

Better management of grassy forests

David Carr

Stringybark Ecological



LANDCARE LED
BUSHFIRE RECOVERY GRANTS RECIPIENT



Border Ranges -
Richmond Valley
Landcare
Network



Workshop outline

- Identification of grassy ecosystems in the region
- Identification of grass species
- Seed collection, processing and storage of native grass
- Nursery propagation of native grass
- Direct sowing of grass seed
- Management of grassy ecosystems – weed control, fire, slashing, grazing

Grassy ecosystems



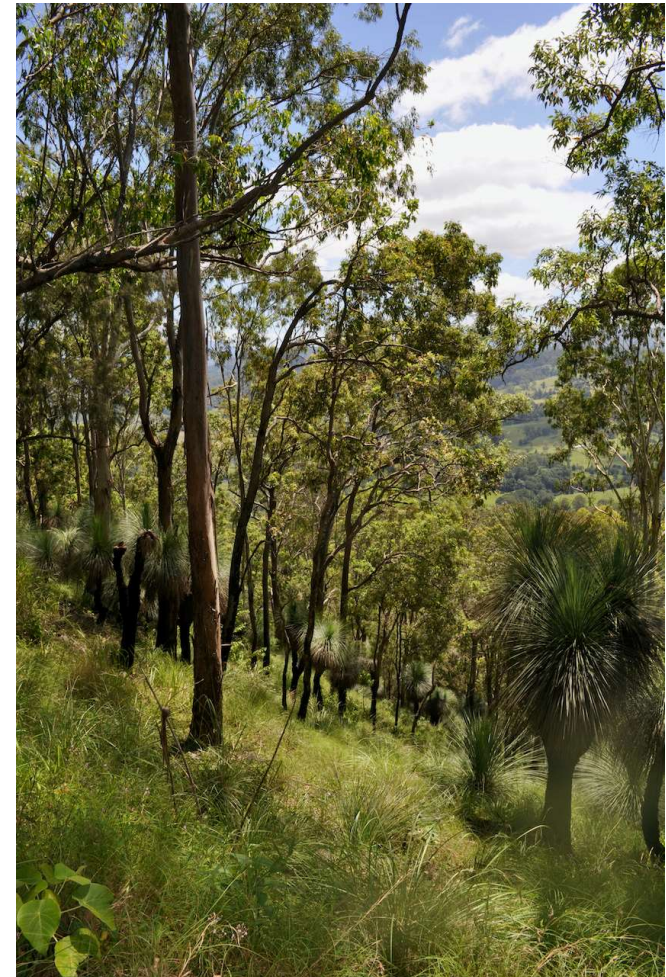
Grassy ecosystems of the North Coast of NSW

Vegetation Formations	Vegetation Classes
Wet Sclerophyll Forests (grassy sub-formation)	Northern Hinterland Wet Sclerophyll Forests
	Northern Tableland Wet Sclerophyll Forests
Grassy Woodlands	Coastal Valley Grassy Woodlands
Dry Sclerophyll Forests (shrub/grass sub-formation)	Clarence Dry Sclerophyll Forests
	Northern Gorge Dry Sclerophyll Forests
	Coastal Dune Dry Sclerophyll Forests
	North Coast Dry Sclerophyll Forests
Grasslands	Maritime Grasslands

Keith, D (2004). *Ocean shores to desert dunes: the native vegetation of New South Wales and the ACT*. NSW Dept of Environment and Conservation.

Characteristics of grassy forests

- Structure
 - Trees with overlapping canopies
 - Ground layer dominated by grasses
 - Scattered shrubs, ferns and vines
- Key grass species -
 - Blady grass (*Imperata cylindrica*),
 - Kangaroo Grass (*Themeda triandra*)
 - Mat Rush (*Lomandra longifolia*)
 - Wiry Panic (*Entolasia stricta*)
- Wet sclerophyll often taller and denser than Dry, with more layers



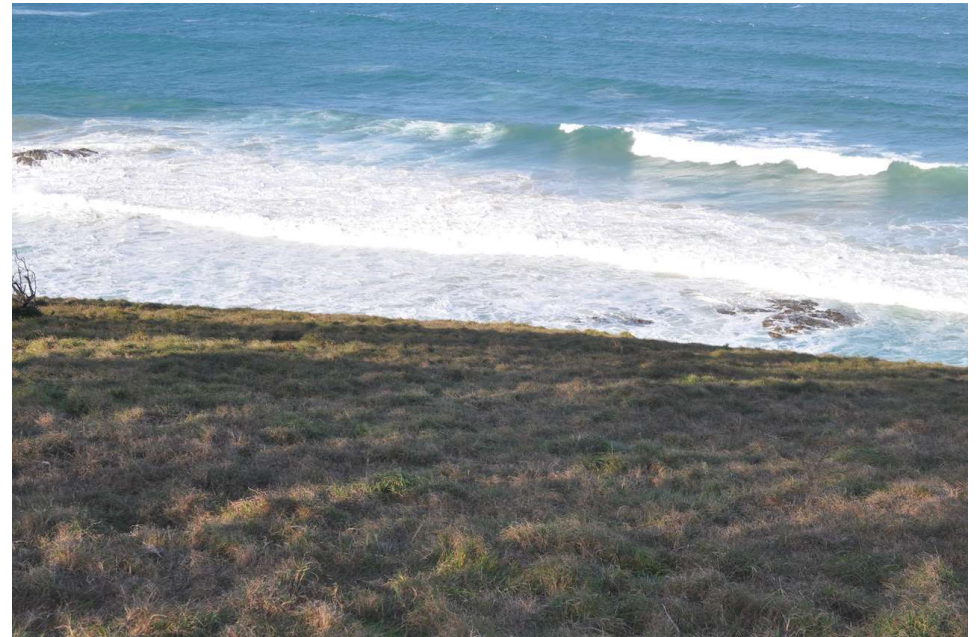
Characteristics of grassy woodlands

- Wide-spaced trees with canopies just touching
- Open understorey dominated by grasses, with sparse shrubs
- High diversity of grass and forb species
- Occurs in areas that are drier or more prone to fire than forests, or shrubby ecosystems

