Australian Oilseeds Federation

Grower Quality Guide

April 2001

A project of the AOF Oilseed Development Fund: Funded by Grains Research and Development Corporation

Acknowledgements:

The assistance of NSW Agriculture, in particular the contribution of Bob Colton, Paul Parker, Tony Dale and Don McCaffery and Dovuro in development of this guide is greatly appreciated. Photographs were kindly provided by: Agriculture Western Australia, Ausbulk, NSW Agriculture and National Sunflower Association.

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THE OILSEEDS QUALITY ISSUE

The quality of Australian oilseeds and oilseed products is critical to maintaining the competitiveness of our industry. Continually improving the quality of our products will help to secure market share in a highly competitive international market, where Australia is a relatively small player.

To understand the importance of quality to the future of the oilseeds industry, the Australian Oilseeds Federation asked domestic and international end users what their major requirements and quality issues were. This direct market feedback is provided in this Grower Quality Guide to enable you to gain a greater understanding of what the market expects and how you can meet their requirements.

We can manage the quality of the oilseeds we grow with quality seed selection, good crop management through the season, and correct storage and handling. This guide outlines the best practices required to maintain the quality of the Australian crop.

ABOUT THIS GROWER QUALITY GUIDE

This Grower Quality Guide has been developed by the Australian Oilseeds Federation (AOF) to highlight the quality issues that impact on the competitiveness of our oilseeds industry and to help growers manage on-farm practices so we can deliver quality products that meet market needs,

The AOF recently conducted a major review of end user needs for oilseeds, oils and meals. Feedback was sought from the people who purchase or process our products including crushers, oil refiners, stockfeed processors and users, and exporters. This review identified the current and emerging end user needs and provided a status report on how well our current oilseed varieties and breeding program priorities are aligned with these needs.

The review identified a number of key quality issues impacting on the competitiveness of the Australian industry and important emerging shifts in quality requirements. Many of these quality factors can be managed or influenced by growers during the crop production process. The findings of the AOF End User Review are included in this Grower Quality Guide.

This Guide draws together the important quality issues and highlights the factors you can manage on-farm to ensure you produce products that meet end users' needs. As this is not intended as a comprehensive agronomic management plan, you may like to contact your agriculture department adviser or agronomist for further information. Contacts are provided at the back of the Guide.

The Guide also highlights the emerging needs for Quality Assurance and Identity Preservation in the oilseeds industry, and outlines the options available for growers to implement on-farm quality assurance and identity preservation systems.

The quality of the Australian oilseeds crop is critical to our ability to access and maintain markets.

Producing quality oilseeds that meet our domestic and export customers' needs requires the combined effort of everyone in the value chain.

The AOF is committed to sharing the information up and down the value chain so all players can understand customer requirements.

WHY QUALITY IS IMPORTANT FOR OILSEED GROWERS

THE AUSTRALIAN OILSEED INDUSTRY forms a valuable part of the grains industry and services both export customers and a vibrant domestic processing sector. The farm gate value of the oilseed industry is around $1 billion annually, with a further $1 billion generated from downstream activities. The value of Australia's canola exports exceeded $700 million in 1999/00.

The new infrared (NIR) machine is used to precisely measure protein, oil and other quality components.

A focus on quality is very important to support both our domestic processing sector and maintain the industry's competitiveness on the international stage. It is the quality of Australian oilseeds that makes them such great value for our export buyers.

Quality starts with the plant breeders and continues through production, the handling and transport system, processing and ultimately to the customer. Communication of customer priorities back through the chain is essential to ensure the industry continues to meet customer needs.

The intrinsic quality of Australian oilseeds is supported by our investment in systems and processes through the entire supply chain to assure the delivery of products to customer specifications. These systems provide our customers with confidence in the end use qualities of each type of oilseed.

The clear message from our customers is that there is value in quality, and increasingly there is a focus by all customers on quality. Quality is now in demand.

Oilseed markets are changing and making new demands on suppliers across a range of quality aspects. This goes beyond crop quality to also include demands for assurances on food safety, product specification and product integrity.

