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Vegetative growth of *Lablab purpureus* and *Canavalia ensiformis* under differing P fertiliser applications in Namibia

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Abstract

The level of N fixation from effectively nodulated legumes depends on the growth rate of the legume and upon soil conditions. The main objective of this study was to compare the vegetative growth of *Lablab purpureus* and *Canavalia ensiformis* under differing P fertiliser application rates. A randomized block design was used during the growing season of December 2013 – April 2014 in a two-way factorial experiment consisting of two legumes (*L. purpureus, C. ensiformis*) and single super phosphate applied by placement below the seed at planting (0 and 11.5 kg/ha). The growth of the legumes was monitored over a period of 2 months (April – May 2014). There were differences (P <.0001) in growth rates (increase in height) of the legumes and between differing P fertiliser application rates (P < .05), but there was no legume x fertiliser interaction (P > .05). The least square means of growth rates (cm/day) of legumes were .193 ± .014 with no P application and .257 ± .016 with P application. *C. ensiformis* grew faster (P < .05) than *L. purpureus* (.276 ± .014 versus .257 ± .016 cm/day). The preliminary results of this study suggest that under Namibian conditions, with lose sandy soils, direct placement of P fertiliser close to the seed is more efficient than broadcasting.

Key words: *Canavalia ensiformis*, forage, *Lablab purpureus*, legumes, ruminants

Résumé

Le niveau de la fixation d'azote à partir de légumineuses nodules efficaces dépend de la vitesse de croissance de légumineuse et des conditions du sol. L'objectif principal de cette étude était de comparer la croissance végétative de *Lablab purpureus* et *Canavalia ensiformis* sous différents taux d'application d'engrais P. Un plan en blocs aléatoires a été utilisé au cours de la saison de croissance de décembre 2013 - Avril 2014 sur les deux sens factoriel expérimental composé de deux légumineuses *(L. purpureus, C. ensiformis)* et un seul super phosphate appliquée par le placement en dessous de la graine à la plantation (0 et 11,5 kg / ha). La croissance des légumineuses a été contrôlée sur une période de 2 mois (Avril - May 2014). Il y avait des différences (P <0,0001) du taux de croissance (augmentation de la hauteur) des légumineuses et entre différents taux d'application d'engrais phosphatés (P <0,05), mais il n'y avait pas d'interaction légumineuse x d'engrais (P> 0,05). Les moyens moins carrés de taux de croissance (cm / jour) de légumineuses étaient 0,193 ± 0,014 sans application de P et 257 ± 0,016 avec l'application P. Le *C. ensiformis* ont grandi plus rapidement (P <0,05) que *L. purpureus* (.276 ± .014 contre .257 ± 0,016 cm / jour). Les

résultats préliminaires de cette étude suggèrent que dans des conditions de Namibie, avec des simple sols sableux, le placement direct des engrais P près de la semence est plus efficace que la radiodiffusion.

Mots clés: *Canavalia ensiformis*, fourrage, *Lablab purpureus*, les légumineuses, les ruminants

Background

As agriculture continues to develop, there are new roles coming up for legumes in farming systems, especially in tropical farming systems (Anikwe and Atuna, 2003). Therefore, any introduction warrants proper investigation for it to be acceptable and provide tangible results to its end users. According to Snapp et al. (1999) legumes which combine some grain yield with high root and leaf biomass, thus a low N harvest offer a useful promise of meeting farmers' food security concerns and improving soil fertility. The main objective of this study was to compare the vegetative growth of *Lablab purpureus* and *Canavalis ensiformis* under differing P fertiliser application rates.

Literature summary

Legumes are needed in perennial pastures used in ruminant production but are assuming a greater role in mixed farming where the legume contributes to sustaining crop yields and protecting the environment (D'Mello and Devendra, 1995). Research has shown that well-chosen legumes could supply the nitrogen boost needed for African soils, helping farmers to provide fodder for animals and lift crop yields. Most legumes grow well in moderately warm soil and a pH of 6.0 to 6.5.

According to Boitumelo and Mahabile (1992) average *Lablab purpureus* dry matter yields from farmers' fields were 1.14, 0.70, 2.82 and 0.87 t/ha. Fertiliser did not have any affect ($P>0.05$). This is contrary to preliminary results obtained in the study.

Study description

The study was done at Neudamm campus farm of the University of Namibia to compare growth rates of *Lablab purpureus* and *Canavalia ensiformis* with and without P fertiliser placement in the soil close to the seed. A randomized block design was used in a two-way factorial experiment with legume as first factor (*L. purpureus, C. ensiformis*) and single super phosphate as second factor applied by placement below the seed at planting (0 and 11.5 kg / ha) replicated 3 times, giving a total of 12 plots. Each of the plots measured 4 m x 3 m and had 6 plants, 60 cm apart. The growth of the legumes was monitored over a period of 2 months (April – May), with heights being recorded fortnightly (Figs. 1 and 2). Data was analysed by the GLM procedure (SAS, 2006). There were differences ($P <.0001$) in growth rates of the legumes and between differing P fertilizer application rates ($P < .05$), but there was no legume x fertilizer interaction ($P > .05$). The least square means of growth rates (cm/day) of legumes were $.193 \pm .014$ with no P application and $.257 \pm .016$ with P application.

Figure 1. L*ablab purpureus* eight (8) weeks after planting.

Figure 2. *Canavalia ensiformis* at eight (8) weeks after planting.

In contrast to a companion study concurrently undertaken (Kaholongo *et al*., 2014), *C. ensiformis* grew faster ($P < .05$) than *L. purpureus* (.276 ± .014 versus .257 ± .016 cm/day). The reversal in growth rates of the legumes under the two studies are explained by the fertilizer application method, which suggests that direct placement of P fertilizer close to the seed is more efficient than broadcasting, in agreement with some studies (Singh and Saxena, 1999).

Research application

The preliminary results of this study have demonstrated the beneficial effects of P fertiliser application on legume growth and has also shown that under Namibian conditions, with lose sandy soils, direct placement of the fertilizer close to the seed is more efficient than broadcasting.

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