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EFFECT OF ATMOSPHERIC CO₂-INCREASE ON CARBON FLUXES IN GRASSLAND ECOSYSTEMS

COST ACTION 619

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S.C. van de Geijn (Ed.)

Effect of elevated CO₂ on tillering ability of perennial ryegrass (*Lolium perenne* L.)

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Summary

In experiments by Ryle et al. (1992) and Gay & Hauck (1994) no increase was observed in tiller production of *Lolium* plants at elevated CO₂ and high light. Possible causes for this phenomenon as mentioned and discussed by the authors are suboptimal nitrogen availability, limiting pot size and low ratio of red/far-red radiation. However, all these three possible causes were unlikely in the two experiments. Therefore, Gay & Hauck concluded that more information is needed on the factors controlling tillering ability in *Lolium* at high light.

According to Neuteboom & Lantinga (1989) the tillering potential of *Lolium* is 0.693 tillers per tiller per leaf appearance interval. This corresponds with doubling of the total tiller number per plant between successive leaf stages. The question is: was this potential tillering pattern already reached in both experiments, independent of CO₂ concentration?

Unfortunately, from both experiments no information is available about the relation between number of leaves appeared on the main tiller and plant tiller number. The temperature regime in the experiment by Ryle et al. was 20/15°C. From data collected by Van Loo (1993) it can be derived that at this regime the leaf appearance interval of diploid *Lolium perenne* plants in growth cabinets is about 7 days. Using this value it was found that tillering rate was at its ecological maximum in the experiment of Ryle et al. (see figure)

Therefore it is concluded that the tillering ability limits the growth response in spaced *Lolium* plants to elevated CO₂.

References

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On the relation between tillering, leaf area dynamics and growth of perennial ryegrass (*Lolium perenne* L.). Doctoral thesis, Agricultural University Wageningen, viii + 169 pp.

ln (tillers/pot)

