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*Onobrychis viciifolia* Scop.  
(syn. *O. sativa* Lam.)

Sainfoin

A STUDY OF GROWTH AND MANAGEMENT OF SAINFOIN  
(Onobrychis viciifolia Scop.)

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ABSTRACT

This thesis reports on studies designed to examine the production patterns of sainfoin (Onobrychis viciifolia Scop.) subject to defoliation. Dry matter yield estimates, seasonal distribution of production, plant disease and long term survival were considered for three sainfoin cultivars in a field trial run over a three year period. Assimilate partitioning and closer examination of plant morphology was studied using two of the cultivars grown under controlled environment conditions.

Sainfoin was successfully established in the spring period and early growth rates and dry matter production were at least as good as those of lucerne. All cultivars grown showed a tendency towards relatively early flowering when compared to lucerne. Only Fakir, the earliest flowering of the three cultivars, regrew sufficiently to be harvested a second time under the conservative harvesting regime imposed to maximise uninterrupted growth during the establishment year. The results of the two different cutting heights provided little evidence to support the higher of the two cuts (12-15cm). The main outcome was to leave about 25% of the dry matter behind as stem with little gain in residual leaf area to provide a photosynthetic surface for regrowth.

Subsequent growth and regrowth cycles in the field gave yields of up to 12 t/ha of herbage dry matter in a single season. All cultivar and management combinations tended to show poor autumn growth, with the plant adopting a rosette habit when lucerne was still actively growing. Also while the cultivar and management combinations gave a variable number of harvests in a given season, there was no evidence to support any one

management approach as being superior in production. The later maturing cultivar Melrose did provide some indication that higher yields may be possible from a later maturing plant, but also provided evidence of the potential for marked leaf loss when the plant was maturing under drying conditions. Leaf loss aggravated the situation of low leaf area indices that was shown for all three sainfoin cultivars.

Plant losses in the field trial resulted in uneven stands and contributed to the sampling variability which reduced the sensitivity of the experiment. While some of the losses were possibly related to the plants consistently harvested at a vegetative stage, all sainfoin plants were susceptible to a crown-root rot complex. This was indicated by necrosis of the crown tissue and vascular tissue of the tap-root which was often extensive and extending well below ground level.

Controlled environment studies provided further evidence of the poor regrowth ability displayed in the field. This would appear to be a result of a combination of the poor development of any new shoots to provide a start point for regrowth, little leaf area remaining at the base of the plant after harvest to provide a photosynthetic surface, and losses of root and nodule tissue from the plant after the stress of harvest. This tissue was subsequently replaced, possibly at the expense of top growth. Movement of assimilates to the root system did not tend to support any hypothesis of a build-up phase which may have interacted with management.

Indication of the within-cultivar variation for sainfoin was clearly shown under the controlled environment conditions. Multivariate analysis of the data provided a preliminary estimate of the gains that might be

possible if certain groups of attributes formed the base of a selection programme. Future prospects for sainfoin in grassland farming were proposed in the light of this information, and that gained from the field trial. These focused on the need to more fully evaluate sainfoin as a species, or group of species, and establish its demands rather than assume it will conform to the management model provided by other summer active forage crops.

# TABLE OF CONTENTS

Frontplate	i
Title Page	ii
Abstract	iii
Table of Contents	vi
List of Tables	x
List of Figures	xii
List of Appendices	xiv
 Chapter 1: Introduction and Objectives	 1
 Chapter 2: Literature Review	 5
2.1    Background	5
2.2    Nomenclature	7
2.3    Morphology	9
2.4    Physiology	10
2.4.1    Seedling Growth and Development	10
2.4.2    Vegetative Growth	11
2.4.3    Flower and Seed Development	13
2.5    Cultural Aspects	14
2.5.1    Adaptation	14
2.5.2    Establishment	16
2.5.3    Weed Control	18
2.5.4    Fertiliser	19
2.5.5    Defoliation and Herbage Dry Matter Production	21
2.5.5.1    General Concepts	21
2.5.5.2    Sainfoin	21
2.5.6    Mixtures	23

2.5.7	Seed Production	24
2.5.8	Pests and Diseases	25
2.6	Genetics and Breeding	26
2.6.1	Population Evaluation and Data Handling	27
Chapter 3:	The Performance of Sainfoin in the Establishment Year	29
3.1	Introduction	29
3.2	Experimental	30
3.2.1	Cultivar Description	31
3.2.2	Experimental Design and Procedure	32
3.2.3	Data Analysis	34
3.3	Results	35
3.3.1	Primary Growth	35
3.3.2	Main Harvests	38
3.4	Discussion	42
Chapter 4:	Defoliation Management and its Effects on Plant Performance and Herbage Dry Matter Production of Sainfoin ( <u>Onobrychis viciifolia</u> )	46
4.1	Introduction	46
4.2	Experimental	48
4.2.1	Trial Site	48
4.2.2	Timing of Harvests	49
4.2.3	Yield Determinations	50
4.2.3.1	Plant Dissections	51
4.2.4	Excavated Quadrats	51
4.2.5	Plant Survival Quadrats	53
4.2.6	Data Analysis	53

