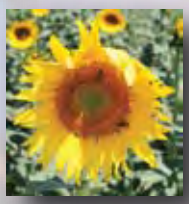
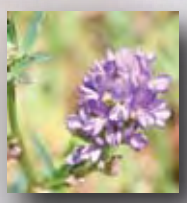
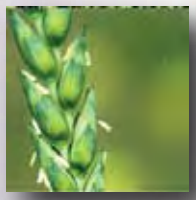
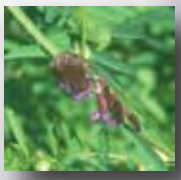
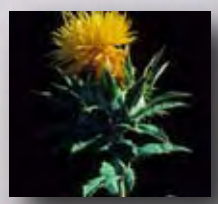
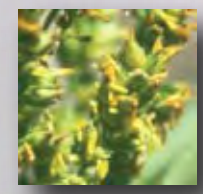
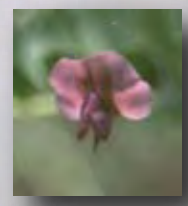
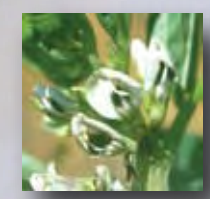
Rotation Crops and Cotton







Cotton Catchment Communities CRC

Australian Government
Cotton Research and Development Corporation

Produced by the Cotton Research and Development Corporation
and the Cotton Catchment Communities CRC

Introduction:

A vital component of any farming system is the inclusion of a rotational phase. This provides both advantages and disadvantages to the enterprise as a whole. There are always interactions ranging from weed pressure, insect hosts, diseases, water use, and soil structural issues. As a farmer, your choice of which rotation best fits your system must consider all these interactions.

The purpose of this document is simply to outline some of the key interactions you need to be aware of in making this choice.

The information listed in the table on the reverse has been compiled from numerous years of research from within and outside the Australian cotton industry. The document is focused directly on the impact that the rotation has on the subsequent **cotton** crop, as well as the interactions you may need to be aware of in terms of insect dynamics when a particular rotation crop is located within your farming system. The sustainability of the entire farming system, including soil, also needs to be taken into account when making rotation decisions.

Acknowledgements

The Cotton CRC national extension team and the Cotton Research and Development Corporation would like to thank everyone who contributed to this project particularly the many researchers, agronomists and growers who contributed their time and expertise including in alphabetical order:

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And the authors of the first Rotation Crops and Cotton poster from which this poster has evolved.

The Cotton Research and Development Corporation.

The Cotton Catchment Communities Cooperative Research Centre.

Disclaimer

This document is designed to be used as a tool to help management of cotton. This document is not a substitute for personnel with expert knowledge of rotation crop management or any other aspects of cotton crop management.

The Cotton Research and Development Corporation (CRDC) and the Cotton Catchment Communities Cooperative Research Centre (Cotton CRC) and its core participants do not warrant or make any representation regarding the use of, or the results of the use of, these guidelines for Australian Cotton Crops. In particular the CRDC, Cotton CRC and its core participants have taken all care to ensure that the information presented in this Rotation Table is correct and accurate, however the advice given should be treated as general in nature and expert advice should be sought in relation to the specifics of any particular farming enterprise.

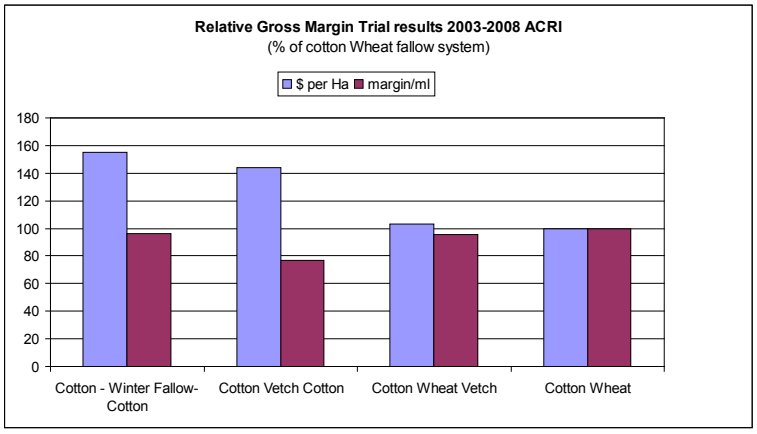
The user relies on this Rotation Table at their own risk.

