

A Study of Modular Growth in Avocado (*Persea americana* Mill.)

By

T. Grant Thorp

Department of Horticulture, Viticulture and Oenology
Waite Agricultural Research Institute
The University of Adelaide
South Australia

Thesis submitted for the Degree of
Doctor of Philosophy
in
The University of Adelaide
(Faculty of Agricultural and Natural Resource Sciences)

August, 1992

I dedicate this thesis to my wife Ann
whose patient support enabled me to pursue my studies ,
and to my daughters Elsa and Solange.

Table of contents.

	Page
Abstract	i
Declaration	iv
Acknowledgements	v
List of tables	vi
List of figures	xi
1 Introduction	1
2 Review of vegetative and reproductive growth interactions in avocado.	
2.1 Introduction	3
2.2 Tree growth	4
2.2.1 Tree architecture	4
2.2.2 Shoot growth	5
2.2.3 Leaf growth	6
2.2.4 Root growth	7
2.2.5 Flowering and fruit set	8
2.2.6 Fruit growth and maturity	10
2.3 Vegetative and reproductive growth interactions	13
2.3.1 Root and shoot growth	13
2.3.2 Alternate bearing and shoot growth ..	15
2.3.3 Manipulation of shoot growth	20
2.3.4 Axillary branching	25
2.4 Conclusions	28

**3 Architectural analysis of tree form in a range of
avocado cultivars.**

3.1	Summary	29
3.2	Introduction	30
3.3	Materials and methods	
3.3.1	Plant material	32
3.3.2	Tree growth	32
3.3.3	Statistical analysis	34
3.4	Results	34
3.5	Discussion	41

**4 Preformation of node number in vegetative and
reproductive proleptic shoot modules of
Persea (Lauraceae).**

4.1	Summary	46
4.2	Introduction	47
4.3	Materials and methods	
4.3.1	Plant material	49
4.3.2	Shoot morphology	49
4.3.3	Bud morphology	52
4.3.4	Compound inflorescence morphology	53
4.3.5	Statistical analysis	53
4.4	Results	
4.4.1	Shoot morphology	53
4.4.2	Bud morphology	56
4.4.3	Compound inflorescence morphology	63
4.5	Discussion	67

**5 Influence of shoot age on floral development and
early fruit set in 'Hass' avocado.**

5.1	Summary	75
5.2	Introduction	76
5.3	Materials and methods	
5.3.1	Plant material	77
5.3.2	Shoot age treatments	77
5.3.3	Pruning treatments	79
5.3.4	Late-formed shoots	79
5.3.5	Statistical analyses	80
5.4	Results	
5.4.1	Shoot age treatments	80
5.4.2	Pruning treatments	86
5.4.3	Late-formed shoots	86
5.5	Discussion	88

**6 Manipulation of shoot growth patterns in relation
to floral development and early fruit set in
'Hass' avocado.**

6.1	Summary	91
6.2	Introduction	92
6.3	Materials and methods	
6.3.1	Plant material	92
6.3.2	Shoot tipping and pruning	93
6.3.3	Rootstock	93
6.3.4	Plant growth regulators	94
6.3.5	Statistical analysis	95

6.4 Results	
6.4.1 Shoot tipping and pruning	95
6.4.2 Rootstock	97
6.4.3 Plant growth regulators	97
6.5 Discussion	102
7 Summary of avocado tree architecture.	
7.1 Introduction	107
7.2 Tree architecture	107
7.3 Conclusions	113
8 General discussion	115
9 References	121

Appendix I. Terms used to describe modular growth

in avocado	154
------------------	-----

Appendix II. List of publications prepared in

association with this thesis	158
------------------------------------	-----