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Growing Western Canola Case Study (Low Rainfall) 2005

Peter Freeman - Bundear Farms - Eradu

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Location:

Bundear Farms crops 6,600 hectares in the Mullewa Shire. The home property is located on the highly regarded Eradu Sandplain 40km west of Mullewa, with a second property located midway between Mullewa and Mingenew. Soil types on the second property consist of yellow sandplain and soft red loams.

Rainfall: **300-325mm** long term average 283mL received in 2005 to the end of September.

Area Sown to Canola in 2005:	980ha
5 Year Average Canola Area:	837ha
2005 Average Yield:	1.3t/ha
8 Year Canola Average:	0.86t/ha
3 Year Average Yield:	1.13t/ha

Additional Rainfall Information for Eradu

The Eradu region receives 85-90% of its annual rainfall during the growing season and is renowned for warm finishes to the season. 2005 was unseasonably dry and warm during July and into August. The average July temperature (Mullewa Figures) was 2.1ºC above the long term average and only 27% of average rainfall was recorded. The finish to the season was very mild with the temperature below the long term average. August temperatures were 2% below normal, while September was 4% below and October 6% below normal. Rainfall for the August to October period was above average. Geraldton recorded 115% of long term average rainfall for August,130% in September and 100% in October. Mullewa was 102%, 101% & 100% respectively for the same 3 month period.

History of Canola growing at Eradu:

The Freeman family first grew Canola in 1997, when the variety Karoo was grown over 120ha. Karoo was the predominant variety in the Northern Agricultural Region until the release of Surpass 501TT. Surpass 501TT was then the dominant variety until the release of ATR Stubby in 2004. Bundear Farms grew TI1-Pinnacle alongside Karoo in 2000 & 2001. Varieties for 2005 included ATR Stubby, Trigold, Tribune and Tornado TT.

Yield History:

Yield variation over the last 9 years has been dramatic with a 740kg yield variance between seasons. Much of the variation in yield can be explained by the following issues:

1997 - 1.22 t/ha - Soft finish
1998 - 0.83 t/ha - Large area of light sand sown
1999 - 0.94 t/ha - Su contamination issues
2000 - 0.56 t/ha - Drought
2001 - 0.63 t/ha - Very dry finish
2002 - 0.70 t/ha - Drought
2003 - 1.22 t/ha - Soft finish
2004 - 0.88 t/ha - Spray drift (Trigold averaged 1.8t/ha with no spray drift)
2005 - 1.30 t/ha - Soft finish but some frost

The ability to make use of summer rainfall events and sow early had the greatest influence on yield. The older, longer season varieties must be sown in April or the first week of May to achieve reliable yields. This sowing window has been extended with new varieties such as ATR Stubby and Trigold. Cool seasons with a mild cool finish such as 1997, 2003 and 2005 produced the greatest yields.

The lighter soils with low organic matter and poor moisture holding capacity are associated with large yield variability, and tend to be very risky soils for Canola production. As a result, Canola is avoided on these soils where possible.

The major negative influences on Canola production over the last 8 years have been:

- Boom spray contamination – crop damage due to herbicide contamination from residues in boom sprays is a continual threat to production, as many are aware. A major yield penalty was suffered in 1999 due to crop injury from SU contamination in a Boom Spray.
- Diamond Back Moth (DBM) – DBM caused major yield penalties in 2001 & 2002. Multiple insecticide applications were required in those years, adding significantly to the cost of production. DBM were present in 2005 but populations did not reach spray thresholds, although a number of paddocks were sprayed for DBM in the region.
- In the initial years of production, achieving adequate establishment was an issue due to an inability to accurately place seed into dry soils. A combination of old tillage technology and poor stubble cover often resulted in poor establishment due to furrow fill. In recent seasons, a move to DBS sowing machines and a reduction in grazing pressure has resulted in higher levels of stubble cover. This has reduced the issue of poor establishment due to furrow fill.