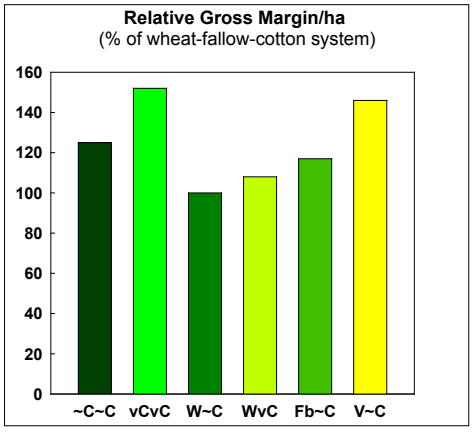
 March 2009

Putting Integrated Pest Management (insects) into practice

Phases Objectives	Post harvest	Pre-planting	Planting to 1 flower per metre	1 flower per metre to 1 open boll per metre	1 open boll per metre to harvest
1. Growing a healthy crop	• Consider the best rotation crop for the situation. • Test soil nutrient status to determine fertiliser requirements for cotton crop. • Consider potential disease risks.	• Seed bed preparation. • Field and cotton variety selection. • Plan irrigation and crop management strategies.	• Consider planting window. • Consider at-planting seed treatment, insecticides and other control options which do not disrupt beneficial insect activity. • Water management.	• Monitor crop for - Water management - Nutrient status - Growth control - Pest control.	• Make final irrigation decisions. • Defoliate when crop is mature (monitor NACB). • Keep on top of pests by using appropriate control options.
2. Keeping track of insects and damage	• Sample cotton stubble for *Helicoverpa armigera* pupae after harvest.	• Assess risk of wireworms, early thrips, mirids, mites and black field earwigs and decide on seed treatments, granular insecticides or in-furrow insecticide sprays.	• Sample for pests, beneficials and parasitism rates in cotton as well as spring trap crops. • Monitor early eason damage. • Track pest trends. Use pest thresholds and the predator / beneficial to pest ratio.	• Sample for pests, beneficials and parasitism rates. • Track pest trends and incorporate parasitism into spray decisions. • Monitor fruit load. Use pest thresholds and the predator / beneficial to pest ratio.	• Sample for pests, beneficials and parasitism rates in cotton as well as last generation trap crop. •Monitor fruit load. Use pest thresholds and the predator / beneficial to pest ratio. • Cease pest control at 30-40% bolls open.
3. Beneficial insects – use them don't abuse them	• Plant lucerne (strips or block) in autumn. • Consider becoming involved in an IPM or AWM group. • Discuss spray management plan with neighbours and consultant.	• If planning to release Trichogramma during the season, plan to sow other crops e.g. sorghum. • Consider growing a diverse habitat to encourage beneficials.	• Sample for beneficials and parasitism rates. • If chemical control of a pest is required, refer to the beneficial impact table. • Keep track of the BDI and predator / beneficial to pest ratio.	• Sample beneficials. • Consider releasing Trichogramma into sorghum. • Keep track of the BDI and predator / beneficial to pest ratio.	• Food sprays may be considered. Manage lucerne appropriately. • Sample for beneficials. Encourage beneficials to reduce late season resistant pests through food sprays and consider low impact insecticide options.
4. Prevent the development of resistance	• Pupae bust to control overwintering Helicoverpa and mites as soon as possible after harvest. • Plant spring trap crop. • Attend annual resistance management meeting. • Reduce the availability of aphid and whitefly hosts over the winter.	• Consider Bollgard II® refuge options. • Consider choice of at planting insecticides or seed treatments and implications for later aphid sprays	• Use pest and damage thresholds. • Follow the IRMS strategy for the region. • Encourage beneficials to help reduce resistant pests. Follow Bollgard II® resistance management plan.	• Use pest and damage thresholds. • Follow the IRMS strategy for the region. • Encourage beneficials to help reduce resistant pests. •Follow Bollgard II® resistance management plan.	• Use pest and damage thresholds. • Follow the IRMS strategy for the region. • Encourage beneficials to help reduce resistant pests. • Follow Bollgard II® resistance management plan.
5. Manage crop and weed hosts	• Keep farm weed free over winter. • Control cotton re-growth.	• Carefully consider summer rotation crops (type and location). • Keep farm weed free.	• Keep farm weed free.	• Keep farm weed free.	• Consider winter rotation crops (type, location and the potential to host pests or diseases). • Keep farm weed free.
6. Using trap crops effectively	• Plant spring trap crop. • Consider flowering date to time planting.	• Consider summer trap crop. • Cultivate all chickpea trap crops by the 30th September.	• Consider last generation trap crop.	• Monitor Helicoverpa populations in summer trap crop, control if necessary.	• Destroy Helicoverpa eggs and larvae in last generation trap crop using biological sprays. • Pupae bust last generation trap crop.
7. Support IPM through communication and training	• Consider becoming involved in an IPM or AWM group. • Attend regional training and information seminars.	• Communicate with neighbours and applicators to discuss spray management plans.	• Meet regularly with your neighbours and consultant to discuss IPM strategies and attend local field days.	• Meet regularly with your neighbours and consultant to discuss IPM strategies and attend local field days.	• Meet regularly with your neighbours and consultant to discuss IPM strategies and attend local field days.

