



# Contents

## Introduction

A.1	Crop overview.....	1
A.2	Value of lupin in crop rotations.....	1
A.3	Nutrition .....	2
A.4	Weeds and pests.....	2
A.5	Disease.....	2
A.6	Plant maturity and harvest.....	3
A.7	End uses.....	3
A.8	Marketing .....	4

## 1 Paddock planning and preparation

1.1	Overview.....	1
1.2	Variety selection .....	1
1.3	Narrow leafed lupin varieties .....	3
1.3.1	PBA Bateman <sup>®</sup> .....	3
1.3.2	PBA Jurien <sup>®</sup> .....	4
1.3.3	PBA Barlock <sup>®</sup> .....	5
1.3.4	PBA Gunyidi <sup>®</sup> .....	6
1.3.5	Jenabillup <sup>®</sup> .....	7
1.3.6	Mandelup <sup>®</sup> .....	8
1.3.7	Jindalee .....	9
1.3.8	Quilinock <sup>®</sup> .....	9
1.3.9	Wonga.....	10
1.4	Albus lupin varieties .....	10
1.4.1	Murringo <sup>®</sup> .....	10
1.4.2	Luxor <sup>®</sup> .....	11
1.4.3	Rosetta .....	11
1.4.4	Kiev Mutant.....	12
1.5	Soil types and paddock selection .....	12
1.6	Rotation and crop sequence considerations .....	13
1.7	Weed and herbicide considerations .....	13
1.8	Disease and pest considerations .....	14
1.9	Machinery considerations.....	14
1.10	Seed quality and germination issues .....	14

FEEDBACK

<b>2</b>	<b>Planting</b>	
2.1	Overview .....	1
2.2	Inoculants .....	1
2.2.1	Peat inoculum .....	3
2.2.2	In-furrow water injection .....	3
2.2.3	Granules .....	4
2.3	Time of sowing.....	4
2.4	Tillage systems .....	6
2.5	Row spacing .....	6
2.6	Seeding rates .....	6
2.7	Sowing depth .....	7
<b>3</b>	<b>Plant growth (phenology) and development</b>	
3.1	Overview.....	1
3.2	Germination and seedling emergence.....	4
3.3	Leaf emergence.....	5
3.4	Stem elongation and branching .....	6
3.5	Flowering .....	7
3.6	Pod ripening .....	8
3.7	Seed ripening.....	10
3.8	Lupin breeding advances .....	10
<b>4</b>	<b>Nutrition and fertiliser</b>	
4.1	Overview.....	1
4.2	Soil tests.....	2
4.3	Diagnosing nutrient deficiencies.....	4
4.4	Plant tissue testing.....	6
4.5	Fertiliser application methods .....	7
4.6	Nitrogen (N).....	8
4.7	Phosphorus (P).....	9
4.8	Potassium (K).....	10
4.9	Sulfur (S).....	12
4.10	Manganese (Mn).....	14
4.11	Molybdenum (Mo) .....	16
4.12	Zinc (Zn).....	17
4.13	Iron (Fe) .....	18
4.14	Cobalt (Co).....	19
4.15	Magnesium (Mg).....	20
4.16	Boron (B) .....	21
4.17	Calcium (Ca) .....	21
4.18	Nutrition benefits of lupin in the crop rotation .....	22



