

# TIPS & TACTICS

## EMERGING WEED THREAT: BUTTON GRASS



### Integrated weed plan the best option for controlling button grass

Button grass (*Dactyloctenium radulans*, Photo 1) is one of a number of summer weeds identified by growers as a potential emerging threat due to changing growing conditions. Button grass can reduce yields and be toxic to livestock.



Photo 1: Mature seed heads of button grass.  
Source: Catherine Borger, DPIRD.

#### FAST FACTS ABOUT BUTTON GRASS

It thrives in open areas (especially pasture or zero tillage systems), seasonal swamps and river banks.

It can tolerate a wide range of climates and soil types (including saline and swampy soils), but is most common on sandy and loamy soils.

#### KEY POINTS

- In a fallow, button grass reduces yields by taking up water and nutrients that would be available to the subsequent crop.
- In a summer crop, direct competition from button grass can significantly reduce yield.
- Button grass can be a valuable pasture species in arid areas, although overgrazing (especially in stockyards) can result in nitrate-nitrite toxicity for sheep and cattle.
- An integrated weed management plan, including prompt use of herbicides when button grass first emerges, is crucial for effective control and to reduce the risk of future herbicide resistance.
- There are few registered herbicides for button grass management in crop; so careful use of non-selective herbicides in fallow is needed for good control.

## Why is this weed a problem?

Button grass (also known as finger grass) is a common summer weed species and grows among other grass and broadleaf weed species in a summer fallow (Photo 2). It is a summer annual or ephemeral species, which means it is a species with a short life cycle, surviving as long as summer moisture is available. Rapid emergence and growth allow it to colonise areas quickly, and the branching, creeping tillers allow single plants to cover large areas. Individual plants can produce over 15,000 seeds/plant.

Like most summer grass weeds, it depletes soil moisture and nutrients, reducing the yield potential of the subsequent crop. It can also act as a 'green bridge' for crop pests and diseases. The rapid growth of button grass after rainfall makes it particularly adept at supporting Australian plague locust.

When growing in crop, it can significantly reduce yield. For example, in a mung bean crop in Queensland (Qld) seeded at 30 kg/ha, button grass densities of 10, 26 and 43 plants per m<sup>2</sup> reduced grain yield by 36%, 53% and 69% respectively (Photo 3).

## Summer control a good strategy

In a summer fallow, button grass and other weeds can be effectively controlled through an integrated weed management (IWM) plan. Beware: where the plants are stressed and dusty, more likely over summer, they can be less responsive to herbicides and more difficult to control.

Button grass can be partially controlled by grazing and therefore this is a low-cost, high return management tactic (see: Valuable pasture species but shouldn't be overgrazed, page 3). However, potential toxicity issues need to be managed in a grazing program.

Zero tillage systems promote button grass, as germination is greater in seeds on the soil surface (see: Conditions that encourage seeds to germinate, page 3).

Where this species grows in crop, the registered selective herbicides should be used on seedling button grass plants, before the weed causes significant yield loss.



Photo 2: Button grass dominating the summer fallow, at Mullewa WA.  
Source: Abul Hashem, DPIRD.



Photo 3: Button grass growing in a mung bean crop in Qld.  
Source: Bhagirath Chauhan, University of Queensland.

## Integrated Weed Management

An IWM plan provides the best opportunity to effectively manage button grass as well as to reduce the risk of herbicide resistance in future. While there is currently no evidence of herbicide resistance in button grass, glyphosate is widely used, and button grass is at high risk of developing resistance to it. For instance, the risk of resistance is particularly severe in the sub-tropical, glyphosate-resistant cotton systems in the Northern Region.

An IWM plan should focus on:

- killing existing weeds
- depleting the seedbank by preventing seedset
- not introducing seeds from external sources like contaminated grain or machinery.

The following five-point plan will assist in developing a management plan in each and every paddock.

1. Review past actions and history.
2. Assess current infestation level.
3. Identify weed management opportunities.
4. Match opportunities and weeds with suitably effective management tactics.
5. Combine ideas into a management plan. Use of a rotational plan can assist.

More information is available at GRDC's Integrated Weed Management Hub (<https://grdc.com.au/resources-and-publications/iwmhub>).

## Tactics for IWM of button grass

There are a range of tactics that should be considered when developing an integrated plan to manage button grass (Table 1).

Table 1: Tactics for managing button grass that growers should consider.

