

## Characteristics Of Pasture Species

Temperature, soil moisture, soil fertility and pasture management are four important factors which determine the suitability of a pasture species for a particular site. We define the characteristics of a range of species in two alternative ways:

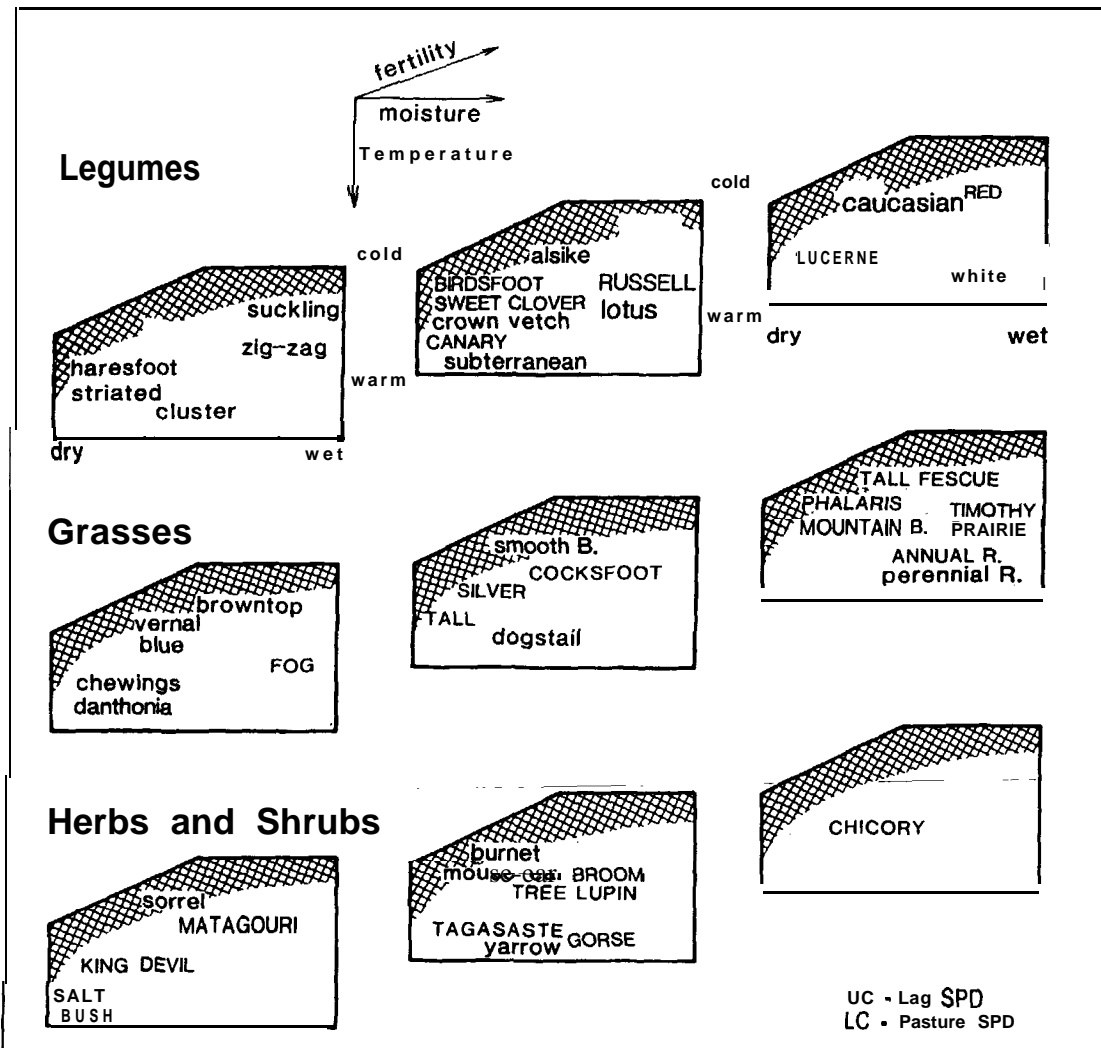
- Diagrammatically in relation to temperature, moisture and fertility for a few species
- In tabular form in more detail for a greater range of species.

Figure 6, in the same manner as earlier figures, places species in the temperature, moisture and

fertility environment in which they are likely to have an optimum role. For most of the pasture species (eg perennial ryegrass) this is in a New Zealand environment outside the high country but, by their location in the diagram, the range of adjacent high country environments in which they have a role can be deduced.

Species most suited to lax grazing are printed in capital letters.

The species name is placed in the environment in which it has its optimum role, but there is a range of adjacent environments which are also suitable.



