

## Relationships between nitrogenase activity, dry forage and water soluble carbohydrates content of selected red clover genotypes

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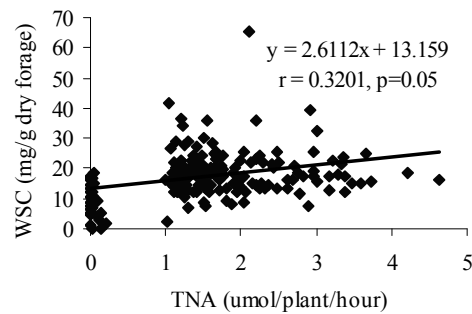
**Introduction** Improving N<sub>2</sub> fixation of perennial forage legumes through selection and breeding reduce reliance on soil N and N fertiliser, whilst enhancing residual benefits to subsequent crops and increasing legume forage dry matter (DM) yield. Simultaneously with the selection for enhanced N fixation, new legume genotypes should be evaluated on forage quality, especially nutrient concentration and dry matter digestibility.

**Materials and methods** Hydroponic perlite experiments were used for screening 1200 individual plants of 38 tetraploid red clover cv ‘Dolina’ genotypes. The selection was based on two previous cycles of recurrent breeding for enhanced nitrogenase activity. Standard cultivar ‘Tempus’ was included as a criterion for the selection. Effective *Rhizobium leguminosarum* bv. *trifolii* strain HZ6 was used for inoculation. Plants were cultivated in plastic pots in a greenhouse (Jakesova *et al.*, 1995). Total nitrogenase activity (TNA) (μmol C<sub>2</sub>H<sub>4</sub>/plant/hour) was measured according to Hardy *et al.* (1973) at the onset of anthesis. Simultaneously with TNA, root volume and forage DM were determined. Water soluble carbohydrates content (WSC) was measured in forage DM using NIRS spectrometry.

**Results** Mean values of measured characteristics are given in Table 1. Hundred and fifty one plants that exceeded TNA of cv. Tempus by 10 % were selected. TNA significantly correlated ( $p < 0.01$ ) with forage DM yield ( $r = 0.4075$ ) and root volume ( $r = 0.5023$ ). Some selected plants had extremely high TNA. WSC content was positively but weakly related to TNA (Fig. 1).

**Table 1** Mean values of TNA, dry forage, root volume and WSC of selected red clover plants

Plants	TNA (μmol C <sub>2</sub> H <sub>4</sub> / plant/ hour)	Dry forage (g/plant)	Root volume (cm <sup>3</sup> )	WSC (mg/g dry forage)
all plants	1.57	3.29	15.50	17.26
selected above the average plants	1.89	3.68	18.14	18.91
poor plants	0.04	1.42	3.06	9.29



**Figure 1** Relationship between TNA and WSC

**Conclusions** New genotypes of tetraploid red clover were selected on the basis of TNA. Positive significant correlations of TNA and other measured characteristics provided promising plant material for future breeding.

### References

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