watering schedule would include:

- (a) 25 mm every second day for the first three waterings;
- (b) 25 mm twice a week for the next three weeks; and
- (c) 25 mm once weekly for a further two weeks.

Rain of more than 20 mm in one day can be taken as a substitute for a single watering.

Only low pressure sprays should be used as high pressure jets can wash away the seed and mulch cover.

Grassing steep slopes

To protect newly planted areas against stormwater damage, slopes steeper than 4(H):1(V) should be treated in one of the following methods:

- (a) Sprayed with a mixture of slow curing bitumen emulsion and paper or wood pulp at the rate of not less than 1250 kg of pulp and not less than 1250 kg of bitumen emulsion per hectare. The mixture should be sprayed with sufficient passes to give an even coverage.
- (b) Covered with a suitable geotextile mat.

B5.4

Trees and shrubs

General To maintain tree growth and health, the following practices should be avoided:

- *Lopping trees*; the regrowth in response to lopping is poorly attached and the exposed heartwood often decays.
- *Tree spiking and machinery damage*; using climbing spurs to prune trees or bumping trees with earth moving machinery, creates wounds in the living tissue of the tree that can allow pathogen or insect attack.
- *Aggressive neighbours*; many plants, often self-seeding, will dominate the soil profile and out-compete existing trees, some of these may be considered noxious weeds and some even poison the soil making it uninhabitable for all but its own species.
- *Neighbouring excavations*; root damage can destabilise trees and create stress through loss of water and nutrient intake. Decreasing water and nutrient intake reduces the tree's natural defence system against pathogens and insect attack.
- *Being buried*; to thrive, the root system of a plant uses air from the soil, particularly oxygen as part of the nutrient absorption functions. Fill and soil compaction (within the drip zone) excludes air from the soil, reducing nutrient uptake and the tree's resistance to attack, causing the slow death of the tree. Even regular foot traffic can cause soil compaction.
- *Altering drainage characteristics*; most trees have certain requirements for soil drainage and some may even require periodic flooding. Earthworks that alter drainage characteristics upstream, upslope or adjacent to rehabilitation sites and retained trees may result in tree dieback.
- *Weed killers*; many selective herbicides used on lawns contain active constituents that will harm or kill trees.

As a rule, the following practices are desirable:

- *Mulch*; decaying mulch feeds beneficial organisms that in turn aerate the soil and create ideal conditions for nutrient absorption. Mulch insulates the soil from sun and helps regulate soil temperature, minimise soil moisture loss, and control weed growth.
- *Companion planting*; many trees do best when grown with other