

Variation for components of seedling vigour among Persian clover cultivars

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ABSTRACT

A glasshouse experiment was conducted to quantify variation for seedling vigour in 8 Persian clover cultivars. To quantify seedling vigour, measurements were taken of total plant and leaf, stem, petiole, root and shoot dry matter, leaf number, stem, petiole, leaf and internode length, height to first branch and total leaf area 8 weeks after sowing. Seedling vigour was assessed with and without applied nitrogen and *Rhizobium* spp. A measure of nodulation was also undertaken. Variation was found in the rate of growth and dry matter accumulation 8 weeks after sowing. The variety Morbulk showed the largest increase in growth and dry matter production. As anticipated, varieties of the *Majus* subspecies had the largest increase in the rate of growth and dry matter accumulation, due to larger leaves and greater total leaf area. The *resupinatum* subspecies had smaller leaves and longer internode lengths than the *Majus* varieties. There were also considerable differences observed between varieties within the 2 subspecies groups.

KEY WORDS

Seedling vigour, Rhizobium, nitrogen, Persian clover.

INTRODUCTION

Persian clover (*Trifolium resupinatum*, ssp. *Majus*) has become increasingly popular as a high yielding, high quality hay crop. It is well adapted to poorly drained soils that are widespread in south-western Victoria and tolerates a broad range of soil pH. Seedling vigour is an important factor for annual legumes as it improves competition with weeds and plant establishment.

In this experiment, eight lines of Persian clover were evaluated for seedling vigour 8 weeks post sowing: Kyambro, Nitro Plus, Maral, Leeton, Laser and Morbulk. Persian clover has several sub-species. Kyambro and Nitro Plus belong to the sub-species *resupinatum* L. var *resupinatum*, while Morbulk, Laser, Leeton and Maral belong to the sub-species *resupinatum* L. var. *majus*. Boiss (1).

It is widely believed that seedling vigour increases the establishment potential of annual legumes, as early vigorous growth improves competition with weed species and root development. Variation for seedling vigour in Persian clover has previously not been documented.

MATERIALS AND METHODS

Seedlings of each of the eight treatment lines were germinated on Petri dishes and 48 seedlings of each were transplanted into seedling trays filled with river sand. The seedlings were sown in a replicated split-plot design consisting of six replicates with the treatments variety (8: Kyambro, Nitro Plus, Maral, Leeton, Laser, Morbulk) by nutrient treatments (2: + O group inoculant, -NO₃; - inoculant, + NO₃). Each replicate comprised four seedlings of each variety. Seedlings were destructively harvested at eight weeks post-sowing and measurements were taken for stem length, leaflet length, leaf area, petiole length, height to first branch, nodule score, internode length, leaf number and total leaf area. Dry matter weights were recorded for stem, leaf, petiole and roots on each plant. Principle component analysis was used to analyse these data (Figure 1) (2).

RESULTS AND DISCUSSION

There was significant variation ($P<0.05$) in seedling growth and thus vigour between the Persian clover cultivars assessed. Internode length ranged from 0.24 mm in Morbulk s2 to 6.90 mm in Nitro Plus; petiole length ranged from 75.8 mm in Kyambro to 149 mm in CPI 27377; and leaf area ranged from 4.76 mm in Nitro Plus to 9.86 mm in CPI 27377.

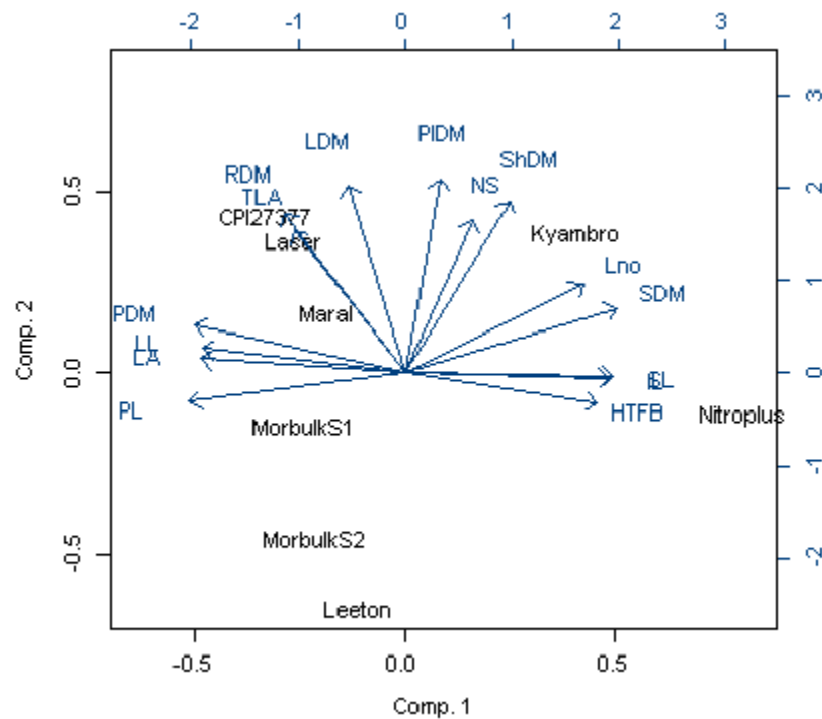


Figure 1. Principle component analysis for components of seedling vigour. LDM= leaf dry matter, PIDM= plant dry matter, NS= nodule score, ShDM= shoot dry matter, Lno= leaf number, SDM= stem dry matter, SL= stem length, HTFB= height to first branch, PL= petiole length, L.A= leaf area, LL= Leaf length, PDM= petiole dry matter, TLA= total leaf area, RDM= root dry matter, IL= internode length.

Persian clover cultivars assessed here expressed considerable variation for traits that contribute to seedling vigour. Generally the data for petiole dry matter, leaf length and area and petiole length were highly correlated. The data also demonstrated that Persian clover seedlings with a high number of leaves tended to have a shorter petiole length.

CONCLUSION

There was considerable variation for traits that contribute to seedling vigour in Persian clover, namely total plant dry matter, leaf, stem, petiole, root and shoot dry matter, leaf number, stem length, height to first branch, petiole length, leaf length, internode length and total leaf area. The identification of varieties with improved seedling vigour will enable the seedlings to compete more successfully with weeds and thus allow better establishment success when sowing new pastures.

REFERENCES

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2. Genstat 5 Committee (1997). Genstat 5 Reference Manual. (Oxford University Press: Oxford)