Rotation Trial Results





Location and Soil Type :
ACRI Narrabri: Vertosol Heavy 80% clay Sodic Subsoil

Assumptions:
- Fixed costs not included.
- Cotton Price 420/bale.
- Seed price 400/tonne.
- Wheat price AH $202.
- Soil: heavy grey clay - sodic subsoil.
- Whole farm situation where water is not limiting.

Location and Soil Type :
ACRI Narrabri Vertosol Medium 50% clay

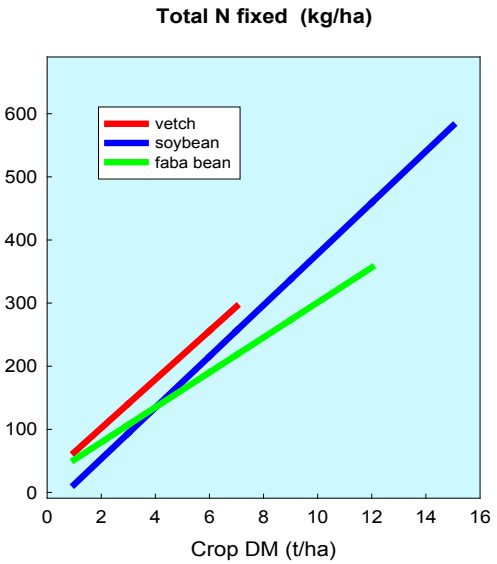
Key: ~C~C and vCvC are back-to-back cotton, with and without vetch each winter; W~C is wheat fallow cotton; WvC is wheat, followed by vetch, then cotton; Fb~C and V~C are faba bean or vetch followed by fallow then cotton.

- All GM/ha are calculated on 2-year cropping cycle. NB: back-to-back cotton systems therefore grow two cotton crops per 2-year cycle.
- Experiment conducted at Narrabri from 1997 to 2008. Values are means of five cropping cycles (except for V~C – only 1 cycle).

N Fixation from Legume Biomass

Guide to sampling crops to determine dry matter (biomass):

- sample plants by cutting off at soil level in an area of 1 m^2.
- cut plants into short sections and place in large paper bags.
- dry plants in oven at 60-70 degrees C for 48 hrs or spread plants in sunlight until crispy dry.
- weigh samples to get biomass (kg / m^2) .
- to convert to t/ha, multiply by 10.
- this process can be repeated across a number of sites within a field to improve accuracy of biomass weights.
- for a very rough estimate of DM, divide fresh weight by 5.
- Because legume-N is not as prone to loss from the soil as fertiliser-N, the N added in legume stubble should not be equated with fertiliser-N when determining the N fertiliser required by future crops.



Total N fixed by legume crops. Estimates include N contained in the shoots and roots , but assumes no grain harvest

tonnes DM /ha		1.0*	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
kg N fixed /ha	Vetch	65	80	100	120	140	160	180	200	220	235	255
	Soybean	10	30	50	75	95	115	135	155	175	195	215
	Faba bean	50	65	80	90	105	120	135	150	165	175	190

* N fixation levels are inconsistent for crops <1.0 t Dry Matter /ha.

Source;
Rochester IJ, Peoples MB, Constable GA and Gault RR (1998). Faba beans and other legumes add nitrogen to irrigated cotton cropping systems. *Australian Journal of Experimental Agriculture* 38, 253-260

Integrated Weed Management

The impact of weeds

Weeds adversely impact cotton in many ways. Primarily, weeds compete for available nutrients, water and light. They can also directly impact cotton quality through contamination of cotton fibre or seed. Weeds may act as sources of pests or diseases that affect cotton, they may reduce irrigation, cultivation and harvesting efficiency, and they may cause physical injury to operators in cotton fields, such as bug checkers, machinery operators and irrigation staff.

