MANAGING THE ESTABLISHING PASTURE - AN ESSENTIAL STEP

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This paper is concerned with growth of the pasture from germination to establishment. Establishment is considered to be complete with the setting of sufficient seed to ensure adequate regeneration in an annual and with the survival of sown species until the beginning of the second growing season for perennials.

SUMMARY

To achieve good establishment, management practices should be adopted to facilitate the quick growth and development of seedlings so that plants are well developed to resist predictable establishment limiting influences, e.g. dry hot summers, predation, disease or interplant competition.

SEEDING RATE

The productivity and persistence of annual legume pastures (subclover, barrel medics) is strongly influenced by the seed set in the year of establishment. The seed set potential can only be achieved by the use of adequate seeding rates at establishment, i.e. 5 to 10 kg/ha. However, a survey of north-eastern Victoria by Reeves and Hirth (1982) clearly showed that the most common seeding rate, for subclover, was 2 to 2.9 kg/ha. A similar situation exists in NSW. Low seeding rates not only produce less seed but also less productive pastures with more weeds.

RESIDUAL VEGETATION

Vertically standing dead vegetation can be beneficial to establishment in arid sites and with surface sowing (Campbell, 1984) but generally, straw and other horizontally placed vegetation inhibits establishment due to physical or allelopathic factors (Quigley and Carter, 1985; Dowling and Linscott, 1983 a). The presence of surface litter can also cause the crown of grass seedlings to be raised making them more susceptible to grazing and less likely to develop adequate root systems necessary for survival (Cornish, 1982). Residual vegetation or the lack of cultivation often associated with minimum tillage or direct sowing techniques can also provide a more favourable environment for insect and mollusc predation (Dowling and Linscott, 1983 b).

FERTILISER USE

Most Australian soils are of low fertility and young seedlings will respond to better nutrition within a few days of germination, e.g. most of the seed reserves of seedling grasses are exhausted within 10 days of germination (McWilliam *et al*, 1970). This highlights the need for fertiliser to achieve rapid seedling growth and helps explain the frequently reported benefits of banding fertiliser close to the seed (Wagner, 1956; Duell, 1973).

Because of the toxic (salt) effects of some fertilisers when mixed with seed (phosphates < sulphates < chlorides < nitrates) fertilisers are best banded to the side or below the seed, separated by 1 - 3 cm of soil. The banding of fertiliser below the seed is of particular benefit in dry environments where fertiliser applied to the surface is unavailable to the seedling's root

system due to the drying of the surface soil, and in the case of phosphorus, to the lack of mobility of the nutrient (Scott, 1973; Cornish, 1977).

Where direct drilling is used there is less disturbance of the seedbed and thus reduced mineralisation of essential nutrients, also surface fertility is not mixed through the profile. In addition, initial root growth is usually slower due to greater soil strength. Given these possible limitations to adequate nutrition, the fertilisation of direct drilled pasture is likely to be more critical than for conventional seedbeds, particularly where initial fertility is low.

SOIL ACIDITY

Where soil pH ($CaCl_2$) is less than 5.0 pasture establishment can frequently fail, particularly with acid sensitive species. Low pH soils need to be limed to ensure successful establishment and growth of legume pastures. A generalised guide to the treatment of acid soil problems at establishment is provided in table 1.

TABLE 1. Generalised guide to the use of lime for pasture and crop establishment. (Cregan *et al*, (1986).

Aluminium sensitivity	pH ($CaCl_2$)				
	5.5	5.4-5.1	5.0-4.5	4.4-4.0	< 4.0
Highly sensitive	-	Pellet or band	Lime	Lime	Lime
Sensitive	-	Pellet	Band	Lime	Lime
Moderately tolerant	-	Pellet	Pellet &/or band	Band &/or lime	Lime
Highly tolerant	-	-	-	-	Lime

Key to terms used in table 1.

Pellet. Lime pellet inoculated legume seed (some tropical species and serradella not suited to lime pelleting).

Band. Lime at 100 to 250 kg/ha mixed with the required rate of phosphatic fertiliser and drilled in a band with the seed.

Lime. Lime broadcast at 1 to 4 t/ha according to the degree of acidity to be corrected, the sensitivity of the plants and the texture of the soil.

HERBICIDE RESIDUES

Herbicides used for seedbed preparation can often have a residual phytotoxic affect on seedling growth, e.g. dicamba (see label), 2, 2-DPA (Thiegs, 1955), paraquat (Warboys and Ledson, 1965) and glyphosate (Campbell, 1974). Therefore, care needs to be used to ensure that harmful residues, either in the soil or vegetation, have broken down to harmless levels before sowing, particularly with surface seeding and direct drilling.