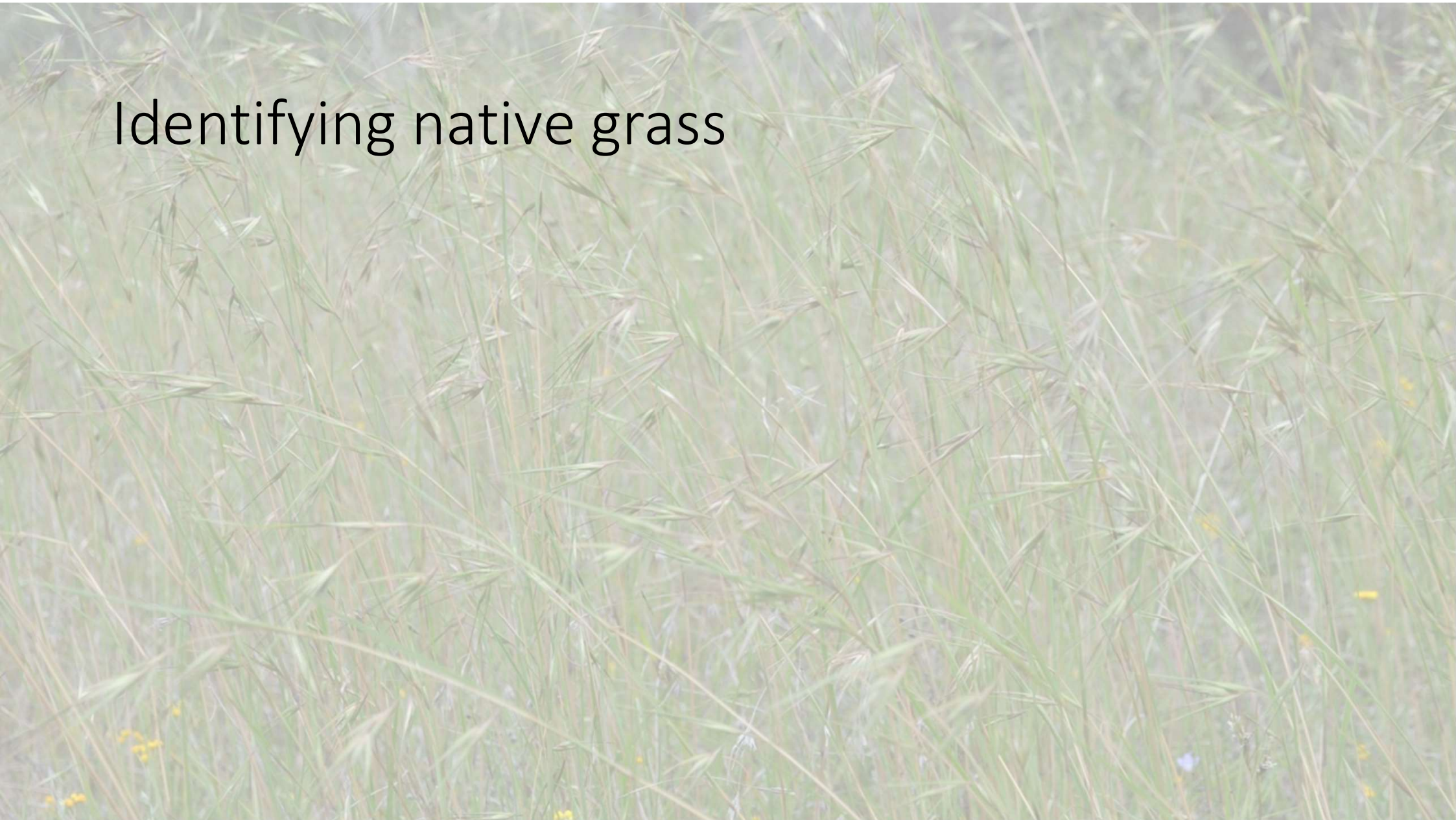


Characteristics of grasslands

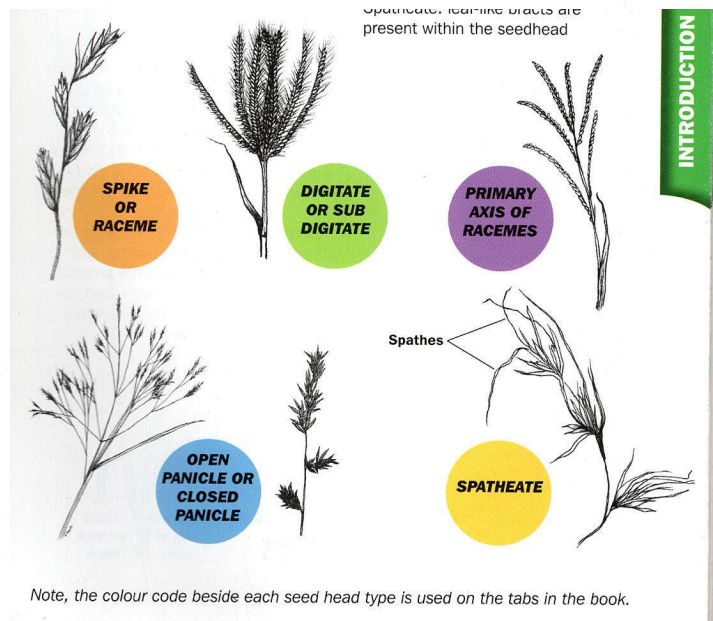
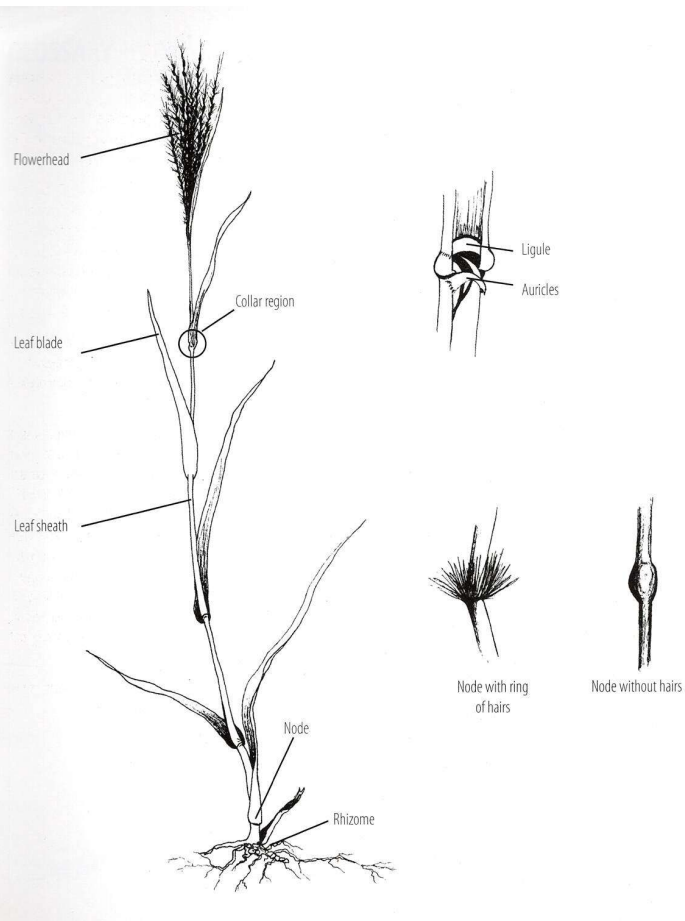
- Treeless or sparse trees
 - Natural, due to frost, poor drainage or exposure, or
 - Human-made through clearing, fire, mowing etc
- High grass and forb diversity
- Rare in the NSW North Coast bioregion – e.g. *Dorrobbee Grass*, *Themeda grassland on coastal headlands and sea-cliffs*



Identifying native grass



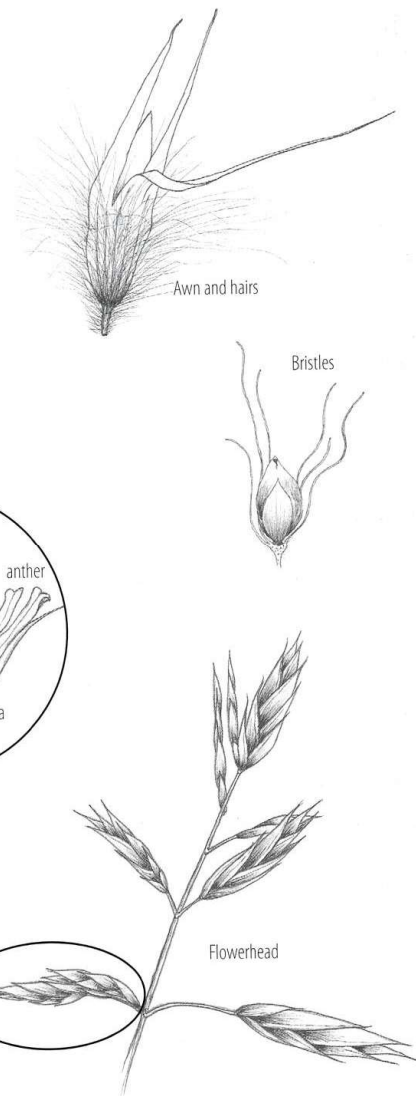
Grass structure



Note, the colour code beside each seed head type is used on the tabs in the book.

SPIKELET STRUCTURE

The flowerhead of grasses is made up of basic units called spikelets. Spikelets typically consist of clusters of one or more florets above two empty bracts called glumes. Each floret normally has two bracts called the lemma (outer) and palea (inner), which enclose a flower (male and female reproductive structure). The grass flower usually has three anthers and an ovary (develops into the "seed") topped by two stigmas. However, any or all of the structures in the spikelet may be reduced in number (e.g. 0 or 1 glume). There may also be additional structures such as hairs, bristles (stiff hairs not attached to the glumes or florets) or awns (bristle-like structures arising on the glumes, lemmas or paleas). The differences between these help differentiate a species.