Even a single weed, such as a large thornapple (*Datura ferox*) can compete strongly with cotton. The economic threshold for control by handchipping is approximately one thornapple per 73 m of cotton row, based purely on cotton yield reductions through competition. In addition, thornapples can host Heliothis, mites and verticillium wilt, they can block cultivation and harvesting equipment, and they can cause serious injury to field workers. Thornapple seeds may also contaminate cotton seed.

Weeds also impact cotton production indirectly, as the tools used to manage weeds are expensive and may adversely affect cotton to some extent. All the currently used herbicides can cause some degree of leaf or root damage to cotton. Many of the more commonly used herbicides can and on occasions do kill cotton plants if they are incorrectly applied, or if adverse weather conditions occur soon after application.

What is integrated weed management (IWM)?

IWM is about NOT relying on only one or two methods of weed control alone, and particularly not relying on herbicides alone. An IWM program uses a range of methods of weed control in combination so that all weeds are controlled by at least one component of the weed management system.

Ultimately, the aim of IWM is to prevent weeds setting seeds, or vegetatively reproducing, so that the weed population is reduced over time, reducing weed competition and improving crop productivity.

Weed management approaches that rely on a limited number of strategies often end up with uncontrolled weeds. The most common example of this is the repeated reliance on one or two groups of herbicides to control a target weed population. Within a weed population there is likely to be individual plants that are naturally resistant to any single herbicide. The frequency of these resistant individuals in the population is usually very low. Repeated exposure of the weed population to a limited range of herbicides results in these resistant individuals being selected out, so that eventually a large proportion of the population is resistant to the herbicides. Eventually herbicide resistance develops such that the herbicide no longer controls the target weed.

As well as selecting for herbicide resistant weeds, the repeated use of a small number of weed management tools causes a species shift in the weed population. Weed species that are not controlled by these management tools will soon dominate the weed population, and the weed spectrum will shift towards these weeds. This species shift can result in new weed problems, with weed species that are much more difficult to control than were the original weeds.

The risk of developing these problems can be greatly reduced by using an IWM program. An IWM program may be conceptualised as shown below. All the individual components of the system contribute to a total weed management system.

Why use IWM?

Using an IWM program throughout the entire cotton rotation, including rotation crops and fallows, will:

- Reduce the reliance on herbicides.
- Reduce the risk of herbicide resistance developing in the weed spectrum and prolong the usefulness of the available herbicides.
- Reduce the rate of shift in the weed spectrum towards more herbicide tolerant weeds.
- Reduce the risk of herbicides accumulating in the soil and riverine systems.
- Reduce the total weed control costs in the future by reducing the weed seed bank (the number of weed seeds in the soil).

Although all these outcomes are important, the evolution of herbicide resistant weeds is a threat that has already had a major deleterious impact on many other cropping systems in Australia and elsewhere.

Rotations and Cotton Disease

Rotations are important to plant disease because they affect the survival and reproduction of plant pathogens and the biology and quality of soil. Disease is only one of several factors to consider when choosing a rotation sequence.

SEEDLING DISEASE (Caused by *Rhizoctonia* , *Pythium* and *Fusarium* spp)

Rhizoctonia occurs in all soils and multiplies on crop residues; particularly residues with a low carbon to nitrogen ratio, such as legumes (including woolly pod vetch). However, climatic conditions have the greatest impact on seedling disease. Delayed planting can help avoid cool wet conditions favourable for disease.

- Early incorporation of residues from cotton and legumes reduces carryover of *Rhizoctonia*.
- Rotation with cereals is likely to decrease *Rhizoctonia* in cotton. (The strains of *Rhizoctonia* that attack winter cereals are different to those that attack cotton).
- In crusting soils, cereal cover crops and/or standing stubble may improve emergence and establishment of cotton (current research is examining the effect of cover crops on seedling diseases).

BLACK ROOT ROT (Caused by *Thielaviopsis basicola*)

Black root rot is widespread in NSW and Southern QLD. *Thielaviopsis* does not grow on crop residues and survives as long-lived spores in the soil. Each crop of infected cotton deposits more spores in the soil and the severity of black root rot increases according to the number of cotton crops, irrespective of rotations (except for biofumigation crops).

