

EFFECT OF INTERCROPPING ON THE NDF AND ADF CONTENTS OF LUCERNE UNDER VARIED LEVELS ON N AND P

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ABSTRACT

Field experiments were conducted to study the possibility of raising intercrops in lucerne (*Medicago sativa* L.) and the effect of N and P application. The treatments consisted of pure lucerne, pure fodder sorghum, pure fodder maize and lucerne plus fodder sorghum/fodder maize. To the mixed stand, nine combinations of three levels each of N and P were applied. The neutral and acid detergent fibre contents of lucerne were greater in the mixed stand of lucerne+fodder sorghum as compared to lucerne+fodder maize. Application of N and P reduced the NDF and ADF contents of the lucerne in the mixed stand.

KEY WORDS: Intercropping, Neutral-detergent fibre, Acid-detergent fibre, Lucerne.

Mostly, the fodder needs of livestock in the farms are usually met through the available crop residues. The nutritional value of this kind of fodder is not satisfactory. Feeding cereal and leguminous fodder will be beneficial for milch animals. Hence, the possibility of intercropping system has to be explored. With this view, two cereal fodder crops. (i.e.) sorghum and maize were selected as intercrops in the lucerne stand. It is well known that the quality in terms

of the cell wall components of legume is greatly affected by N and P fertilizer elements. To assess the effect of intercropping under different levels of N and P on the cell wall components of lucerne, the study was undertaken.

MATERIALS AND METHODS

The treatments consisted of pure lucerne, pure fodder sorghum, pure fodder maize and lucerne plus fodder sorghum during first year and pure lucerne, pure fodder maize, pure grain

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maize and lucerne plus fodder/ grain maize during second year. Lucerne Co 1, Sorghum Co 24, maize Ganga 5 (F₁) and UMC 6 for fodder purpose, Hybrid Ganga 5 and UMC 6 for grain purpose were the varieties tried. For lucerne Co 1, 25-100-40 kg NPK/ha/year was adopted and the entire quantity of fertilizer was applied as basal dose. For cereal fodder crop, 60-25-20 kg NPK/ha/crop and 120-60-60 kg NPK/ha crop for grain maize were followed.

P and K were applied at the time of sowing. Nitrogen was applied in two equal splits one at the time of sowing and another at 30 days after sowing for intercrops. The intercrops were given fertilizer as per the treatments viz., 0, 30 and 60 kg N/ha/crop; 0, 12.5 and 25 kg P₂O₅/ha/crop for cereal fodder crops and 0, 60 and 120 kg N/ha/crop and 0, 30, and 60 kg P₂O₅/ha/crop for grain maize respectively.

For pure lucerne, solid row spacing of 30 cm between rows was followed. For the intercrop system lucerne was sown in paired rows of 45 cm + 15 cm. Lucerne seeds were treated with bacterial inoculum of *Rhizobium* spp. The cereal fodder crops were sown conti-

nuously in the lucerne rows in the 45 cm space. The grain maize crop was sown in the interrow space of lucerne with a plant to plant spacing of 30 cm. Pure grain maize was sown with a spacing of 45 x 30 cm. The intercrops were sown after the first cut of lucerne at 60 days after sowing. The experiment was laid out in a factorial randomised block design with four replications. The lucerne samples of the last cutting were taken for analysing the cell wall components. These were measured as Neutral-Detergent Fibre and Acid-Detergent Fibre. The method developed by Goering and Van Soest (1967) was followed for the estimation.

RESULTS AND DISCUSSION

The data recorded on cell wall components are presented in the Table. The NDF and ADF values which influence the quality aspects of fodder are greatly effected by crop maturity and other factors.

Neutral-Detergent Fibre 1980-81:

Pure lucerne recorded the lowest Neutral-Detergent Fibre (NDF) value (42.35 percent). In between, the cereal fodder crops fodder sorghum and fodder maize recorded NDF value of 44.77 and 44.03 per cent respectively. In the mixed stand, the

NDF values were reduced with N and P application. The reason was better utilisation of applied nutrients which would have reduced the same due to lush vegetative growth. Similar results were reported by Anderson and Thacker (1970) and Shanmugasundaram (1980).