Rose, H and Rose, C (2012)
Grasses of Coastal NSW. Dept
of Primary Industries

Poa labillardiere –Poa Tussock



- Dense tussock
- Leaves 1-4mm wide, rough to touch, grey to greyish-green
- Seedhead is an open panicle with erect to spreading branches held above the tussock
- Spikelets 5-8mm long with 3-5 florets
- Moist or highly-fertile sites, often the dominant species

Themeda triandra – Kangaroo Grass

- *Banbun* in Bundjalung language
- Tufted C4 warm-season perennial grass
- Tufted grass up to 150cm tall with bluish green leaves up to 50cm long. Inflorescence a spatheate panicle, 10-25cm long. Seeds with long awn.
- Flowers Nov-Jan



Sorghum leiocladum - Native Sorghum

- Perennial C4 tussock grass
- Summer active
- Distinct hairy ligule (ballet skirt)
- Flat, grey to blue green leaves with white midrib
- Red-brown spikelets on open panicle on tall stem
- Flowers Nov-Jan



[Harry Rose](#), licensed
under [CC BY 2.0](#)

Panicum decompositum – Native Millet

- Large perennial C4 tussock grass
- Small hard, millet-like seeds in large open panicle held above leaves
- Leaves broad, green with white mid-vein
- Often a pioneer in disturbed areas
- Wide distribution and on different soil types



[Harry Rose](#) under [CC BY 2.0](#)

Bothriochloa decipiens— Red Grass

- a.k.a Pitted Bluegrass
- C4 perennial tussock grass
- Sparsely hairy or hairless leaves, spikelets pitted. Inflorescence sub-digitate with 3-6 branches bare at the base.
- Variable flowering through summer
- Common pioneer of disturbed sites



[Harry Rose](#) under [CC BY 2.0](#)

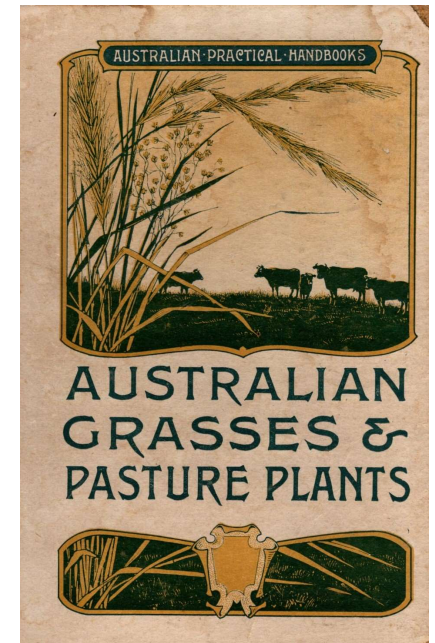
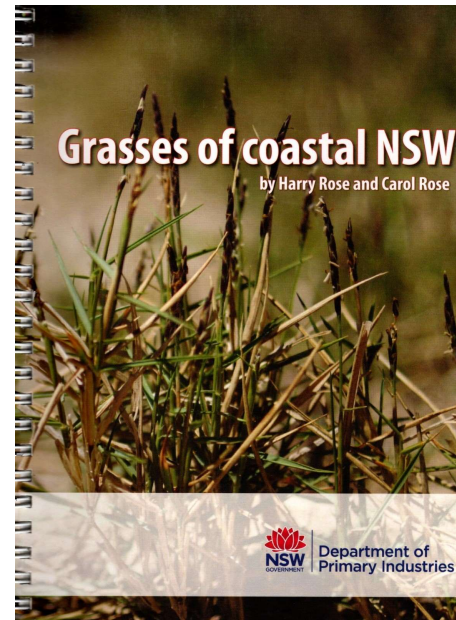
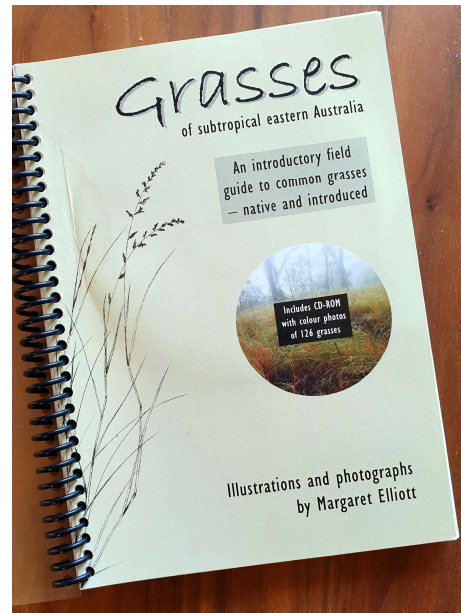
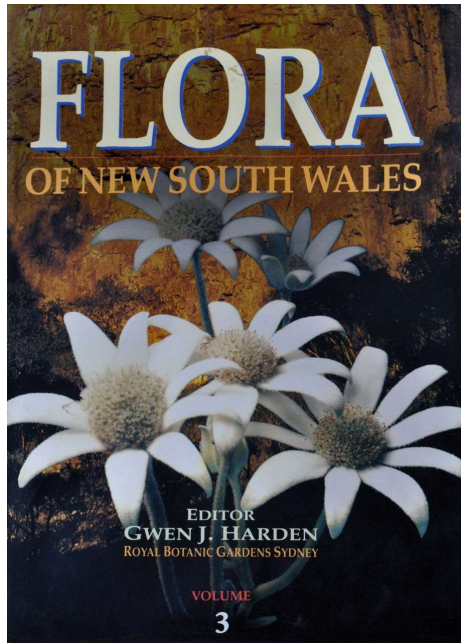
Lomandra multiflora – Many-flowered Mat Rush

