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Title

THE INFLUENCE OF ENVIRONMENT ON GROWTH AND DEVELOPMENT  
IN THE FORAGE LEGUME SAINFOIN  
(Onobrychis viciifolia Scop.)

A thesis presented in partial fulfilment  
of the requirement for the degree  
of Master of Science in Botany  
at Massey University.

Patrick Joseph Sheely

1977



Frontpiece  
Sainfoin (Onobrychis viciifolia Scop.) blossoming  
after long day treatment.

ABSTRACT

The effect of environment on growth and development in the forage legume sainfoin is examined. A comparative study has been made between five sainfoin cultivars (Melrose, Giant, Italian, Krasnodar, Common) and also between genotypes within each cultivar.

The effect of plant age on growth and development of cv. Melrose is examined. Results show that this cultivar had a juvenile phase of approximately 60 days when plants were grown in long days (LD) in a warm glasshouse (GH).

When Melrose sainfoin was grown in small pots reproductive development was inhibited. After data on root-and shoot growth and development had been obtained various hypotheses are presented that might explain this result.

The effect of gibberellic acid ( $GA_3$ ) on growth and development of Melrose in a warm GH is examined. Low concentrations of  $GA_3$  caused plants with a prostrate leaf and rosette habit to change to a erect leaf and rosette habit in short days (SD). Application of higher concentrations of  $GA_3$  to plants in SD made plants elongate stems, although, inflorescence initiation did not occur.  $GA_3$ , when applied to warm LD grown plants, decreased the juvenile period, lowered the critical photoperiod for inflorescence initiation and possibly helped to overcome this observed root growth/small pot size inhibition on reproductive development, however,  $GA_3$  did not cause an increase in the percentage of plants with macroscopically visible inflorescences (mvi) with only 30-50% having mvi.

Results on the effects of low temperature on growth and development are presented for all cultivars. Those plants that did not flower in long days when held in the warm glasshouse did so after low temperature treatment. Plants held in natural cool short days initiated inflorescences, although, these inflorescences did not develop to anthesis while held under these environmental conditions. Results on the effect of critical day length on continued inflorescence development after SD low temperature treatment show that a daylength of approximately 14 hours was necessary for inflorescences to reach anthesis. Data is also presented on inflorescence initiation and development for Melrose plants grown in the natural cool environment with various extended photoperiods.

The relative importance of these environmental and hormonal factors, and the interactions between them, in controlling growth and development is discussed.

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