- Woolly pod vetch and Indian mustard have a 'biofumigation' effect on *Thielaviopsis* (i.e. toxic to spores) when grown as green manures' (incorporate biofumigation crops at least four weeks before cotton to minimise *Rhizoctonia*).
- Rotation with cereals delays, but does not prevent, the build-up of black root rot (two or more consecutive cereal crops may reduce black root rot and this is the subject of current research).
- Rotation with legume crops (except vetch) may increase black root rot.

ALTERNARIA LEAF SPOT (caused by *Alternaria macrospora*)

Alternaria leaf spot is ubiquitous in Australian cotton but seldom severe. Alternaria survives on cotton residues on the soil surface. Alternaria leaf spot at the pre-square stage is unlikely to cause later problems. Alternaria leaf spot affects mature cotton when stressed (e.g. premature senescence).

- Carryover of Alternaria is reduced by incorporation of cotton residues between consecutive cotton crops and/or rotation with cereals.

VERTICILLIUM WILT (caused by *Verticillium dahliae*)

Verticillium is widespread in much of NSW and Southern QLD. Verticillium survives in infested cotton trash but does not multiply in crop residues. Verticillium wilt increases with the use of susceptible varieties of cotton.

- Rotation with cereals may decrease the severity of Verticillium wilt.
- Incorporate crop residues as soon as possible after harvest.

FUSARIUM WILT (caused by *Fusarium oxysporum* f.sp. *vasinfectum*)

Fusarium wilt is widespread in parts of QLD and is currently spreading in NSW. Fusarium survives in infested cotton trash and may also multiply on residues from other crops.

- Rotation with some crops may increase Fusarium wilt ('biofumigation' crops should not be used until their effectiveness is demonstrated by research).
- There is no evidence that any rotation crop will reduce the severity of fusarium wilt.
- Retain cotton residues on the soil surface for as long as possible before incorporation.
- Best bet' option for infested parts of fields: sow cereal in standing stalks, pull and mulch cotton stalks and leave on surface, harvest cereal and burn stubble.

BENEFICIAL ORGANISMS
MYCORRHIZA (a partnership between plants and beneficial fungi)

Mycorrhiza (also known as VAM) occurs when the roots of plants are colonised by 'beneficial' fungi. The plant 'feeds' the fungi with sugars and, in return, the mycorrhizal fungi supply the plant with nutrients from the soil. Cotton is highly dependent on mycorrhizal fungi for uptake of P and Zn. A lack of mycorrhiza development can slow the growth of cotton seedlings. Cropping sequences are important to mycorrhizal fungi because they can only survive and reproduce on living plants.

- Mycorrhizal development in cotton will be adequate after rotation with cereals or legumes in either summer or winter.
- After a single season with either bare fallow or rotation with a non-mycorrhizal crop (eg. canola), there will usually be sufficient mycorrhizal fungi in the soil (cotton compensates for a slight lack of mycorrhiza).
- Bare fallow for more than one season or removal of top-soil (especially more than 40 cm) may result in a severe lack of mycorrhiza; a cereal or green-manure crop may restore sufficient mycorrhizal fungi for cotton.

Sourcing More Information

Cotton Catchment Communities CRC Web Site

Home page
www.cottoncrc.org.au

Cotton Tales: Latest issues in the cotton farming system from industry extension officers.
www.cottoncrc.org.au/content/Industry/Noticeboard/Cotton_Tales_Regional_Newsletters.aspx

Numerous relevant publications on; Agronomy & Nutrition; Disease & Microbiology; Economics; Environment and NRM; Fibre Quality; Pests and Beneficials; Soils; Water; Weeds
www.cottoncrc.org.au/content/Industry/Publications.aspx

Gross Margins

NSW DPI website under farm budgets
www.dpi.nsw.gov.au/agriculture/field/field-crops/farm-budgets

