Effect of boron fertilizer on density, growth, seed yield and nutrient concentrations of *Centrosema pubescens* grown in humid subtropical areas of Yunnan in China

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Introduction Livestock production depends on quality and quantity of forage which can be influenced by fertilizer application (Forth 1984). Pasture improvements techniques in tropical and subtropical areas of Yunnan have largely centered on the use of new species of plants which had been introduced to China from Australia. Less is known about how nutrient limitations may limit forage quality and yield. This study examined the effects of boron (B) on the density, growth, seed yield and nutrient concentrations of *Centrosema pubscens* in terms of nutrient requirements. Yield improvements with B addition could greatly assist animal husbandry in humid subtropical areas of Yunnan.

Material and methods The study was conducted on the southeast of Yunnan(101°17′E, 22°47′N), of latosolic soil type with average annual rainfall of 2220 mm, an elevation of 890 m, a mean temperature of 20.6℃, annual evaporation of 1865 mm. The original vegetation was *Chromolaera odorata*, *Eupatarium coelestinum*, natural grasses and a few *Desmodium* spp. The nutrient contents of 0-20 cm soil were 29.7 g.kg^{-1} organic matter, 1.5 g.kg^{-1} total nitrogen, 14.2 mg.kg^{-1} available phosphorus, 0.5 mg.kg^{-1} available boron, 5.6 pH. The method used was a randomized factorial design of one factor with four levels(viz. nil, 0.55, 1.1 and 1.65 kg B/hm^2) and three replications for *Centrosema pubescens*. The plant spacing was 0.5 m, with sowing rate of 6 kg/hm^2 for each block(4m×4m). Boron fertilizer was applied at sowing with supplement of P 16 kg/hm^2, Cu 1.2 kg/hm^2, Mn 2.6 kg/hm^2, Co 0.063 kg/hm^2, Zn 1.8 kg/hm^2 and Mo 0.162 kg/hm^2, respectively. Number of seedlings, oven-dry matter and seed yields were recorded for three years. All samples were analysed for N, P, K, Ca, Mg, Zn, Cu and Mn in general method (Bao 2000). Data was analyzed with SPSS 11.0.

Results Seed yield and dry matter yield of *Centrosema pubescens* with B 1.65 kg /hm^2 was increased by 163% ($p<0.01$) and 83% ($p>0.05$) to compare with the control treatment in the Table 1. Moreover, with B application, the yields of Ca ($p<0.01$), P, S and Cu ($p<0.05$) increased significantly. Nutrient concentrations of *Centrosema pubescens* fertilized with 1.65 kg B per hectare increased significantly compared with the controlled treatment as illustrated in the Table 2.

Table1 *Effect of B fertilizer application on the number of seedling, seed yield and dry matter yields of* Centrosema pubescens *(Mean SD).*

boron rates kg/hm^2	0	0.55	1.10	1.65
Number of seedlings plants/m^2	4.3±3.1	5.3±0.6	6.3±1.2	4.3±2.1
Seed yields kg/hm^2	27±8.7^b	43.5±12.5^{ab}	58±15.0^a	71±20.1^a
Dry matter yields kg/hm^2	1798±533	1596±229	2640±1311	3294±1232

$^{a-b}$Means in a row having a common letter are not different($P>0.05$)

Table 2 *Effect of various boron rates on the yields of nutrient requirements of* Centrosema pubescens *in VP Boron rates.*

Boron rates kg/hm^2	N kg/hm^2	P kg/hm^2	K kg/hm^2	Ca kg/hm^2	S kg/hm^2	Cu g/hm^2	Zn g/hm^2	Mn g/hm^2
0(CK)	53.9	1.8^b	27.0	8.1^B	3.2^b	12.6^{ab}	44.9	396
0.55	47.9	2.6^b	22.3	7.0^B	2.6^b	9.6^b	33.5	345
1.10	66.0	4.0^{ab}	37.0	14.5^B	3.4^b	15.8^{ab}	52.8	528
1.65	95.5	5.9^a	42.8	36.2^A	6.9^a	23.1^a	49.4	629

$^{a-b\ A-B}$Means in a column having a common letter are not different($P>0.05$)

Conclusion With application of 1.65 kg/hm^2 of boron fertilizer, *Centrosema pubescens* performed not only the best in seed yield but also high yield of quality forage, supplying sufficiently nutrient requirements for livestock.

References

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