Tactic	Most likely % control range	Comments on use
Knockdown (non-selective) herbicides for fallow or pre-sowing control	80 (50–95)	Button grass is one of the first weeds to become moisture stressed in summer, making it hard to kill. Try to spray at the seedling stage or use high application rates. Spray early in the day, where possible.
Double knockdown or 'double knock'	80 (60–95)	In hot conditions where plants are stressed, use high label rates of both herbicides. Paraquat or paraquat + diquat products give poor control when applied alone (button grass will resprout), but are effective in a double knock.
Residual control in fallow	60 (40–95)	Imazapic is registered in fallow control in some states.
Pre-plant (double incorporation)	80 (75–90)	Pendimethalin is registered in cotton, cow peas, mung beans, navy beans, peanuts, pigeon peas, soybeans and sunflowers in some states.
Post-plant pre-emergence	80 (75–90)	Pendimethalin is registered in cotton, sunflowers, maize and teatree in some states.
Grazing	40 (0–70)	Graze heavily and continuously during spring, summer and autumn, to reduce plant numbers and seedset. Button grass can be toxic. Ensure stock have an alternative feed source and are not in poor condition when first exposed to fields with a high density of button grass. Monitor stock health and immediately remove stock following signs of poor health. If grazing mature plants, some seed in the faeces will remain viable. A short quarantine of stock will be necessary to avoid spread of this weed.
Burning residues	50 (0–75)	Fallows can be burnt in autumn if there is sufficient standing residue from the previous crop. Burning an entire field may result in poor soil structure, erosion and reduced crop yield.
Inversion ploughing	90 (70–99)	Use skimmers to ensure deep burial. Mouldboard ploughing is highly effective. Other forms of soil renovation (e.g. rotary spade, offset disks) are less effective. Ensure this technique is suitable for your soil type (generally best suited to the Western and Southern Regions). Choose a method that will leave seeds buried for 4–5 years so they degrade.

## Conditions that encourage seeds to germinate

Button grass plants generally emerge in summer following rainfall and set seed during summer and autumn. The length of their life span is highly dependent on moisture availability, and plants may set seed six weeks after germination if they run out of moisture. Button grass seeds that have just shed from the plant can have over 90% viability. However, recent research showed initial germination ranged from less than 5% in Western Australia (WA) to 30–61% in Qld. Seeds have dormancy and require after-ripening — time and appropriate environmental factors — to lose their dormancy before germinating.

In field conditions, seeds need a few months for the seed coat to degrade, to allow germination. In WA, seed in the laboratory was more likely to germinate in

light than in dark conditions (52% and 15% germination). Field experiments in WA and Qld show that button grass seed on the soil surface mostly germinate or degrade in the first year after they are produced (with 5–8% of seed still viable after 12 months). By comparison, seed buried at 2 cm or more will not easily germinate or degrade (with up to 50% of seed still viable after 12 months). The buried seed will germinate if it is returned to the soil surface by subsequent soil disturbance, like crop sowing in the following year.

It is likely that seedset in early summer could germinate in late summer or autumn, when further moisture is available. Seedset in late autumn would be ready to germinate the following spring. Cohorts in both summer and autumn should be killed prior to seedset, where possible.

In zero tillage systems, where seeds

## Valuable pasture species but shouldn't be overgrazed

Button grass can be a valuable pasture species in arid areas, although grazing of button grass (green or dry plants) in stockyards can result in nitrate-nitrite toxicity in sheep and cattle. Plants in a stockyard are heavily manured with nitrogen-rich urine and faeces. An investigation into four incidents showed that ingesting plants with high nitrate levels resulted in rapid mortality of 16–44% of those grazing (McKenzie et al. 2004).

Further, toxicity from prussic acid (cyanide) can result in the field when hungry stock animals graze young, succulent, rapidly growing plants; particularly when stock are in poor condition and button grass is the dominant feed source. Dry plants in the field, however, are rarely toxic. Other weed or crop species can also cause nitrate-nitrite toxicity, and a summary can be found at:

<http://agriculture.vic.gov.au/agriculture/livestock/beef/feeding-and-nutrition/nitrite-poisoning-of-livestock>

remain on the soil surface, most seeds will germinate or lose viability over one year. Intensive weed control over 1–2 years should effectively reduce the population. Buried seeds are less likely to germinate and remain dormant in the soil for over a year. They will germinate when subsequent soil disturbance (i.e. crop sowing the follow year) returns them to the soil surface.

