

Short communication

A minimal effect of hydroponic culture of perennial ryegrass (*Lolium perenne*) plants on infection with the endophyte *Neotyphodium lolii*

J. P. J. EERENS

AgResearch
Ruakura Agricultural Research Centre
Private Bag 3123
Hamilton, New Zealand

Abstract Ryegrass seedlings with an unknown endophyte infection status were grown in hydroponic culture for 5 weeks as part of a ryegrass evaluation, to allow selections on different root types to be made. Of the 1920 plants grown, 132 were selected and planted out in the field. After a year, two ramets of each of the 132 plants were grown in hydroponic culture for a second period of 5 weeks and the level of endophyte infection was only then assessed. Endophyte strands were found in 98% of the 264 plants. Of each of the 5 endophyte-free plants, the duplicate plant contained endophyte. Endophyte infection was 100% in 18 of the 20 half-sibling (HS) ryegrass families used and 93% and 67% in the remaining two HS families. It is concluded that growing endophyte-infected perennial ryegrass plants in hydroponic culture has a minimal effect on the endophyte infection level.

Keywords hydroponic culture; perennial ryegrass; *Lolium perenne*; *Neotyphodium lolii*; endophyte

INTRODUCTION

Perennial ryegrass (*Lolium perenne*) plants in New Zealand depend on the presence of an endophytic fungus (*Neotyphodium lolii*) for survival, especially in areas with high population densities of the Argentine stem weevil (*Listronotus bonariensis*) (Prestidge & Gallagher 1988). Interactions between endophyte strain and ryegrass genotype have been observed, complicating interpretation of the impact

of the endophyte (Eerens 1996). To get a true indication of the extent to which the endophyte influences the morphology and physiological processes of its host plant, isogenic plants with and without endophyte are produced for experimental use. Lewis & Vaughan (1995) reported that growing ryegrass plants in hydroponic culture resulted in loss of endophyte infection in 55% of the plants compared with loss of endophyte infection in 0.5% of plants grown in peat and sand. Lewis & Vaughan (1995) suggested that hydroponic culture could be a useful tool to develop isogenic ryegrass lines. At the Ruakura Research Centre, plants are routinely grown in hydroponic culture to study root systems, but if in the case of endophyte-infected ryegrass the infection is lost, data may have been misinterpreted. The impact of the Ruakura system of hydroponic culture on ryegrass endophyte associations needed to be established. This paper reports on the effects of hydroponic culture on endophyte infection of a range of perennial ryegrass plants.

MATERIALS AND METHODS

Thirty perennial ryegrass families were taken from a population of maternal half-sibling (HS) families. The population had originated from plants from old pastures throughout New Zealand and was developed by three generations of random mating and selection for vigour and disease resistance at a range of locations throughout New Zealand. In July/August 1996, 64 plants of each of 30 HS perennial ryegrass families were grown from seed in hydroponic culture for 5 weeks and 132 plants (originating from 20 HS families) were selected to be grown in the field over spring, summer, and autumn. Two three-tiller ramets were removed from each of the 132 selected plants, roots were trimmed, and they were grown in hydroponic culture for another 5-week period in July/August 1997. The hydroponic solution used in both years was a low ionic strength solution culture (Blamey et al. 1991), replaced fortnightly, and pH-corrected three times

