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# Tropical perennial grasses – pre-sowing weed control

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Weed control for 1–2 years before sowing is required to reduce the soil seed banks of summer-growing annual grasses to levels that will not adversely affect the establishment of sown tropical perennial grasses.

One summer-growing annual grass seed per handful of soil indicates that there are about 400 seeds/$m^2$.

Allowing seeds to germinate and then prevent new plants from flowering is the most effective means of control. Over time this will reduce the soil seed bank of weeds to acceptable levels.

If possible, select paddocks that do not have a long history of summer-growing annual grasses. Plan ahead and use grazing and high levels of ground cover to reduce the presence of these weeds.

Use a combination of grazing at high stocking rates and herbicide use to reduce summer-growing annual grass soil seed banks. If possible, plan ahead using crop rotations to reduce seed banks.

In the spring before sowing, removal of summer-growing annual grass seedlings on at least two occasions before sowing is still required, even after up to 2 years of pre-sowing weed control.

Check the paddock to be sown by sampling several handfuls of soil. If in doubt continue weed control rather than sowing.

Tropical perennial grasses are often sown into old cropping country that has been intermittently grazed for several years and had little or no weed control since the cropping phase finished. The most common weeds in such situations are summer-growing annual grasses, predominantly liverseed grass (*Urochloa panicoides*) and awnless barnyard brass (*Echinochloa colona*). These can provide valuable green feed and ground cover, particularly in dry summers, but if they have been growing for several years they can build up soil seed banks of more than 50,000 seeds/$m^2$.

*Top: Pre-sowing weed control of summer-growing annual grasses for two years before sowing and, bottom: pre-sowing weed control only in the spring before sowing.*

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*Three handfuls of soil with varying levels of summer-growing annual grass seeds corresponding to: left, an average of almost no seeds/handful or about 15 seeds/m$^2$; centre, an average of about 4 seeds/handful or 1650 seeds/m$^2$, and right, an average of about 14 seeds per handful or 5550 seeds/m$^2$.*

Seeds from these seed banks germinate and grow at the same time as sown tropical perennial grasses, but because they are annuals they establish faster than the sown grass seedlings and can provide severe competition. Paddocks heavily infested with these weeds can result in the failure of the sown species to establish or plant densities that are below those required for a productive pasture.

Annual grass seedlings are extremely difficult to control in an establishing perennial grass pasture and there are no herbicides that can be applied to selectively remove them without also damaging the perennials. The only way to ensure that annual summer-growing grass are not going to be a problem at sowing is to run down their seed banks before sowing, so that their numbers are low and competition minimal.

To reduce the annual summer-growing grass seed banks you will need to start up to 2 years before sowing in the paddock you have selected. Depending on the size of the seed bank and seasonal conditions, 1–2 years of pre-sowing weed control will be required. As a guide 1 summer-growing annual grass seed per handful of soil is equivalent to about 400 seeds/m$^2$, which would be sufficient to reduce establishment of sown tropical perennial grasses. One way to avoid the need for a long period of pre-sowing weed control is to choose paddocks that have a history of low amounts of summer-growing annual grasses. Often these may be paddocks that have had high amounts of other grasses or ground cover that have suppressed the germination and growth of summer-growing annual grasses. Alternatively, they might be paddocks that have been used in summer-crop rotations where summer-growing annual grasses have been controlled and seed banks are likely to be at a low level.

To reduce the soil seed bank, existing seeds in the soil need to germinate and the new plants prevented from setting new seeds and replenishing the seed bank. This process needs to be repeated over several germination cycles to deplete the seed bank. Annual summer-growing grass seeds can start to germinate in August and may continue germinating until the following May, if rainfall and temperatures are favourable. It has been observed that once there is a high density of large plants of annual summer-growing grasses their rate of germination declines, so the more open the grass sward the more seeds that will germinate. Seeds will not germinate in the colder winter months, but the seed bank can still be reduced by the activity of soil insects and pathogens, particularly in wet winters.

Just as important as encouraging annual grass seed germination is the prevention of flowering and thus the addition of more seeds to the seed bank. Annual summer-growing grasses can flower quickly, particularly under dry conditions and seedheads can lie flat on the ground. Because of this, and the low palatability of the seedheads to grazing livestock, it is often difficult to use grazing alone to prevent seeding. Grazing is most likely to be successful if small areas are grazed at high stock densities when plants are young. Sheep may be more effective than cattle, but unless young plants are defoliated to ground level they can tiller and regrow. Alternatively, cultivation of the paddock as part of the normal preparation for preparing a seedbed can be timed to kill newly germinated plants and

prevent flowering and re-seeding, reducing the need for herbicide application.

Often 1–2 applications of glyphosate can be used in conjunction with grazing to prevent flowering. Lower rates can be used on smaller plants and stock should be excluded for at least 1 day after spraying to allow plants to absorb the chemical. Avoid repeated applications of the same chemical in any paddock so that herbicide resistance does not develop.

In areas suitable for cropping, either a sorghum grain or forage crop can be grown as part of a pre-sowing weed control program. In this situation, the pre- and/or post-sowing use of residual chemicals for control of grass weeds can be an effective way of reducing the summer-growing annual grass seed bank and preventing re-seeding. However, tropical perennial grasses should not be sown in areas treated with these chemicals until the recommended plant-back period has passed. Alternatively the paddock can be left in a fallow, protected by a winter cereal stubble. This has the advantage of a broader range of chemical options being available.

In the spring before sowing, try to allow for at least two germinations of summer-growing annual grasses and spray each of them out before sowing. If in doubt about seed bank levels and whether or not it is safe to sow, check several handfuls of soil from across the paddock. If you can see more than 1–2 annual grass seeds per handful of soil then you are likely to encounter sufficient weed seeds to adversely affect the establishment of the tropical perennial grass you are wanting to sow. Rather than risk a poor establishment it is wiser to delay sowing until summer-growing annual weed seed bank levels have been reduced to lower levels.

Good pre-sowing weed control will also assist in the accumulation of subsoil moisture which is important for early plant growth. Use a push-probe to ensure that there is a least 1 m of subsoil moisture at sowing.

## Further reading

Lodge GM, Brennan MA, Harden S (2010) ‘Field studies of the effects of pre-sowing weed control and time of sowing on tropical perennial grass establishment, North-West Slopes, New South Wales’. *Crop & Pasture Science* **61**, 182-191.

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