INVESTIGATION OF THE USE OF OATS IN ANNUAL MEDIC PASTURES

by

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CONTENTS

ABSTRACT

The removal of volunteer annual grasses from annual medic pastures can dramatically improve the following cereal crops by providing important cereal root disease breaks, improved biological nitrogen fixation and reduced grass weed competition in medic-cereal rotations. Early removal of these volunteer grasses has the disadvantage of creating a winter feed shortage due to low medic productivity. A comparison of adding cereal root disease resistant oats to medic based pastures with the effects of either early removal or retention of volunteer grasses was conducted. Adding oats increased total pasture production and improved early dry matter production, so that sheep were introduced 21 days earlier than the grass-free medic pasture and 11 days earlier than the grass+medic pasture type. Final sheep liveweight gain was similar between all pasture types (128 g/sheep/day) suggesting compensatory growth in spring was occurring, particularly on the grass-free medic pasture type. Wheat yield and quality were directly related to the previous pasture type, with significant reductions after grass+medic and oat+grass+medic pasture types (average both pasture types 53% less) due to take-all disease, grass weed competition and reduced available N. Improving the low productivity of medic when grown in grass mixtures was the focus of additional experimentation. Establishment in autumn (20/10°C day/night) simulated temperatures compared to winter (15/8°C day/night) improved the productivity and competitevness of medic in both monocultures and mixtures, particularly after defoliation and a period of regrowth (66% increase in medic dry matter in medic12:2 oats mixture). Total season dry matter production was always greater in medic/oat mixtures than monocultures with sowing ratios that strongly favour increased medic density (> medic 3:1 oat) maximising medic production in mixtures. Delaying defoliation and high medic populations were the most successful management methods to maximise medic production in medic/oat mixtures. Delayed sowing of low density oats into established medic stands reduced seedling competition but provided little gain to early pasture productivity. This relationship did not alter with stocking rate. Appraisal of the Australian Medicago Genetic Resource Centres collection of medics and a limited number of CSIRO plant industries *Rhizobium meliloti* strains failed to find accession × rhizobium combinations better than the current commercial cultivar Paraggio for medic/oat mixtures. The capacity to improve the competitvness of the medic component in medic/oat mixtures was found to be limited as was the usefulness of this mixture to medic-cereal rotations.