FACTORS AFFECTING THE MANAGEMENT OF TROPICAL AND TEMPERATE PASTURES

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ABSTRACT

This presentation deals with a comparison of some of the factors affecting the management of tropical and temperate pastures.

1 Water: Water deficit is the most important factor affecting pastures in the tropics unlike in the temperate zone.

2 Fertilizer: In tropical pastures application of nitrogen fertilizer is usually not adopted due to economic constraints, hence the emphasis placed on the introduction of legumes, whereas in temperate pastures the use of nitrogen fertilizer is often effective as well as that of legumes.

3 Light: Competition for light is not as important in tropical pastures as in the temperate pastures. Thus the establishment of pastures under coconut trees is suitable in terms of light utilization in the tropics.

4 Establishment: Stem transplanting is often effective in the establishment of tropical pastures. Moreover, oversowing of legumes or pioneer grasses such as mollasses grass or sorghum is effective in native grasslands. Both methods are seldom applied in temperate pastures.

5 Maintenance of pasture productivity during the dry season: Irrigation along with fertilizer or dung and urea application to highly productive grasses such as Napier grass in limited areas may enable to maintain pasture productivity during the dry season in the tropics, while in temperate pastures there are no effective methods to promote productivity during the winter season.

6 Selection of suitable grass species: There are many kinds of tropical grasses which are suitable for cooler areas (Kikuyu grass, Bahia grass, Dallis grass, Bermuda grass, Rhodes grass), for warmer areas (Signal grass, Para grass, Napier grass, molasses grass), for humid areas (Para grass, Pangola grass, Scrobic grass), and for dry areas (Weeping Love grass, Jaragua grass, Buffel grass).

In contrast, the range of adaptability of temperate grasses to different climatic conditions seems less wide than that of tropical grasses.

Advanced techniques of management suitable for temperate pastures have been introduced to the tropics with mixed results. The occasional failures recorded may be ascribed to the fact that limiting factors affecting the management of tropical pastures had been overlooked.

Since the author had the opportunity to carry out studies on tropical pastures for two years in Thailand and for one year in Australia, the factors affecting the management of tropical pastures were compared with those affecting pastures in Japan, which is located in the temperate zone.

1 Water

As water deficiency is the most important factor affecting pastures in the tropics, pasture yield or pasture persistence is regulated by the amount of rainfall, while in the temperate zone, temperature is the main factor regulating yield or persistence.

In Thailand, establishment of pastures was compared between two periods of the year i.e. early in the rainy season (June-July) and late in the rainy season (August-September). Although transplanted Guinea grass and Para grass grew well when established both early and late in the rainy season, sown legumes could survive only in the late rainy season establishment (Table 1).

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Table 1 Dry weight (kg/ha) and ratio (%) of grass and legume after establishment early and late in the rainy season

Combination	Early rainy season establishment (June, July)		Late rainy season establishment (August, September)	
	D W	%	D W	%
Guinea grass	3,750	97.7	1,330	82.1
Centrosema	90	2.3	290	17.9
Guinea grass	5,280	100	1,270	97.7
Glycine	0	0	30	2.3
Guinea grass	5,860	100	1,280	61.5
Townsville stylo	0	0	800	38.5
Para grass	2,870	97.6	1,590	82.8
Centrosema	70	2.4	330	17.2
Para grass	2,520	99.2	1,700	99.8
Glycine	20	0.8	4	0.2
Para grass	3,360	100	1,380	82.6
Townsville stylo	0	0	290	17.4

As a rule, in the early part of the rainy season, the soil tends to be dry owing to high temperature and low humidity in the air. Such conditions are not conducive to the establishment of pastures. However, after a pasture is established, grass and legume will have enough time to grow before the onset of the dry season. On the other hand, in the later part of the rainy season, the soil tends to be wet. Although the establishment of a pasture may be easy, grass and legume will have little time to grow before the onset of the dry season.

2 Fertilizer

In tropical pastures application of nitrogen fertilizer is usually not adopted due to economic constraints, hence the emphasis placed on the introduction of legumes, whereas in temperate pastures the use of nitrogen fertilizer is often effective as well as that of legumes.