Summer crop farm enterprise budgets
Irrigated northern summer crop gross margins
Irrigated cotton (Roundup Ready® Bollgard II®) ;Irrigated cotton (conventional); Irrigated maize; Irrigated mungbeans; Irrigated navy beans; Irrigated sorghum; Irrigated soybeans; Irrigated summer crops, northern NSW; Irrigated sunflowers; Spray irrigated lucerne for hay; Lucerne for seed; Surface irrigated lucerne for hay
Dryland north-west summer crop gross margins
Bollgard II® cotton; No-till sorghum;No-till sunflowers (mono-unsaturated)
Irrigated Murrumbidgee summer crop gross margins 2008/09
Cotton - Bollgard II® ; Flood irrigated lucerne establishment (Murrumbidgee/Murray); Flood irrigated lucerne maintenance (Murrumbidgee/Murray); Flood irrigated maize; Rice: long grain, aerial sown; Rice: medium grain, aerial sown; Rice: medium grain, sod sown; Rice: medium grain aerial sown using bore; Soybeans (human consumption); Soybeans for crushing, permanent beds;Water costs for Colleambally area; Water costs for Murrumbidgee Irrigation Area
www.dpi.nsw.gov.au/agriculture/farm-business/budgets/summer-crops

NSW DPI Publications:

Summer Crop Production Guide
Winter Crop Variety Sowing Guide
Weed Control in Summer Crops
Weed Control in Winter Crops
Insect and Mite Control in Field Crops

Publications available in hard copy from DPI offices or download from the DPI website
http://www.dpi.nsw.gov.au

Or contact you local extension officer or district agronomist

There is a wide range of Agfacts and Primefacts available on the web for specific crops but too may to mention them all individually. All available from website.

There is a great deal of information on rotation crops on the websites of New South Wales Department of Primary Industries and Queensland Department of Primary industry and Fisheries -The following links may be useful - Also use the search facilities available on the Home pages :
www.dpi.nsw.gov.au
www.dpi.qld.gov.au

NSW DPI Web Publications

Also use the internal search engine on (www.dpi.nsw.gov.au)

Cotton pest management guide
recommendations for insect pest, weed and disease management decisions on cotton
www.dpi.nsw.gov.au/agriculture/field/field-crops/fibres/cotton/cotton-pest-management-guide

SOILpak - cotton growers (See also CottonPaks CD)
includes use of rotation to improve soil structure
www.dpi.nsw.gov.au/agriculture/resources/soils/guides/soilpak/cotton

NSW grains report
The NSW Grains Report contains current crop production information highlights, seasonal conditions and outlook and information on specific summer and winter crops.
www.dpi.nsw.gov.au/agriculture/field/field-crops/farm-budgets/nsw-grains-report

Winter crop variety sowing guide 2008. Released/reviewed: Jan 2008. ... Handy hints.
Winter Crop Variety Sowing Guide can be downloaded in full, or in parts: ...
www.dpi.nsw.gov.au/.../field/field-crops/winter-cereals/guides/winter-crop-variety-sowing-guide

Summer crop production guide 2008 [PDF]... population, row spacing, hybrid or variety characteristics, nutrition ... In addition to crop production recommendations, at ... for safe storage of summer grains.
www.dpi.nsw.gov.au/__data/assets/pdf_file/0005/178664/Summer-crop-production-guide-1-2008.pdf - 2008-10-29

Primex (formerly Agsell)
Primex works closely with local producers and international buyers to encourage partnerships in a broad range of commodities
www.dpi.nsw.gov.au/aboutus/services/marketing/primex

Sunflower production guidelines for the Northern grains region ... [PDF]
The project Sunflowers in Northern NSW and Southern Qld Tools for Success included benchmarking of 134 commercial crops across these regions ...
www.dpi.nsw.gov.au/.../0011/249779/Sunflower-production-guidelines-for-the-northern-grains-region.pdf - 2008-09-30

Soybeans: inland northern NSW planting guide 2007-2008 inland northern NSW planting guide 2007-2008, 142.6 kb. ...
www.dpi.nsw.gov.au/agriculture/field/field-crops/oilseeds/soybeans/soybeans-inland-northern-nsw -

Soybeans: southern NSW planting guide 2007-08. Primefact ... Download. Soybeans: southern NSW planting guide 2007-08 (Full version), 162.2 kb. Downloads ...
www.dpi.nsw.gov.au/.../field/field-crops/oilseeds/soybeans/soybeans-southern-nsw-planting-guide

Summer crop production guide 2008
Grains sorghum, maize, Mungbean, soybean, Sunflower, grain storage, receival standards, insecticide seed dressings
www.dpi.nsw.gov.au/agriculture/field/field-crops/summer-grains/general/summer-crop-production-guide

Grain sorghum
Grain sorghum. Series: Agfact ... Grain Sorghum (Sorghum bicolor (L.) Moench) is the main summer cereal crop grown in northern Australia. It is ...
www.dpi.nsw.gov.au/agriculture/field/field-crops/summer-grains/sorghum/grain-sorghum