**Figure 6:** The most suitable role of some pasture species in relation to the environmental factors of temperature, soil moisture and three levels of soil fertility. The name is placed in the environment in which it has its optimum role, but like browntop and perennial ryegrass, there is a range of adjacent environments in which each is also suitable. Species more suited to lax grazing are given capital letters.

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**Table 2:** Species adaptation and tolerances to different high country physical and management environments.

Species	Temp	Moisture			Soil Fertility			Grazing Tolerance	Acceptability To Stock	Seeding Rate kg/ha
		1	2	3	1	2	3			
<b>Legumes</b>										
Alsike clover	A/B	M	M-H	M	M	M	M	B	M	2-4
White clover	B/C	L-M	H	M-H	L	M	H	A	H	2-4
Red clover	A/B	L-M	H	M-H	L	L-M	M-H	C	H	2-4
Lucerne	B/C	H	H	L	L	L	H	C	H	4-10
Lotus	B	L-M	L	M-H	M-H	H	L-M	B	M	3-5
Birdsfoot trefoil	B/C	M-H	M-H	L-M	M	L-M	M	C	H	3-5
Perennial lupin	B	M	M	M	M	L	M	B	M	2-5
Caucasian clover	A/B	M-H	L	M	H	M	L-M	A	H	1-2
Zigzag clover	B	M	L	M-H	H	M	L-M	A	M	1-2
Crown vetch	B/C	H	L	L	H	L	L-M	A	M	1-2
Cicer milk vetch	B	M-H	M	M	M	L	L	B	H	5-10
Suckling clover	A/B	L-M	L	M-H	H	H	L	A	M	0.5-1
Haresfoot clover	B/C	H	L	L	H	L	L	A	L	
Sweet clover	B	M	L	M	M	M	L-M	B	M	2-5
Subterranean clover	C	M	L	L-M	L	L	H	B	H	5-10
Vetch or tares	C	H	L	L	M	L	M	C	M	5-15
Canary clover	B/C	H	L	L	H	L	L-M	B	L	4
Greenfeed lupin	B	M	L	M	L	M	H	C	H	5-10
Sainfoin	C	M-H	M	M	M	L	L	C	H	5-15
<b>Grasses</b>										
Cocksfoot	ABC	H	M	L-M	M	M	L-M	B	M-H	2-12
Tall fescue	A/B	M	H	M-H	L-M	L	M-H	A	H	2-12
Timothy	B	L	H	H	L-M	M	H	C	H	2-5
Perennial ryegrass	B/C	L-M	H	M-H	L-M	L	M-H	A	H	10-15
Hybrid ryegrass	B/C	L-M	H	M-H	L-M	L	M-H	B	H	10-15
Annual ryegrass	B	M	H	M-H	L	L	H	B	H	15-25
Browntop	A/B	M	L	L-M	M-H	H	L	A	M	0.25-2
Sweet vernal	A/B	M	L	L-M	M	M	L	A	M	
Yorkshire fog	B	L-M	L	M-H	M	H	L	B	M-H	2-5
Chewings fescue	B	H	L	M	H	H	L	A	L	1-4
Tall oat grass	B	H	L	L-M	H	L	L	C	M	5-10
Fescue or hard tussock	A/B	H	N-A	L	H	M	L	B	L	
Blue tussock	A	M	N-A	M	H	M	L	B	M	
Silver tussock	B	M	N-A	N	M	M	M	B	L	
Snow tussock	A	M	N-A	M-H	H	H	L	B	L	
Red tussock	A	L	N-A	H	H	H	L	B	L	
Crested dogstail	C	M	M	M	L-M	L	M	A	M	5
Smooth brome	B	M	L-M	M-H	M	L	M	A	H	1 0-20
Prairie grass	C	M	M	L-M	L	L	H	C	H	15-25
Kentucky bluegrass	B	M-H	L	M	M-H	L	L	A	L	
Pubescent wheat grass	C	H	L	L-M	H	L	L	B	M	5
<b>Ryecorn</b>										
Mountain rye	A/B	M	L-M	L-M	M		L-M	C	M	30-40
Danthonias	B/C	H	L	H	L	L	L	A	L	
Phalaris	B/C	H	L-M	M-H	H	M	L	B	L-H	1-3
<b>Herbs</b>										
Sheeps bumet	B	H	.	L	M	L	L	B	M	
Sheeps sorrel	A	H	.	L	H	H	L	A	L	
Mouse-ear hawkweed	B	M	L-M	M	L	L	A	M	.	
King devil hawkweed	B	M	.	L-M	H	M	L	B	M	
Yarrow	B	M	.	L	M	M	M	B	M	2-5
Chicory	C	M	.	M	L	L	H	C	H	2-5
Plantain	B	M	.	L-M	M	M	M	B	H	1-2