In tropical pastures deficiency of minor elements such as Mo, S, Fe, Co, Zn often occurs unlike in the temperate pastures. These deficiencies impair the growth of the plants in the pasture. But in some cases although pasture growth is not affected, cattle suffer from the lack of these minor elements.

3 Light

Competition for light is not as important in tropical pastures as in the temperate pastures. Thus the establishment of pastures under coconut trees is suitable in terms of light utilization in the tropics. Active growth of grasses under the shade of trees or houses is often observed in the tropics.

4 Establishment

Stem transplanting is often effective in the establishment of tropical pastures in contrast to the erratic establishment by seed sowing because of water deficiency, while in the temperate zone, this method is seldom applied.

In Thailand, an experiment was conducted to have legumes as dominant pasture crops because in ordinary pastures, the composition ratio of legumes tends to decrease rapidly. As legumes are usually established by seed sowing, legumes were sown first and after the growth of seedlings, grasses were transplanted.

Table 2 Dry weight (kg/ha) and ratio (%) of grass and legume after simultaneous and sequential establishment

Combination	Simultaneous establishment D W	%	Sequential establishment D W	%
Guinea grass	1,330	82.1	10	4.0
Centrosema	290	17.9	240	96.0
Guinea grass	1,270	97.7	0	0
Glycine	30	2.3	80	100
Guinea grass	1,280	61.5	30	2.9
Townsville stylo	800	38.5	1,010	97.1
Para grass	1,590	82.8	70	20.6
Centrosema	330	17.2	270	79.4
Para grass	1,700	99.8	70	77.8
Glycine	4	0.2	20	22.2
Para grass	1,380	82.6	50	8.2
Townsvill stylo	290	17.4	560	91.8

By the application of this method, legume-dominated pastures were established compared to the low ratio of legumes in pastures with simultaneous establishment of legumes and grasses (Table 2).

Oversowing of legumes or pioneer grasses such as mollasses grass or sorghum is effective in native grasslands. This method results in the gradual improvement of the soil conditions, thus enabling the introduction of higher yielding grasses. This method is seldom applied in temperate pastures.

5 Maintenance of pasture productivity during the dry season

To overcome the shortage of forage crops during the dry season in the tropics, several methods can be applied in addition to the making of hay or silage, while in temperate pastures there are no effective methods to promote productivity during the winter season.

One of the methods which can be applied in the tropics is irrigation where it is practicable. Irrigation along with fertilizer or dung and urea application to highly productive grasses such as Napier grass in limited areas may enable to maintain pasture productivity during the dry season. In this case, pasture should be located under cattle barn for easy recycling of sewage or dung and urea.

Another method is the use of deep-rooted legumes such as *Leucaena* or *Glycine* which can grow to some extent during the dry season.

Another method is to supply molasses and urea for licking in the vessel on grazing pasture during the dry season. This method supplies sugar and protein which are definitely deficient in dried grasses during the dry season.

The identification of grass species which contain a reasonable amount of nutrients after being dried during the dry season is also desirable.

6 Selection of suitable grass species

There are many kinds of tropical grasses which are suitable for cooler areas (Kikuyu grass, Bahia grass, Dallis grass, Bermuda grass, Rhodes grass), for warmer areas (Signal grass, Para grass, Napier grass, molasses grass), for humid areas (Para grass, Pangola grass, Scrobic grass), and for dry areas (Weeping lovegrass, Jaragua grass, Buffel grass).

In contrast, the range of adaptability of temperate grasses to different climatic conditions seems less wide than that of tropical grasses.

Discussion

Koseki, J. (Japan): Did you observe any deficiency in micro-nutrients in the pasture species?

Answer: I do not have personal data to present but the probability of deficiency is very high since leaching of nutrients is likely to occur in the tropics due to the strong precipitation and high temperature.

Chen, C. P. (Malaysia): The contrasting results obtained in the establishment of grasses (low) and legumes (high) are interesting. I wonder if you proceeded to any follow-up after the last collection of data. Indeed you might have observed different results since the growth of grasses is usually more aggressive than that of legumes.

Answer: No we did not.