[PDF] **Cowpea, lablab and pigeon pea** This Agfact outlines the agronomy of each crop for grain production.
www.dpi.nsw.gov.au/__data/assets/pdf_file/0006/157488/cowpea-lablab-pigeon-pea.pdf -

Faba bean
Suitable environments; Why grow faba beans? The plant; Breeding of faba beans in Australia; Growing the crop; Weed control, disease risk and management; ...
www.dpi.nsw.gov.au/agriculture/field/field-crops/pulses/beans/faba-bean -

Pastures and rangelands. Namoi woolly pod vetch. Series: Agfact P2.5.9 Edition: Fourth edition Last updated: 25 Nov 2004 ... Namoi woolly pod vetch and other crops. ...
www.dpi.nsw.gov.au/agriculture/field/pastures/species-varieties/factsheets/namoi-woolly-pod-vetch -

Pastures and rangelands. Lucerne. Name: Lucerne (Medicago sativa). Description: Widely grown perennial legume with its main growth ...
www.dpi.nsw.gov.au/agriculture/field/pastures/species-varieties/a-z/lucerne -

Canola, sunflower and other oilseeds.
Canola is the most important oilseed cropin the dryland farming systems of central and southern NSW. ...
www.dpi.nsw.gov.au/agriculture/field/field-crops/oilseeds - 13k

Qld DPI&F Web Publications

Also use the internal search engine on (www.dpi.qld.gov.au)

Cotton production in Queensland
Information about growing cotton in Queensland including varieties, planting, harvesting, nutrition, disease and pest management.
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_4002_ENA_HTML.htm

Cotton and grain irrigation website
Profit per drop newsletter
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_9878_ENA_HTML.htm

Sunflower production in Queensland
Overview of information on sunflower production in Queensland
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_4419_ENA_HTML.htm

A guide to soybean production in Queensland
Issues affecting soybean production in Queensland including key cropping points and output statistics.
www2.dpi.qld.gov.au/fieldcrops/8706.html

Maize production in Queensland
About maize production in Queensland
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_3491_ENA_HTML.htm

Sorghum production in Queensland
Sorghum production in Queensland including varieties, planting, irrigation, pest and disease management, nutrition, harvesting and marketing
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_3488_ENA_HTML.htm

Mungbean production in Queensland
Information about growing mungbeans in Queensland including varieties, planting, pest management, nutrition, irrigation, harvesting and marketing.
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_3492_ENA_HTML.htm

Chickpea production in Queensland
Chickpea varieties, planting, harvesting, storage, marketing, disease, weed and insect management
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_4457_ENA_HTML.htm

Vetches in southern Queensland
Vetch species available for winter legume pastures include; common vetch, pueple vetch, and woolly pod vetch. They have advantages of reasonable production fo high quality ...
www2.dpi.qld.gov.au/pastures/4055.html

Lucerne production in Queensland
Information about growing and managing lucerne in Queensland
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_4001_ENA_HTML.htm

Selecting a winter crop - Darling Downs
Lists average yields for the major winter crops on several Darling Downs soil types. Briefly outlines performance of minor winter crops.
www2.dpi.qld.gov.au/fieldcrops/9512.html

Wheat production in Queensland
The page links to comprehensive factsheets dealing with the production of wheat in Queensland
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_3500_ENA_HTML.htm -

Barley production in Queensland
A comprehensive page about the production of barley in Queensland
www.dpi.qld.gov.au/cps/rde/dpi/hs.xsl/26_3501_ENA_HTML.htm

Triticale
Information on triticale (a cross between wheat and cereal rye) production in Queensland.
www2.dpi.qld.gov.au/fieldcrops/9059.html

Cropping options for dry seasons
A menu of links to information on cropping strategies for dry seasons.
www2.dpi.qld.gov.au/fieldcrops/6538.html

Planting - Rotations
What crop rotations are, and what they can mean for you.
www2.dpi.qld.gov.au/fieldcrops/8846.html - 61k - 6 Jun 2007

Other Web

Irrigated Cotton an Grains web site
Information on irrigation management in cotton and Grains
http://www.cottonandgrains.irrigationfutures.org.au/default.asp

The Beatsheet
The Beat Sheet is a blog about insect pest management issues relevant to Australia's northern grain region of Queensland and northern New South Wales.
http://thebeatsheet-ipmnews.blogspot.com