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SEED PRODUCTION IN BIRDSFOOT TREFOIL (Lotus corniculatus L.)

A thesis presented in partial fulfillment
of the requirements for the
Degree of Doctor of Philosophy
in Seed Technology
at Massey University
Palmerston North
New Zealand

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1989

A B S T R A C T

This thesis reports the results of three years' research on seed production of birdsfoot trefoil (Lotus corniculatus L.). Previous work by other researchers has suggested that a protracted flowering period is a major factor limiting seed production in this legume. The research programme was begun in 1986 with an investigation of the cause(s) of this protracted flowering period. By carefully examining the growth and flowering behaviour of tagged shoots formed at different times of the year, it was identified that the protracted flowering pattern in this plant is caused by the continuous production of shoots with the capacity to flower. The continuous development of new shoots replacing older flowering shoots was the main cause of the long flowering period. Results of the first year's research also showed that seed yield is primarily determined by the number of inflorescences produced. In turn, inflorescence numbers are primarily dependent on the number of shoots available at the time of flowering. It was suggested by the results that manipulation of the number and branching of shoots should be an important management strategy for improving seed production in this plant.

The second stage of the study involved a number of hand removal and cutting treatments designed to investigate the possible effects of shoot removal on plant growth and seed production. Hand removal of crown shoots affected branching behaviour in this plant. Removal of young crown shoots at different growth stages resulted in a range of plant structural forms which influenced seed production potential. Cutting treatments, the major effect of which was to remove a section

of shoot from the top, showed no obvious beneficial effects on seed yield in birdsfoot trefoil.

In the third stage studies were extended to investigate a more practical situation in which plant growth regulating chemicals (paclobutrazol (PP333), etofumesate (Nortron) and fatty alcohols (Fatol Super)) were used to manipulate shoot growth and development. Research at this stage involved both widely spaced individual plants and plants grown in a sward to simulate commercially practised situations. Results showed that PP333 is a promising pre-peak flowering shoot manipulator which acts by promoting branching. Nearly a 40% increase in seed yield was consistently obtained in two years' experiments when this chemical were applied during the time from the pre-bud stage to the early flowering stage. Nortron showed its value in sward situations when applied at early plant development stage. However, Nortron was of limited value when it was used as a post-peak flowering shoot manipulator because of its injurious effect on plant growth and flowering. Fatol Super showed some potential as a post-peak flowering shoot manipulator, particularly when applied to spaced plants, but was less effective in sward situations. This reduces its value for use in the narrow row or sward seed production systems currently practiced in New Zealand for birdsfoot trefoil.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Dr. Murray J. Hill, my chief supervisor and Director of the Seed Technology Centre, for his wise supervision throughout the work and patience in reading and correcting this manuscript.

I am also greatly indebted to Professor R.G. Thomas and Dr. Alex. Chu, my co-supervisors, for their warm encouragement, guidance with the field work and constructive criticism and patient correction of this manuscript.

My sincere thanks are also extended to:

Dr. John G. Hampton and Dr. Peter Coolbear for their wise advice, warm encouragement and constructive criticism of this work.

Mr. M. Hare and Dr. P. Rolston for allowing me to use DSIR's Aorangi property and for their kind encouragement, wise suggestions and constructive criticism of this work.

Ray and Karen Johnstone, Craig McGill, Mrs Dulcie Humphrey and the students in the Seed Technology Centre for their understanding and help in so many ways.

The Miss E.L. Hellaby Indigenous Grasslands Research Trust and the Helen E. Akers Scholarship for financial support.

All my friends for their help and encouragement.

Finally, my deepest gratitude to my parents and my daughter, whose love, emotional support and encouragement have been invaluable to me. My thanks are also indebted to my wife, Chunying, for her devoted support and encouragement.

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