COVER CROPS AND WEEDS

In drier environments cover crops and weeds generally reduce establishment or seed set. In more favourable cool humid climates, the early growth of perennials and the seed set of annuals is often reduced but the density of establishing perennial pastures is not affected. Cover crop type, sowing

date and sowing rate, the spatial arrangement of cover crops and pasture as well as the time of cover removal all can influence the establishment of undersown pasture although cover crop or weed dry matter production is the major influence on the establishment of undersown pasture.

In Australian environments cover crops mainly affect undersown pastures through competition for moisture, although competition for light can also be important. At best, cover cropping is an economic compromise that becomes more risky as environments increase in aridity and where species that are not capable of increasing density over time are used.

Good weed control is essential for rapid seedling growth and reliable pasture establishment.

Selective weed control is now available in pastures through a wide range of herbicides (Swarbrick, 1986) or a combination of grazing management and herbicide, e.g. spray graze.

INSECT CONTROL

Pasture seedlings, in contrast to most crop seedlings, are small, delicate and slow growing. Thus, they are highly susceptible to predation or disease.

Critical insect levels that consider insect species, stage, vigour and susceptibility of host as well as the period of feeding, need to be established for all major insect pests. Once the critical economic damage level is reached, spraying is required to prevent further damage. This data has been developed for blue green aphid (BGA) on lucerne by Bishop (1984), his findings indicate for example, in how many days a given population of aphids will cause 10% damage in the early regrowth stage of lucerne, comparing a susceptible and a tolerant variety.

Often, because of the young seedlings extreme vulnerability to any damage, such sophisticated decision making guides are not required and protective spraying should be carried out as soon as damage is evident. For example, emerging lucerne or clover seedlings should be sprayed immediately red legged earth mite (RLEM) are observed. Seedbed management prior to sowing can frequently reduce the chance of insect attack, eg. summer burning or fallowing and effective broadleaf weed control in the previous winter can help reduce the RLFM risk. Insect problems are more likely to occur where minimum tillage is used for establishment.

DISEASE CONTROL

The importance of disease in pasture establishment is only now being fully appreciated. A limited but increasingly volume of evidence suggests that foliar and root diseases impose important limitation on the establishment of subclover, annual medics, lucerne and white clover.

Resistant varieties have been developed for many diseases of lucerne and for clover scorch in subclover. Fungicides are also useful for the protection of susceptible subclover varieties against clover scorch and for controlling damping-off (*Pythium spp*), a common cause of lucerne establishment failures in cool moist environments. Root diseases, particularly (*Phytophthora clandestina*) are now recognised as a major cause of plant death in both establishing and established subclover pastures (Greenhalgh and Taylor, 1985). Varieties vary in their reaction to *P. clandestina* eg. Woogenellup is highly susceptible while Junee and Trikkala are tolerant. The selection of well adapted tolerant varieties appears to be the only practical strategy farmers can use to minimise this problem.

GRAZING MANAGEMENT

Grazing management specifically designed to optimise pasture establishment has not been studied in detail. Thus, I will assume that the management requirements are similar to those for established pasture, albeit grazing should not commence until the plants are firmly rooted and cannot be pulled from the ground and the sensitivity of establishing pastures to management influences will be much greater than established pastures. Since the area of the establishing pasture on a property is relatively small in relation to the total pasture area, and since the investment in the new pasture is high with high potential benefits which may continue for many years special attention should be given to the management of the pasture. In particular, the grazing management should be more precise and carefully monitored, with the intensity and duration of grazing controlled to optimise growth of the sown species to a degree that would not be practicable for the remainder of the property. The establishing pasture is perhaps the only situation in Australia where the concept of manipulating grazing to maximise growth and development for the attainment of an optimum leaf area index has a regular practical application. The management practices for perennial pastures have been reviewed by Smetham (1977) and for lucerne by Leach (1978). For lucerne practical experience has demonstrated rotational grazing can successfully begin when the plant first starts to flower provided that the grazing duration does not exceed two weeks.

Subclover should be set stocked at a moderate rate (pasture 3-10 cm high) until 50% of plants have started to flower. After this, stocking may need to be reduced to ensure flowers and developing seedpods are not eaten. For surface sown pastures, Campbell (1985) suggests that grazing should be delayed until the first autumn unless weed competition is severe, when a short heavy grazing is recommended. The delaying of grazing until the year after sowing is not beneficial to most establishing pastures.

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