This feedback from our customers means our industry must have a greater focus on:

- Crop quality and hygiene.
- Quality testing.
- Quality assurance and identity preserved systems, both for CM crops and specialty qualities.

Increasingly in agricultural markets the issue of quality is becoming an issue of access to markets. Meeting defined quality requirements will allow Australia to participate in the market or increase our presence in world markets.

In the international oilseeds market, Australia is a relatively small player as shown in Table 1. The pressure to meet quality requirements becomes critical when we compete against the giants of the oilseed trade, like Canada, into exacting markets like Japan.

TABLE 1: WORLD AND AUSTRALIAN OILSEED PRODUCTION AND EXPORTS COMPARED

'000 tonnes, Oct-Sept	Production			Exports		
	1997/98	1998/99	1999/00	1997/98	1998/99	1999/00
Canola* - World	33,100	36,060	42,105	4,953	7,489	8,890
Canola - Australia	861	1,761	2,460	568	1,348	2,010
Soybeans - World	158,563	159,923	155,924	39,297	39,723	42,223
Soybeans - Australia	93	109	113	3	2	3
Sunflowers - World	23,834	27,403	26,708	3,014	3,818	3,082
Sunflowers - Australia	98	109	117	3	16	5

** Includes rapeseed. Source: Oil World.*

This Grower Quality Guide is designed to help growers keep Australian oilseeds in the game and it shows what we can do to:

- Manage crop quality.
- Provide integrity through implementation of quality assurance and identity preservation systems that go across the value chain**.**

WHAT END USERS EXPECT OF AUSTRALIAN OILSEEDS

The major findings of the AOF's review of end user requirements are summarised in the following section with an explanation of the quality issues and standards that end users look for when purchasing or using Australian oilseeds. Precise targets are provided for canola, soybeans and sunflowers across the key quality parameters.

This section outlines target quality requirements for domestic oil processing and seed exports. The targets specified by end users appear, followed by comments on the current performance of Australian oilseeds and areas for improvement.

REQUIREMENTS FOR DOMESTIC OIL END USERS AND SEED EXPORTERS

Oil Content

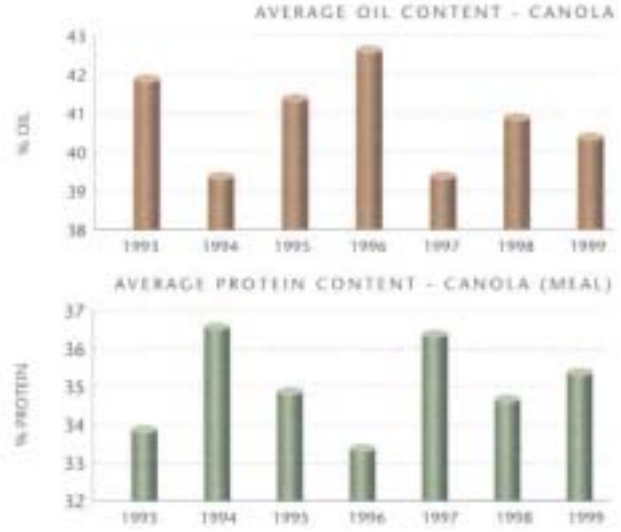
Targets

Canola:

42-44% average @8.5% moisture

Sunflowers:

43% average @8.5% moisture



COMMENTS

Australian canola oil content has improved in recent years with the introduction of new cultivars, and oil levels have been reported as high as 50%. However, economic considerations often see the high yielding varieties grown at the expense of the better quality (high oil and protein) varieties. The crop is highly variable due to the environmental diversity across the canola growing areas and oil contents can range from mid 30% up to 50%.

The graphs above show the average oil and protein content of Australian canola from 1993 to 1999 and demonstrate the trade-off that occurs between oil and protein in different seasons. When protein peaked in the 1994 and 1997 seasons, oil levels were at their lowest. The trend over time shows the variability of oil content. The development of higher oil yielding TT (Triazine tolerant) varieties will assist to reverse this trend.