In seeds exposed to water for 10 days (in laboratory conditions) germination levels increased from 52% to 85%, although 30 days of water reduced germination to 2–6%. This confirms the tendency of button grass to germinate rapidly after heavy rainfall in the field, and favour environments like river banks that might be subject to temporary flooding. Growers should control button grass after particularly heavy rainfall, when seed germination rates will be highest.

## Identifying button grass

Button grass is fairly easy to identify (Figure 1), however it can be confused with Durban grass/sweet smother grass (*Dactyloctenium australe*), which is frequently planted as a lawn. It may also be confused with other species that have seed heads in a finger-like arrangement, such as windmill grass (*Chloris truncata*) or couch grass (*Cynodon dactylon* or *Elymus repens*).

### Plant and tillers

- grows semi-erect
- spreading branches forming leafy tufts (Photo 4)
- single plant can form up to 45 primary tillers, both prostrate and erect.
- prostrate tillers develop roots at the node, and branch into 7 or 8 secondary tillers. A single plant can spread over an area of 1.5 m diameter
- tiller stems are up to 40 cm long, slender, smooth and hairless, and often bend at the nodes.

### Leaves

- flat and may be covered in hairs
- blade approximately 80 mm long and 2–6 mm wide at the base, tapering to a point
- edges often wrinkled or fringed, with long (1.5–2 mm) hairs.



### Seed heads and seeds

- 2 or 3 seed heads on end of each tiller (Photo 5)
- each seed head has 3–11 compact spikes in a finger-like arrangement
- spikes 5–13 mm long
- each spike contains overlapping spikelets, containing 5–11 seeds per spikelet (over 15,000 seeds/plant)
- seeds < 1 mm long (Photo 6).

C. A. Gardner

Figure 1: A button grass plant (left), and an individual spikelet (top right) from a spike (bottom right)  
Source: adapted from Gardner 1952.



Photo 4: Button grass seedling.  
Source: Abul Hashem, DPIRD.



Photo 5: Button grass seed heads.  
Source: Catherine Borger, DPIRD.



Photo 6: Button grass seeds.  
Source: Catherine Borger, DPIRD.

## AUSTRALIA: COSTS OF WEEDS AND ROI FOR CONTROL

The total cost of weeds (revenue loss plus expenditure) to Australian grain growers was estimated at \$3.318 billion in 2016 (Llewellyn et al. 2016). Australian grain growers are investing heavily in weed management, mostly through use of herbicides.

The return on investment for summer weed management is high (Cameron and Storrie, 2014). Economic benefits include:

- increased plant available water and nitrogen
- reduced pests and diseases via interruption of the green bridge
- a wider sowing window
- greater ease of sowing and reduced physical impact of dead summer weed plants on the establishment of crop seedlings.

The cost of summer weeds depends on a wide range of factors, including average rainfall, soil type, region etc. However, when considering stored soil moisture alone, control of summer weeds has a 70–99% chance of making a profit in low rainfall zones, and a 30–80% in high rainfall zones. These values are much higher when taking nutrient loss into account. As a general rule, complete control of summer weeds gives an average return of \$6.07/ha for every \$1/ha invested.

## RESOURCES



Using this resource

Rapid expansion of herbicide resistance and the lack of new modes of action (MOA), require that non-herbicide tactics must be a significant component of any farming system and weed management strategy. Inclusion of non-herbicide tactics is critical to prolong the effective life of remaining herbicides, as well as for new products and modes of action that have not yet been released or indeed invented. Effective herbicides are key components of profitable cropping systems. Protecting their efficacy directly contributes to the future sustainability and profitability of cropping systems.

We need to look after what we have. It is a shock to some that the last significant new herbicide mode of action released in Australia was Group H chemistry, first launched in Australia in 2001. Prior to that, the most recent other

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## FAQS

### Button grass is another weed I need to think about so at what stage should I get worried about it?

Button grass is a species to monitor over the summer crop or fallow.

### Who can I talk to about managing my button grass problem?

Agronomists or State Government departments can assist in formulating a button grass management plan. Refer to Useful resources on page 6.

### Is it worth controlling button grass?

Yes. Where button grass grows in summer crops, it is highly detrimental to grain yield. In a fallow, summer weed control gives a high return on investment. If you have stock in the system, button grass can provide valuable summer feed.

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## GRDC PROJECT CODES

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