- Not a grass. Fam: Asparagaceae
- Tufted perennial forb with rigid leaves with rounded tip. Separate male and female plants. Showy flowers in branching spikes amongst foliage.
- Prefers rocky outcrops or infertile, shallow soils in forest and woodland

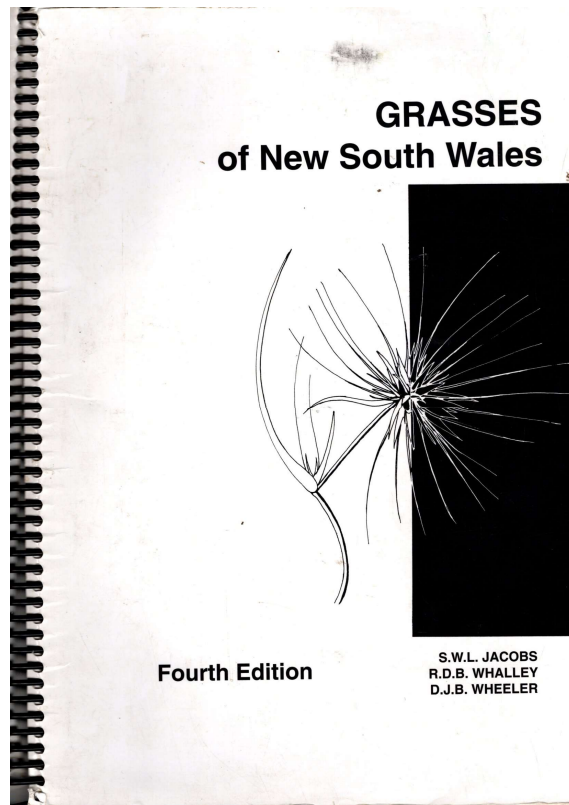


[Harry Rose](#) under [CC BY 2.0](#)

Grass ID resources



Grasses of New South Wales

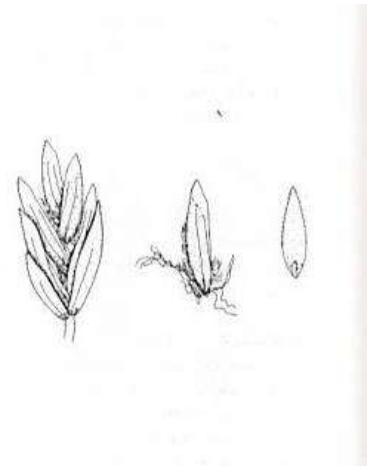


P. labillardieri Steud.

Tussock

Coarse, densely caespitose perennials, glabrous, scabrid, with mostly intravaginal innovations, not or very rarely producing a rhizome. *Culms* to c. 1.2 m tall, usually terete and scabrous below the panicle. *Leaves* mostly basal, very long; *sheath* usually pallid at the base, upper \pm scabrous; *ligule* c. 0.5 mm long, truncate; *blade* to 80 cm long, flat or inrolled, to 3.5 mm wide, scabrous, moderately rigid, tip fine, setaceous. *Inflorescence* 10–25 cm long, with erect or erectly and loosely spreading branches. *Spikelets* 3–4(–8)-flowered, strongly laterally compressed. *Glumes* broad to rather narrow, subacute to occasionally subacuminate. *Lemmas* 2.5–4.5 mm long, firm, narrow to moderately broad, usually hairy on the lower nerves, glabrous on the internerves, web usually copious, consisting of long hairs; *palea* firm, closely scabrous on the keels. On river flats and moist situations, and in forests, extending up open sheltered slopes. NC CC SC NT CT ST NWS CWS SWS SWP: Qld, Vic., Tas., S.A.