Some of the positive influences on yield reliability over recent years have been gained from:

- Dry sowing – Having the confidence to dry sow with a machine that can place the seed accurately at the desired depth has resulted in a large increase in establishment rates. Dry sowing using furrow sowing techniques, gaining the benefit of water harvesting, has resulted in a reduction in sowing rates and more reliable establishment.
- The adoption of DBS sowing machinery has reduced the variability in establishment rates and provided the ability to chase moisture if required, often achieving germination up to 2 weeks earlier than previously possible.
- Ability to deep band fertiliser and accurately control seed and fertiliser depth has eliminated the effects of fertiliser toxicity, and allowed higher rates of fertiliser to be banded below the seed.
- The adoption of some of the newer, short season varieties has had a big influence on the

reliability of Canola production in the northern area. The new varieties are better suited to the short season and warm, quick finishes so often experienced.

- Soil pH has emerged as a major influence on the sustainability of production. A program of lime application to any paddock with pH lower than 5.0 ($CaCl_2$) the year prior to Canola has been implemented. This has proven successful, with distinct yield differences being recorded between pH rectified and non-rectified paddocks in 2005.
- Experience – Lessons learned through trial and error in past seasons have proved invaluable.

Why Is Canola Part Of The Rotation?

Bundear Farms include canola in the program from a profitability point of view. There are rotational benefits associated with canola, but a cash positive crop is the number one criteria.

The rotational effects of including canola in the program have resulted in a yield increase across the Lupin program. This is due to a reduction in the weed burden, predominantly Wild Radish, and a decrease in soil diseases such as Rhizoctonia and Eradu Patch. The primary rotational effect on the wheat program has been the reduction in Ryegrass and Wild Radish weed burdens. Any yield effects attributable to a reduction in soil diseases in the wheat program have not been as obvious.

One major strength of canola in the rotation is weed control with the greatest effect being Wild Radish numbers. Non-selective knockdown spray usage during the swathing operation (applied underneath swather front) has dramatically reduced the amount of Radish and Ryegrass seed set.

2005 Program:

Summer rainfall events started the season off with 98.5mm recorded prior to the opening rain. As a result all canola country received at least one knockdown prior to sowing. Seeding began on the 26th of April, sowing into dry soil with good moisture at depth. May 2nd received 25mm of rain resulting in the remainder of the program (completed by 3rd of May) being sown wet.

60% of the Canola program was sown onto deep yellow sand with the remaining 40% on red sandy loams. Varieties sown included ATR Stubby, Trigold, Tribune and Tornado TT.

In 2005 all Canola was sown at 4kg/ha. Prior to the transition to DBS tillage machinery, Canola was sown at rates up to 10kg/ha. The move to the DBS machines has resulted in significantly increased establishment. Excessive plant numbers became an issue and as such, sowing rates have been gradually reduced over the past few seasons to the current low level.

Seed is largely retained from the previous season, with small amounts of new seed purchased for seed nurseries and new variety evaluation. Given that Canola seed size is viewed as a major influence on establishment and early vigour, all retained seed is graded to above 2mm seed size

The healthy opening rains received on May 2nd, combined with good subsoil moisture and high soil temperatures, resulted in very fast germination and emergence and vigorous early growth. Growing conditions during May and June were excellent, producing some very competitive and bulky crops by July. The warm moist conditions during May and June resulted in excellent Triazine performance and when combined with a good pre-sowing knockdown resulted in very good early weed control.

"July About Turn"

July saw a dramatic about turn in the season with only 18mL of rain being received for the month. This combined with higher than average temperatures resulted in significant wilting and moisture stress on any soil type with low moisture holding capacity. The deeper light sands dropped off during this time, showing signs of drought stress. Crops on these soil types did not recover when the rains did return in August. Even a soft finish to the season was not sufficient to allow the short season varieties to regain the month of growing season that was lost during the July dry spell. The higher clay content soils with higher moisture holding capacity did not suffer as much during July and as a result have been the highest yielding soil types in 2005. The less determinate longer season varieties such as Surpass 501 were not retarded to the same extent as the short season varieties during July and had the ability to compensate at the end of the season.

At Bundear Farms, detrimental insect activity during 2005 was surprisingly low during flowering. It is common in the warm northern climate to see Diamond Back Moth (DBM) numbers build up early in the season and require multiple insecticide applications to manage. This was not required in 2005, although many crops further west required DBM and Heliothis control.