1981-82:

Pure lucerne recorded the lowest NDF value (42.68). The NDF values of lucerne were increased (44.76 and 44.28) when it was mixed with grain maize and fodder maize respectively, the increase being greater with grain maize. In the mixed stand, lesser availability of N to lucerne due to competition increased the NDF. In a mixed stand of lucerne-grain/fodder maize, the NDF value was reduced with increase in the level of N applied. Nitrogen application prolonged the maturity of the crop and thereby reduced the NDF content. Singh and Chatterjee (1968) reported that in mixed grass/legume pastures, N accumulated whenever legumes grew well. This increased the growth rate resulting in reduction in lignification. Mowat et al. (1969) observed increased NDF content of orchard grass with maturity. Similar results were reported by Anderson and Thacker (1970) and Shanmugasundaram (1980).

Reduction in the NDF content was caused by applica-

tion of P also. Increased N uptake with P application could be the reason for reduced NDF. Bhagawan Das et al. (1974, 1975) and Shanmugasundaram (1980) reported a small reduction in the NDF due to P application.

Acid-Detergent Fibre

1980-81:

Lucerne as pure stand recorded lesser per cent (30.60) of Acid-Detergent Fibre (ADF). In the mixed stands of lucerne-fodder sorghum and lucerne-fodder maize recorded 33.52 and 32.67 percent of ADF respectively. Progressive decrease in ADF values was observed due to N and P application in the lucerne-cereal mixed stands. Govindasamy (1978) and Shanmugasundaram (1980) reported decreased ADF values due to fertilizer.

In general, the NDF and ADF contents of lucerne were greater in the mixed stand of lucerne-fodder sorghum as compared to lucerne-fodder maize. This indicates that the quality of the lucerne fodder is less affected in association with fodder maize than fodder sorghum.

1981-82:

The ADF content is related to the constituents of forage. This component increases the cellulose (Sood et al., 1974) and decreases digestible dry matter (Suresh Kumar, 1977; Govindasamy, 1978) and crude protein.

Table. Neutral-Detergent Fibre and Acid-Detergent Fibre of lucerne

Character	1980-81				1981-82			
	Fodder sorghum		Fodder maize		Grain maize		Fodder maize	
	period		period		period		period	
Treatments	NDF (%)	ADF (%)	NDF (%)	ADF (%)	NDF (%)	ADF (%)	NDF (%)	ADF (%)
Control (Pure lucerne)	42.35	30.60	42.35	30.60	42.68	30.75	42.68	30.75
Rest Lucerne+Sorghum/ Maize (Fodder)	44.77	33.42	44.03	32.67	44.76	33.51	44.28	32.98
SE _D	0.12	0.17	0.16	0.10	0.08	0.15	0.14	0.09
CD (P=0.05)	0.25	0.33	0.32	0.21	0.17	0.31	0.30	0.10
N ₀	46.10	34.85	45.90	34.10	46.17	34.98	45.72	34.50
N ₁	44.85	33.10	44.26	32.75	45.05	33.40	44.57	32.90
N ₂	42.75	32.55	42.15	31.25	43.06	32.16	42.54	31.60
SE _D	0.08	0.13	0.12	0.25	0.06	0.12	0.11	0.23
CD (P=0.05)	0.16	0.26	0.23	0.51	0.13	0.24	0.23	0.47
P ₀	45.95	33.70	45.10	33.30	45.74	33.80	45.33	33.20
P ₁	45.10	33.25	44.35	32.45	45.01	33.46	44.68	32.90
P ₂	43.85	33.05	42.40	32.15	43.53	33.51	42.82	32.80
SE _D	0.08	0.13	0.12	0.25	0.06	0.12	0.11	0.23
CD (P=0.05)	0.16	0.26	0.23	0.51	0.13	0.24	0.23	NS
N x P	NS	NS	NS	NS	NS	NS	NS	NS

NS - Not significant.

Lucerne as pure stand recorded ADF value of 30.75 per cent. It was increased to 33.51 per cent in lucerne-grain maize and 32.98 per cent in lucerne-fodder maize. The increase was more with grain maize than with fodder maize. Due to the greater competition in the mixed stand, higher ADF values were recorded in lucerne. Application of N and P to the

mixed stand reduced the ADF content of lucerne. The increased uptake to N due to N and P fertilizer would have caused reduction in the ADF values.

The ADF content was reported to be negatively correlated with crude protein. In the present study, higher crude protein in lucerne with increased N level, reduced the

ADF of lucerne in the mixed stand.

Lucerne recorded higher values of NDF and ADF in the mixed stand than pure stand. But among the two cereal fodder crops tested, the quality of

the lucerne fodder was less affected in association with fodder maize than fodder sorghum. The application of N and P resulted in reduction NDF and ADF contents of lucerne in the mixed stand of maize as fodder and grain intercrops.

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