Tropical perennial grasses

2. *Pre-sowing weed control*

This brochure is the second in a series of guides released by the Future Farm Industries CRC (FFI CRC) to promote the use and management of tropical grass based pasture mixes in the summer-rain dominant region of New South Wales (see map).

Weed control for up to two years before sowing is essential to reduce the soil seed bank of summer-growing annual grasses to levels that will not adversely affect the establishment of sown tropical perennial grasses.

Allowing seeds of annual summer-grass weeds to germinate and then preventing new plants from flowering and setting seed 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. Use a combination of grazing at high stocking rates and herbicides 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 two years of pre-sowing weed control.

One summer-growing annual grass seed per handful of soil indicates that there are about 400 seeds/m^2. Check the paddock to be sown by sampling handfuls of soil. If in doubt continue weed control rather than sowing.

Minimising the seed bank

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),* awnless barnyard grass *(Echinochloa colona)* and stink grass *(Eragrostis cilianensis).* 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.

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 perennial grass seedlings and can provide severe competition. When paddocks are heavily infested with these weeds, the sown species can fail to establish or establish as densities 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 grasses 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.

NSW GOVERNMENT Primary Industries

FUTURE FARM INDUSTRIES CRC

Tropical perennial grasses - *Pre-sowing weed control*

To reduce the annual summer-growing grass soil seed bank you will need to start up to two years before sowing in the paddock you have selected. As a guide one 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. These might be paddocks that have been used in summer-crop rotations where summer-growing annual grasses have been controlled and soil 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 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.

Preventing flowering

Just as important as encouraging annual grass seed germination, is the preventing 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 feed quality 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 or herbicide application as part of the normal preparation of a seedbed can be timed to kill newly germinated plants and prevent flowering and seed set.

Often one or two applications of a grass herbicide can be used in conjunction with grazing to prevent flowering and seed set. Avoid repeated applications of the same herbicide group in any paddock to prevent herbicide resistance developing.

Pre-sowing weed control of summer-growing annual grasses for two years before sowing (top), one year before sowing (middle) and pre-sowing weed control only in the spring before sowing (bottom).

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

Residual chemicals

In areas suitable for cropping, either a grain or forage sorghum 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 soil 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 fallow, protected by a winter cereal stubble. This has the advantage of a broader range of chemical options.

Checking seed bank levels

In the spring before sowing, try to allow for at least two germinations of summer-growing annual grasses and control each of them before sowing. If in doubt about soil seed bank levels and whether or not it is safe to sow, check handfuls of soil from across the paddock. If you can see more than one or two 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 want to sow. Rather than risk poor establishment, it is wiser to delay sowing until summer-growing annual weed seed bank levels have been reduced.

Soil moisture

Good pre-sowing weed control will 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 one metre of subsoil moisture at sowing.

For further information contact: GM Lodge, Principal Research Scientist, NSW Department of Primary Industries, Tamworth email: greg.lodge@industry.nsw.gov.au

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