Frost affected the short season variety Trigold, causing significant yield reduction in low lying areas. This could be attributed to the very early sowing of the variety. Trigold sown at the end of April started flowering by mid July–August. The longer season varieties were not affected by frost to the same extent.

Nutrition:

The nutrition strategy is formulated to supply adequate nutrition for a 1.2 – 1.5 t/ha Canola crop. Leaching can be an issue on the sandplain when heavy rainfall is received soon after sowing. This has not been a significant issue over the past few seasons with a pattern of lighter rainfall events, however the risks associated with leaching cannot be overlooked. Soil pH is addressed in the wheat phase prior to Canola.

Fertilisers applied in 2005:

60kg DAP:	Deep banded below the seed.
150kg Sulphate of Ammonia:	Spread at the 2 leaf stage.
50kg Muriate of Potash:	Spread at the 2 leaf stage (only on the sandplain).
70kg Urea:	Spread at the bolting stage of the Canola.

This program supplied the following nutrients:

74.5kg/ha of Nitrogen
12kg/ha of Phosphorus
25kg/ha of Potassium
41kg/ha of Sulfur

Sulfur has proved to be very important for canola production on northern sandplain with most crops receiving at least 25kg/ha Sulfur. Input costs on the red loams are lower than sandplain due to the reduced requirement for Potassium and (to a lesser extent) Sulfur.

Weed Control Strategies:

Due to high levels of Ryegrass, Trifluralin is used pre-emergent on any "dirty" paddocks. Wild Radish is the major weed thus an early application of Atrazine is required. Depending upon season this is generally applied pre-emergent with Trifluralin, although on the odd occasion (such as a late season) the Atrazine can be delayed and applied after the first rain and successful emergence has occurred. This is a risk management practice, as if emergence fails then the paddock can be resown to either Wheat or Barley.

A typical 2005 herbicide program was:

Knockdown:	1L/ha Glyphosate 450
Pre-emergent:	1.8L/ha Trifluralin 480
	1.12kg/ha Atrazine
3 Leaf Stage:	1.12kg/ha Atrazine
	100mL/ha Dimethoate
	200mL/ha Cypermethrin 200EC
5 Leaf Stage:	280 – 300 mL/ha Select ®
Swathing:	600mL/ha Paraquat (applied under the swather)

Cost of Production:

The approximate cost of production and break-even requirements for the 2005 canola program:

Fertiliser:	$90/ha
Chemical:	$65/ha
Other operating costs:	$79/ha – This includes contract swathing @ $25/ha
Total variable costs:	$234/ha

At a nett farm gate price of $330/tonne, yield required to cover variable costs is 0.71t/ha.
If an average of $80/ha (fixed and overhead costs) was assumed then for Canola to be a cash positive crop in 2005 a yield of 0.95t/ha was required. This was achieved.

Lessons Learnt From 9 Years Canola Growing Experience At Eradu:

Peter sees the following as some key issues to successful canola crops at Eradu and Mullewa:

- Ensure that paddocks are well set up. This includes getting soil pH right – do not sow Canola until soil pH has been corrected. If there are issues with subsoil pH, do not sow Canola.
- Deep rip if there is a hard pan restricting root growth.
- Ensure good stubble cover on sand.
- Be flexible and be prepared to change paddock according to where summer rain falls.
- Use the best seed possible. Only use good quality seed with good seed size. Bundear Farms grade all seed to ensure that minimum seed size is 2mm.
- Prepare early. This allows taking advantage of any early sowing opportunities that arise.
- Be well informed of the latest research and varieties.

What Is The Future For Canola?

Peter considers the future for Canola production in the northern wheat belt will be in the area of Bio-Diesel production. This may see a shift away from the traditional varieties and a move to specialty varieties with a specific end use. Peter believes that the introduction of GM canola focusing on varieties for specific end uses will help reduce yield and income variability associated with canola production.

Peter expects canola will always be part of the cropping program on Bundear Farms due to the rotational benefits it provides. However yield increases through better varieties and agronomy are vital to maintain the crop's current cash positive status, in light of ever increasing production costs.

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