4.19 Nitrogen budgets .....	22
4.20 Role of lupin in nutrient cycling .....	24
4.21 Lupin, nutrients and soil constraints.....	25
<b>5 Weeds and herbicides</b>	
5.1 Overview .....	1
5.2 Herbicide types and use .....	2
5.3 Managing residual herbicide issues .....	2
5.3.1 Tips for managing newer herbicide options.....	7
5.4 Broadleaf weed control in lupin crops .....	9
5.4.1 Sowthistle ( <i>Sonchus oleraceus</i> ).....	9
Management and control of sowthistle.....	10
5.4.2 Wild radish ( <i>Raphanus raphanistrum</i> ) .....	12
Management and control of wild radish .....	13
5.4.3 Wild mustard/Indian hedge mustard ( <i>Sisymbrium orientale</i> ) .....	15
Management and control of wild mustard.....	16
5.4.4 Wireweed ( <i>Polygonum aviculare</i> , <i>P. arenastrum</i> ).....	17
Management and control of wireweed .....	18
5.5 Grass weed control in lupin crops.....	19
5.5.1 Annual ryegrass ( <i>Lolium rigidum</i> ) .....	19
Management and control of annual ryegrass.....	20
5.5.2 Wild oats ( <i>Avena sativa</i> ssp. <i>Fatua</i> and <i>A. ludoviciana</i> ).....	23
Management and control of wild oats.....	24
5.5.3 Brome Grass ( <i>Bromus diandrus</i> and <i>B. diandrus rigidus</i> – previously known as <i>B. rigidus</i> ).....	26
Management and control of brome grass.....	27
5.5.4 Barley grass ( <i>Hordeum glaucum</i> and <i>H. leporinum</i> ).....	28
Management and control of barley grass.....	29
5.5.5 Silver Grass ( <i>Vulpia myuros</i> and <i>V. bromoides</i> ).....	30
Management and control of silver grass .....	31
5.6 Crop-topping for weed control .....	32
Management tips and tactics for crop-topping.....	32
5.7 Harvest weed seed control (HWSC) tactics .....	33
5.8 Summer weed control .....	35
5.9 Decision support tools .....	37
5.9.1 Ryegrass Integrated Management (RIM) .....	37
5.9.2 Weed Seed Wizard .....	37
<b>6 Pests and insects</b>	
6.1 Overview .....	1
6.2 Integrated Pest Management (IPM) planning .....	1
6.3 Costs of insect and pest control.....	2



<b>6.4</b>	<b>Pest identification and management.....</b>	<b>4</b>
6.4.1	Snails .....	4
6.4.2	Redlegged earth mites ( <i>Halotydeus destructor</i> ).....	7
6.4.3	Blue oat mite ( <i>Penthaleus major</i> ).....	9
6.4.4	Balaustium mites ( <i>Balaustium medicagoense</i> ).....	10
6.4.5	Lucerne flea ( <i>Sminthurus viridis</i> ).....	11
6.4.6	Aphids ( <i>Aphididae</i> ).....	12
	<i>Cowpea aphid</i> .....	13
	<i>Blue green aphid</i> .....	13
	<i>Green peach aphid</i> .....	13
6.4.7	Lucerne seed web moth ( <i>Etiella behrii</i> ).....	13
6.4.8	Native budworm ( <i>Helicoverpa punctigera</i> ).....	14
6.4.9	Cutworms ( <i>Agrotis</i> spp.).....	15
6.4.10	Weed web moth ( <i>Achrya affinitalis</i> ).....	16
6.4.11	Grey-banded leaf weevil ( <i>Ethemaia sellata</i> ).....	17
6.4.12	European earwig ( <i>Forficula auricularia</i> ).....	18
<b>7</b>	<b>Root diseases and nematodes</b>	
7.1	Overview.....	1
7.2	Pleiochaeta root rot ( <i>Pleiochaeta setosa</i> ).....	2
	<i>Management of pleiochaeta root rot</i> .....	4
7.3	Rhizoctonia bare patch ( <i>Rhizoctonia solani</i> AG8).....	4
	<i>Management of rhizoctonia bare patch</i> .....	5
7.4	Phytophthora root rot ( <i>Phytophthora</i> spp, <i>P. cryptogea</i> ).....	6
	<i>Management of phytophthora root rot</i> .....	7
7.5	Rhizoctonia hypocotyl rot, or rhizoctonia root rot ( <i>Rhizoctonia solani</i> ).....	8
	<i>Management of rhizoctonia hypocotyl rot</i> .....	9
7.6	Minor root diseases in southern region lupin crops.....	10
7.7	Nematodes.....	11
	<i>Testing to identify nematodes</i> .....	12
	<i>Management of nematodes</i> .....	12
<b>8</b>	<b>Foliar diseases</b>	
8.1	Overview .....	1
8.2	Anthracnose ( <i>Colletotrichum lupini</i> ).....	4
	<i>Management of anthracnose</i> .....	5
8.3	Brown leaf spot ( <i>Pleiochaeta setosa</i> ).....	7
	<i>Management of Brown leaf spot</i> .....	8
8.4	Phomopsis stem and pod blight ( <i>Phomopsis leptostromiformis</i> , <i>Diaporthe toxica</i> ).....	9
	<i>Management of phomopsis</i> .....	10
8.5	Cucumber mosaic virus (CMV).....	11
	<i>Management of CMV</i> .....	12
8.6	Bean yellow mosaic virus (BYMV).....	14