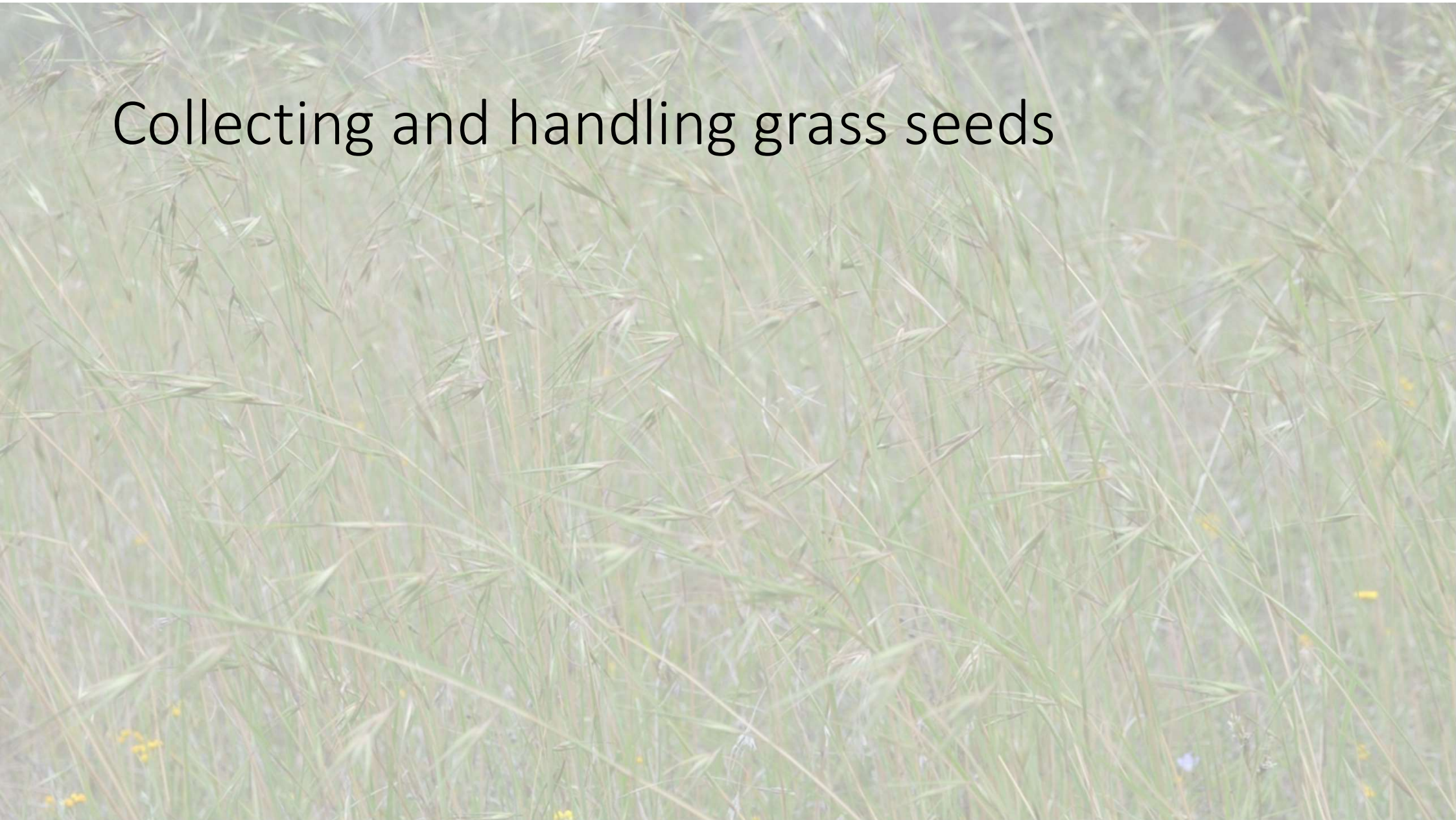
P. meionectes Vickery



Websites and Apps

- PlantNet – www.plantnet.rbgsyd.nsw.gov.au
- Ausgrass - <https://ausgrass2.myspecies.info/>
- Atlas of Living Australia- www.ala.org.au
- I-Naturalist App

Collecting and handling grass seeds



Determining ripeness

- Difference between flowering grass and ripe seeds
 - Look for anthers
- Cut or squash test
 - Feel for hard seed
 - Break open spikelet
- Take a sample across the site to determine variation in ripeness



Flowering Sorghum



Ripe Sorghum seed

Collecting methods – hand collection

- Used for small patches or to collect individual species growing among other species
- Hand-stripping – wear gloves
- Tools – secateurs, sickle, scythe
- Blower Vac

Mechanical harvesting

- Before harvesting check for:
 - Rocks,
 - Logs and stumps,
 - Gullies,
 - Weeds
- Use a GPS to mark boundaries of paddock and obstacles



Paddock of Sorghum ready for harvest

Collecting methods – Grass Grabber



Collecting methods – Bandicoot Harvester



- Big clean swards
- Rare to get pure species stands
- Clean the paddock first – cut and remove weeds-with-seeds
- Mark obstacles – gullies, holes, stumps, rocks, patches of weeds