4.3	Results	54
4.3.1	Timetable of Events, and General Climatic Conditions	54
4.3.2	Yield	57
4.3.2.1	Total Herbage Dry Matter Production	57
4.3.2.2	Leaf Yield	59
4.3.2.3	Growth Rates	61
4.3.2.4	Distribution of Production	64
4.3.3	Plant Development	65
4.3.3.1	Dry Matter Production and Growth Rates	65
4.3.3.2	Leaf Dry Matter Yield	68
4.3.3.3	Leaf Area Index	68
4.3.4	Single Plants	71
4.3.5	Rosette Phase	76
4.3.6	Plant Disease	78
4.3.7	Final Plant Density and Distribution	79
4.4	Discussion	84
Chapter 5: Patterns of Growth and Assimilate Partitioning in Two Cultivars of Sainfoin ( <u>Onobrychis viciifolia</u> )		92
5.1	Introduction	92
5.2	Experimental	94
5.2.1	Plant Preparation	94
5.2.2	Distribution Experiment	95
5.2.3	Redistribution Experiment	95
5.2.4	<sup>14</sup> C Carbon Labelling Procedure	96
5.3	Results	98
5.3.1	Introductory Remarks	98
5.3.2	Growth and Regrowth Patterns	101

5.3.3	Distribution	110
5.3.4	Redistribution	118
5.4	Discussion	119
Chapter 6: A Multivariate Approach to the Examination of Variability in Sainfoin ( <u>Onobrychis viciifolia</u> )		126
6.1	Introduction	126
6.2	Experimental	127
6.2.1	Data Analysis	127
6.3	Results	129
6.4	Discussion	136
Chapter 7: General Discussion		140
Acknowledgements		148
References		150
Appendices		161

LIST OF TABLES

Table	Title	Page
3.1	Relative growth rates over the first eleven weeks from sowing	36
3.2	Regressions with yield against time during first eleven weeks of growth (yield = $\ln$ yield)	36
3.3a	Main harvest yields (kg DM/ha) of sainfoin for two cutting heights	38
3.3b	Mean growth rates (kg/ha/day) for main plots for low cutting height (4 - 6 cm) only	39
3.4	Ratio of leaf to stem combined over both harvest heights	40
3.5	Leaf area index (LAI) and specific leaf area ( $\text{cm}^2/\text{g}$ leaf) as combined means of both cutting heights	41
3.6	Residual leaf area ( $\text{cm}^2/\text{m}^2$ ) remaining on stubble after harvesting	41
4.1	Dry matter production (kgDM/ha) for 1980 - 81 and 1981 - 82	58
4.2	Leaf yield (kgDM/ha) for 1980 - 81 and 1981 - 82	60
4.3	Predictive equations for either yield (Y) or stem number (S) over two harvests (1 = first; 2 = second) in the 1980 - 81 season	73
4.4	Single plant data from first harvests in the 1980 - 81 season	75
4.5	Comparison between visual estimates of number of plants and actual numbers dug in quadrats ( $\text{plants}/\text{m}^2$ )	77
4.6	Total mass (kgDM/ha) of plant components from quadrats excavated in autumn 1981	77
4.7	Crown-root rot intensity scores (1 = min; 5 = max) from autumn 1981	78
4.8	Final plant density scores (1982)	79
4.9	Potential stem surface area ( $\text{cm}^2$ )	89
5.1	Numbers and weights of basal buds	111
5.2	Mean counts per plant for each harvest (d.p.m.)	112

5.3	Contingency table for Fakir	116
5.4	Contingency table for Melrose	117
6.1	Complete factor structure for Fakir and Melrose after principal component extraction	129
6.2	Loadings of the variables on the first 2 factors after both direct extraction and varimax rotation	131
6.3	Fakir clusters and character means (weights = g/plant)	132
6.4	Melrose clusters and character means (weights = g/plant)	133
6.5	Comparisons between Melrose and Fakir where differences occur	135
6.6	Factor scores for individual cases associated with some of the clusters	135

LIST OF FIGURES

Figure	Title	Page
3.1	Top weights of plants sampled over first eleven weeks of growth	37
4.1	Crown-root rot: disease intensity scores	52
4.2a	Harvest schedule 1980 - 81	55
4.2b	Harvest schedule 1981 - 82	56
4.3a	1980 - 81 Growth rates for individual harvests	62
4.3b	1981 - 82 Growth rates for individual harvests	63
4.4a	1980 - 81 Percentage distribution of total D.M. yield for each harvest	66
4.4b	1981 - 82 Percentage distribution of total D.M. yield for each harvest	66
4.5	Dry matter yield (fitted) - quadratic polynomial	67
4.6	Leaf dry matter yield (fitted) - quadratic polynomial	69
4.7	Percentage leaf	70
4.8	LAI (fitted) - quadratic polynomial	72
4.9	Percentage distribution of disease scores	80
4.10a	Final plant distribution - all treatments combined	82
4.10b	Final plant distribution - cultivar effect	83
5.1	Timetable of harvests	99
5.2	Component dry weight (g/plant) for Melrose primary growth and regrowth	102
5.3	Component dry weight (g/plant) for Fakir primary growth and regrowth	103
5.4	Top mass (g/plant) for Fakir and Melrose primary growth and regrowth	106
5.5	Leaf area development (cm <sup>2</sup> /plant) for Fakir and Melrose primary growth and regrowth	107

5.6	Numbers of flower buds and flowers	108
5.7	Total root mass (g/plant) for Fakir and Melrose primary growth and regrowth	109
5.8	Distribution of $^{14}\text{C}$ in Melrose over seven consecutive treatment periods (Distribution experiment)	113
5.9	Distribution of $^{14}\text{C}$ in Fakir over seven consecutive treatment periods (Distribution experiment)	114

LIST OF APPENDICES

Appendix	Contents	Page
1	Rainfall and evaporation data for duration of field trial.	161
2	Polynomial equations for describing plant growth in the field experiment (1980 - 81).	162
3	Stem numbers per plant from single plants harvested in the 1980 - 81 season.	163
4	Controlled Environment Rooms (Plant Physiology Division, D.S.I.R., Palmerston North) - Conditions for experiments outlined in Chapter 6.	164