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Species	Temp	Moisture			Soil Fertility			Grazing Tolerance	Acceptability To Stock	Seeding Rate kg/ha
		1	2	3	1	2	3			
<b>Shrubs</b>										
Matagouri	A	L	.	L-M	H	H	L	A	L	-
Briar	B	H	.	L-M	M	M	L	A	L	-
Gorse	B	L	.	M	M	H	M	A	L	-
Brome	B	M	.	M	M	H	L	A	L	-
<b>Saltbush</b>	C	L	L	L	M	L	L	C	M	10
Tagasaste	C	L	M	L-M	L-M	L	M	C	M	2-5
Mountain mahogany	C	L	L	L	M	L	L	B	L	10
<b>Bluebush</b>	C	L	L	L	M	L	L	C	M	10
Tree lupin	C	L	L	M	M	M	L	B	L	5-15
Tree medic	C	L	L	L	M	L	L	C	M	5

Temperature (zone of greatest value)

A Cool temperature

B Moderate temperatures and altitudes

C Warm temperatures, low altitudes, sunny faces

**Moisture (L=Low, M=Medium, H=High)**

1 Tolerance to prolonged moisture stress (drought)

2 Suitability for intensive irrigated pastures

3 Rainfall at which species is most useful or prevalent

Acceptability To Stock

L=Low, M=Medium, H=High

Soil Fertility (L=Low, M=Medium, H=High)

1 Adaptation to low soil fertility

2 Suitability for wet, acid and infertile soils

3 Fertility levels where species is of greatest value

Grazing Tolerance

A Tolerates intensive set stocking at least moderately well

B Intermediate

C Requires lax grazing or long regrowth periods

Seeding Rate (kg/ha)

Legume seed inoculated and coated

This is not where each species grows best (nearly always in a warm, wet, high fertility environment) but rather where each species would be more productive and persistent than other species that might be considered. The second approach (Table 2) gives detailed information on a greater range of species. It discriminates between different degrees of temperature, moisture and fertility adaptation and gives information on grazing tolerance, palatability, and seed rates. A general theme of this guide is to get the right species for the actual conditions experienced on each site.

The relative importance of the plant attributes which determine the level of success or suitability of specific pasture species will vary with environment, type of management, and expected performance. In difficult environments, traits which determine long-term persistence, survival and sustainability are given more weight than production potential and level of animal acceptability.

To appreciate how a plant species will respond to grazing, cutting or trampling, we need some understanding of its actual growth habit or morphology, i.e. the type of shoots and process of shoot development; the location of growing points and their level of vulnerability to removal and damage. For example, lucerne starts producing new shoots from the plant crown at or slightly below ground level following first defoliation. These grow into zones where they can be eaten within 7-10 days. Thus lucerne can be grazed very hard, but only for a short period (7-10 days). Red clover produces its new shoots at or just above ground level and should not be grazed as close as lucerne. Ryegrass produces its new shoots at or below ground level, whereas cocksfoot shoots originate above ground level.

These morphological differences allow hard grazing of ryegrass on one hand, but dictate lax grazing or brief intense grazing of cocksfoot on the other.

Interaction between where the new shoots are produced and how quickly they grow leads to a contrast of species tolerance to closeness and frequency of grazing. Species like lucerne and prairie grass are intolerant of frequent grazing. Subterranean clover is the other extreme, intolerant of close but tolerant of frequent grazing. Others range from those intolerant of close and frequent grazing, like red clover and annual ryegrass, through cocksfoot, biennial and hybrid ryegrasses, white clover and tall fescue, to perennial ryegrass and phalaris which are tolerant of close and frequent grazing.

Widespread occurrence of browntop, sweet vernal and haresfoot clover in the high country shows that spread of species by volunteer reseeding is effective. The occasional occurrence of white clover, red clover, cocksfoot, Yorkshire fog and tall oat grass in many unimproved parts of the high country also indicates that volunteer reseeding can occur in these species. However, seed set and spread should not be assumed. For instance, cool temperatures and high altitudes can lead to frost damage during flowering. Establishment of legumes by reseeding can be restricted by lack of rhizobia spread.

Pasture species, particularly legumes, can spread vegetatively also. White clover is the prime example. Research has shown that seasonal variation in soil moisture levels has a far greater influence on the vegetative spread of white clover on tussock country than grazing management. Other spreading legumes are lotus, Caucasian clover, zigzag clover and crown vetch. Most grasses have very slow vegetative spread.