Drying

- Spread seed out
- Turning
- Humidity
- Effects on dormancy



Cleaning – small batches

- Rub through sieve
- Hand separation
- Sieving
- Home-made sieves

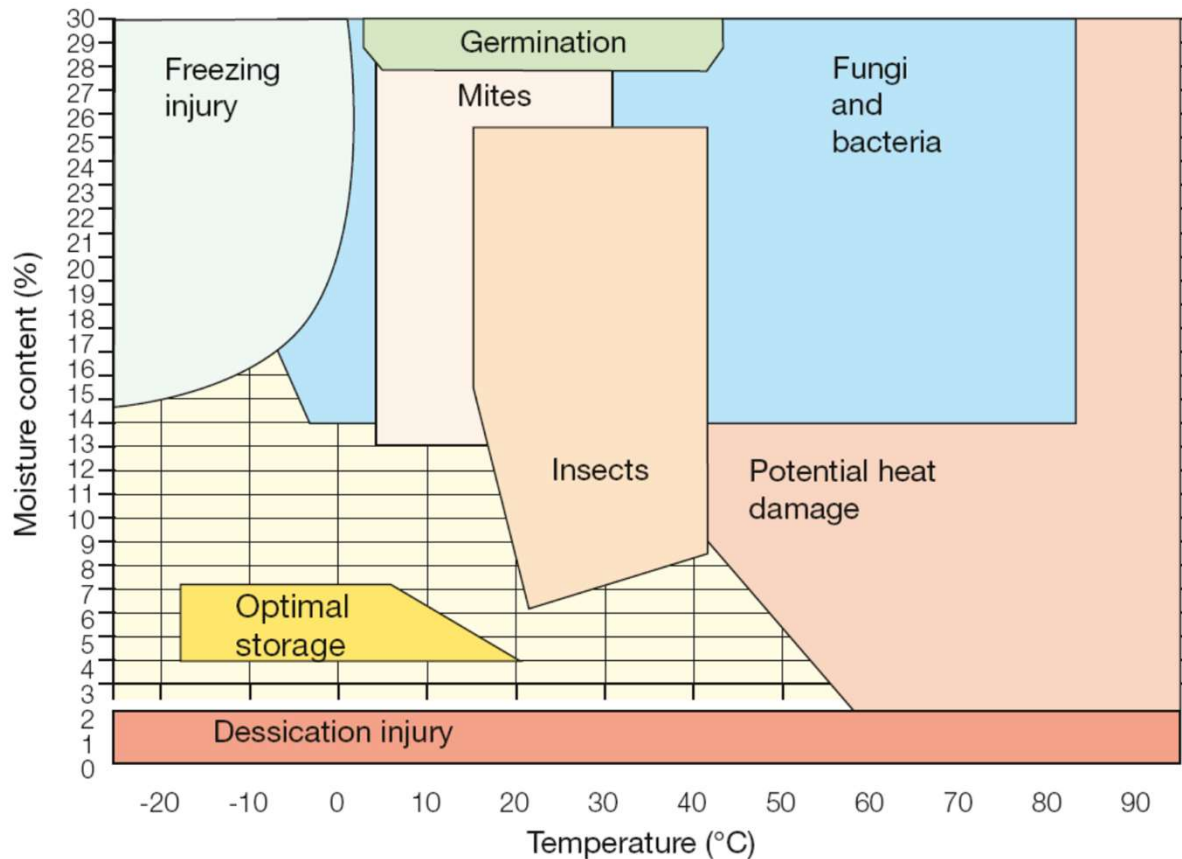


Cleaning large batches

- Sieves
 - Home-made
 - Bed spring base
 - Screen mesh
 - Industrial
- Vacuum aspirator



Storage

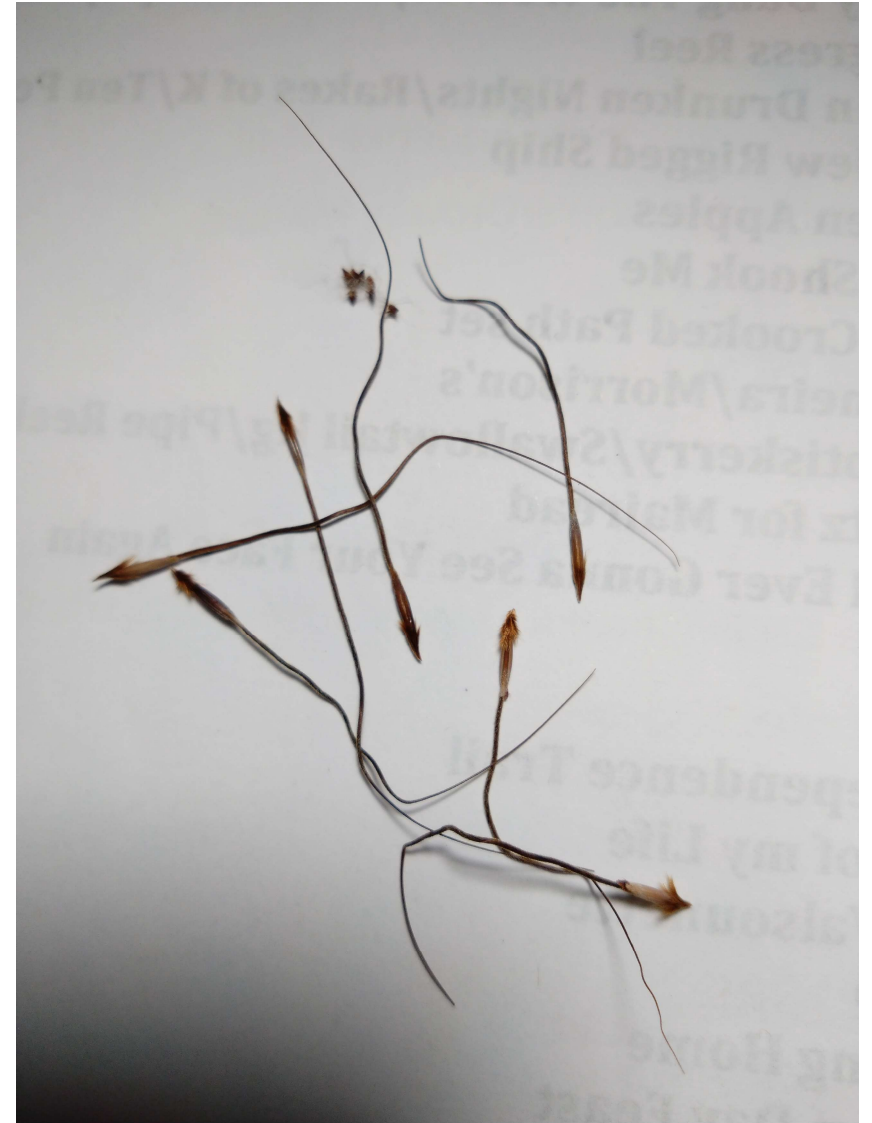


Source: Thomsen and Stubsgaard, 1998.