	<i>Management of BYMV</i> .....	15
<b>8.7</b>	<b>Sclerotinia stem and collar rot (<i>Sclerotinia sclerotiorum</i>, <i>Sclerotinia minor</i>)</b> .....	<b>16</b>
	<i>Management of sclerotinia</i> .....	17
<b>8.8</b>	<b>Minor foliar diseases in southern region lupin crops</b> .....	<b>19</b>
<b>9</b>	<b>Desiccation, crop-topping and green/brown manuring</b>	
9.1	Overview .....	1
9.2	Windrowing/swathing .....	2
9.3	Decision-making for desiccation (with windrowing/swathing) .....	4
9.4	Decision-making for crop-topping .....	4
9.5	Products and timing for crop-topping and desiccation .....	5
9.5.1	Paraquat use .....	6
9.5.2	Diquat use .....	6
9.6	Green manuring of lupin .....	7
9.7	Brown manuring of lupin .....	7
<b>10</b>	<b>Harvest</b>	
10.1	Overview .....	1
10.2	Harvest timing .....	2
10.3	Minimising shattering and pod drop .....	3
10.4	Maintaining grain quality .....	3
10.5	Machinery configuration .....	4
	<i>Using closed (comb) fronts</i> .....	4
	<i>Using open fronts</i> .....	5
10.6	Managing harvest fire risks .....	6
10.7	Stubble management .....	7
10.8	Grain storage .....	8
<b>11</b>	<b>Grain markets</b>	
11.1	Overview .....	1
11.2	Export destinations .....	2
11.3	Domestic markets .....	2
11.4	Human consumption markets .....	3
11.5	Grain specifications .....	3
11.5.1	On-farm factors influencing lupin deliveries and marketing .....	5



*Pests* ..... 5  
*Disease*..... 6  
*Weed seed contamination*..... 6  
*Harvester settings*..... 6

**12 Lupin as a feed source**

**12.1 Overview** ..... 1  
**12.2 Grain protein** ..... 2  
**12.3 Feed mixes** ..... 3  
    12.3.1 Ruminants (dairy, beef, sheep)..... 3  
    12.3.2 Monogastrics (pigs, poultry) ..... 4  
**12.4 Grazing lupin crop stubbles** ..... 5  
    12.4.1 Lupinosis ..... 5

**13 Grain Marketing**

**13.1 Overview** ..... 1  
**13.2 Selling Principles** ..... 1  
    13.2.1 Be prepared..... 2  
        *When to sell*..... 2  
        *How to sell*..... 2  
    13.2.2 Establish a business risk profile – when to sell ..... 3  
    13.2.3 Production risk profile of the farm ..... 3  
    13.2.4 Farm costs in their entirety, variable and fixed costs  
        (establishing a target price) ..... 4  
    13.2.5 Income requirements ..... 4  
**13.3 Ensuring access to markets**..... 5  
    13.3.1 Storage and logistics..... 6  
    13.3.2 Cost of carrying grain..... 8  
**13.4 Executing tonnes into cash** ..... 9  
    13.4.1 Set up the tool box ..... 9  
        *Timely information* ..... 9  
        *Professional services* ..... 9  
    13.4.2 How to sell for cash..... 9  
        *Price* ..... 9  
        *Quantity and Quality* ..... 9  
        *Delivery terms*..... 9  
        *Payment terms* ..... 9  
        *Negotiation via personal contact* ..... 12  
        *Accepting a public firm bid* ..... 12  
        *Placing a firm offer*..... 12  
    13.4.3 Counter-party risk ..... 12  
    13.4.4 Relative values ..... 13  
    13.4.5 Contract allocation..... 13  
    13.4.6 Reading market signals ..... 13

FEEDBACK

<b>13.5 Market dynamics and execution.....</b>	<b>14</b>
13.5.1 Price determinants for southern lupin .....	14
13.5.2 Ensuring market access for southern lupin.....	15
13.5.3 Executing tonnes into cash for southern lupin.....	17
<i>Store on farm then sell .....</i>	<i>17</i>
<i>Cash sale at harvest .....</i>	<i>17</i>
<i>Warehouse then sell .....</i>	<i>17</i>