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## Response of plantain and chicory to frequency and intensity of cutting

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**Key words** : *Plantago lanceolata* , *Cichorium intybus*

**Introduction** Plantain and chicory are used to provide high nutritive value herbage during warmer months in forage crops and pasture mixes in New Zealand .Use of plantain has increased recently but little is known about its comparative response to cutting or grazing management .The objective was to compare the response of plantain and chicory to cutting frequency and intensity .

**Materials and methods** Plantain cv Ceres Tonic and chicory cv Choice were mown at three frequencies (1 ,2 ,4 weeks) and three intensities (3 ,5 ,6 ,5 ,9 ,0 cm) for 8 weeks in autumn (11/3/07-21/5/07) in a randomised complete block design with four replicates .Individual plots were 48 m<sup>2</sup> .The crops were one year old and on a highly fertile ,free draining soil at Massey University ,where they were grazed monthly prior to the experiment .Plots were sampled pre and post mowing by cutting at ground level in 0 .25 m<sup>2</sup> quadrats .Intact plants were sampled by digging out 0 .06 m<sup>2</sup> quadrats .

**Results and discussion** There were no interactions between species ,frequency and intensity ,and the effect of height was not significant ,except for a species by intensity interaction on tap root diameter .The shoot dry matter (DM) % leafiness % dead material and shoot density of plantain were greater than those of chicory (Table 1) .There were 1 .7 shoots/plant for both species .Shoot dry matter increased with decreasing frequency of cutting ,but shoot density was at its maximum at 2 weekly intervals .Both species appeared unsuited to a cutting frequency of 1 week .The shoot density from 26/3/07 to 11/9/07 was stable for plantain 421 to 399 shoot/m<sup>2</sup> ,but for chicory decreased by 30 % from autumn to spring (335 to 234) ,suggesting some plants died as shoot number/plant increases over time for chicory (Li and Kemp 2005) .The tap root diameter of plantain was unaffected by cutting intensity ,but that of chicory was less under hard cutting (Table 2) showing greater sensitivity to cutting intensity by chicory .

**Table 1** Shoot dry matter (DM) production % leafiness and dead and shoot density .

|                  |              | DM (g/m <sup>2</sup> ) | % leaf/shoot | % dead | Shoot/m <sup>2</sup> |
|------------------|--------------|------------------------|--------------|--------|----------------------|
| <b>Species</b>   | plantain     | 141 .2                 | 99 .8a       | 17 .8a | 338 .1a              |
|                  | chicory      | 88 .9                  | 85 .4b       | 12 .8b | 281 .0b              |
|                  | significance | **                     | ***          | *      | *                    |
| <b>Frequency</b> | 1 week       | 63 .0a                 | 94 .4a       | 17 .1a | 288 .1a              |
|                  | 2 week       | 119 .9b                | 91 .1a       | 17 .4a | 351 .2b              |
|                  | 4 week       | 162 .16c               | 92 .6a       | 11 .5b | 289 .3a              |
|                  | significance | ***                    | NS           | *      | *                    |

NS ,not significant ; \* P<0 .05 ; \*\* P<0 .01 ; \*\*\* P<0 .001 .

**Table 2** Diameter of tap root (mm) at 21/5/07 after 8 weeks with three intensities of cutting .

| Species      | Hard    | Height Middle | Lax     | significance |
|--------------|---------|---------------|---------|--------------|
| Plantain     | 114 α A | 105 α A       | 102 α A | NS           |
| Chicory      | 266 β A | 336 β B       | 341 β B | **           |
| Significance | ***     | ***           | ***     |              |

NS ,not significant ; \*\* P<0 .01 ; \*\*\* P<0 .001 . A ,B ,C show the differences within species ; α and β show the differences between the species .

**Conclusion** The growth ,development and shoot density of plantain was less sensitive to cutting than chicory inferring that plantain will be more productive and persistent under cutting and grazing than chicory .

### Reference

Li ,G . ; Kemp ,P .D . 2005 . Forage chicory (*Cichorium intybus* L .) : a review of its agronomy and animal production . *Advances in Agronomy* 88 : 187-222 .