- Store seed in DRY and COOL conditions
- 5-8% moisture content and less than 20°C is ideal for long term storage
- Small batches – ziplock bags or food vacuum sealer
- Large batches – nylon mesh bags or cloth bags in a dry room

Viability and dormancy

- How many of the seeds are alive?
- Seeds may look healthy but can be hollow or dead
- Expressed as a % of total
- Dormancy is a physical or physiological barrier to germination



Nursery Propagation

A photograph of a field of tall, thin grasses, likely a type of bamboo or reed, with some small yellow and blue flowers scattered throughout. The text "Nursery Propagation" is overlaid on the left side of the image.

Seedlings



- Methods
 - Seedling tray
 - Individual cells/pots
- Germination treatments
 - Dormancy breaking
- Managing uneven germination

Division



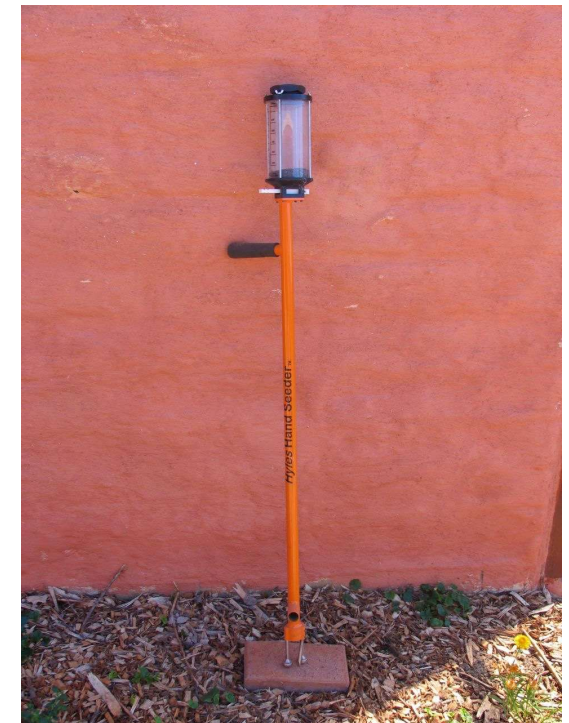
- Grow stock plants to divide
- Separate tillers at base
- Best for 'grass-like' plants such as Lomandra, Carex, Juncus
- Works with large perennial tussock grasses

A photograph of a field of tall, green grass with some yellow and blue flowers scattered throughout. The grass is the dominant feature, with long, thin blades and some seed heads. The background is slightly blurred, showing more of the same field. The overall color palette is green and brown, with small accents of yellow and blue.

Direct sowing of seed

Broadcast

- Chook feeding
- Rake hoe
- Spot seeder
- Seed spinner



Mechanical sowing

- Curtain seeder
- Direct drill
- Agricultural seeder



Grassy Groundcover method



Monitoring field germination

- For broadcast seeding use quadrats with known dimensions (50 x 50cm or 1 x 1m)
- Randomly throw in broadcast area (min of 10)
- Count seedlings of each species within quadrat
- For row seeding monitor set distance of row (e.g. 10m)
- Choose starting points randomly
- Repeat 3-5 times



Trials and research

- Small-scale trials to answer specific questions
- Clearly document what you do.
- Monitor outcomes



Management of grassy ecosystems



Matching management to threats/barriers

Threat or barrier	Management action
Weed competition	Weed control, Fire
Shrub or tree regrowth	Fire
Excess biomass or dominance by one species	Fire, slashing or grazing
Grazing selectively removing plants	Fencing or grazing management
Grazing selectively removing plants	Manage feral herbivores
Low species diversity	Revegetation – seedlings or sowing
Elevated nutrients	Hay cutting, sugar or carbon addition

Management – weed control

- Hand pulling or chipping
- Flame weeding or steam
- Smothering
 - Mulch mats
 - Clear plastic (solarisation)
- Herbicide
 - Wick wand or wiper
 - Spot spraying
 - Boom spray
- Fire can make it easier to distinguish natives from exotics



Management - Fire

- Fire-adapted and fire-intolerant plants
- Fire reduces biomass and creates space
- Consider
 - Intensity
 - Timing
 - Frequency
- Post-fire weed control



Post fire regeneration

Obligate Seeders



Post fire regeneration

Resprouters



Management – grazing management

- Too much grazing can eliminate desirable plants or introduce weeds.
- Grazing can also reduce biomass in a similar way to fire.
- Fencing allows specific areas to be managed with grazing.



Monitoring success

- Cover
 - Native vs exotic
 - Change over time
 - Individual species
- Diversity
 - Number of species
 - Number of species by growth form
- Resilience – change in threats/barriers



Acknowledgements

- Developed by David Carr, Stringybark Ecological Pty Ltd, for
- Border Ranges-Richmond Valley Landcare Network (Tamar Cohen, Gavin Tinning)
- This Landcare Led Bushfire Recovery Project has been supported by the Australian Government's Bushfire Recovery Program for Wildlife and their Habitat.
- People in Roseberry Creek and Mackellar Range Landcare Groups