Protein Content

Target (in meal)

Canola:

Minimum 35% @13% moisture

Soybeans:

Minimum 45% @13% moisture

COMMENTS

Canola: As with oil content, protein content is highly variable in Australian canola as the two move inversely. New cultivars are available that have significantly higher levels of protein and oil. Protein content and quality is very important in the Japanese canola market, which has a minimum protein requirement of 35%. Japanese processors perceive protein levels in Australian canola to be lower than Canadian product, which tends to disadvantage Australian canola.

Soybeans: Currently Australian soybeans have protein levels of 2-3% below imported (US) soybeans. The Australian breeding program is targeting protein levels as a priority to meet the needs of the local stockfeed industry and domestic and offshore edible soybean users**.**

Oil And Protein Variability

Target

All Oilseeds: Reduced variability and consistently above minimum requirements

COMMENTS

The variability in oil content of Australian canola is a key issue for the industry. The oil content of Australian canola typically ranges from 38 to 45%, compared to an average of 42-43% in Canadian canola. Oil levels vary significantly depending on location. Variability across all quality parameters is an important issue and the industry will progressively become more specific in assessing quality on receival and segregating on oil, protein, fatty acid profile etc. Additional testing at receival points to look at protein and other quality parameters may provide a basis for market differentiation.

Fatty Acid Profile

Target

Traditional Canola:

Minimum 9% linolenic content,

Minimum 60% oleic acid

High Oleic/Low Lin (HOLL) Canola:

Maximum 3% linolenic content

(There are differences between end users regarding this 'new' canola and some markets may demand oleic acid levels of 80+%, with linolenic levels closer to zero.)

Sunflowers:

Linoleic content 55% minimum, desirable 62%

High Oleic Sunflowers:

Oleic acid content 80% minimum

COMMENTS

The development of HOLL canola offers the Australian canola industry opportunities and challenges. It has the potential to significantly expand the market with application across the food manufacturing and food service sectors. However, it will require the industry to implement systems to preserve the integrity of the product where it is grown alongside traditional canola varieties. HOLL varieties should be available within the next two seasons.

A major challenge for the sunflower industry is the declining level of linoleic acid, in particular in early-planted sunflower crops. This has seen the demand for locally grown early-planted sunflowers fall, with this being replaced by canola and/or imported sun oil.

Erucic Acid

Target

Canola:

Maximum 2%, desirable 1 % and preferably 0%

COMMENTS

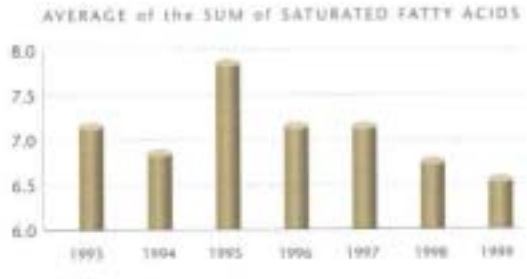
Australian varieties are typically very low in erucic acid at less than 0.5%. The presence of Brassica weed seeds, high in erucic acid, in farmer retained seed may be the cause of instances of high levels of erucic acid. The exception to the low erucic levels is the Karoo variety (widely grown in WA), with levels of 1 and 2% and some samples over 2%. There is also considerable variation in erucic acid levels due to environmental effects.

Saturated Fat

Target

Canola:

Maximum 7%



COMMENTS

Saturated fatty acid levels in Australian canola have been trending down over time to reach the lowest level in six years in the 1999 season. However further reductions will assist to meet market requirements and improve competitiveness in the international market.

Cloudiness Of Oil

Target

Haze free and cloud free in fully refined state

COMMENTS

Cloudiness is likely to be a result of higher saturated fats. Development of new testing methods will improve the detection of cloudy oil during processing.

Sulphur

Target

Canola:

Sulphur content in extracted oil 10mg/kg maximum, desirable target 0%

COMMENTS

Sulphur levels can be an issue for oil and meal users, and the processing sector due to the odours released. This is most likely due to glucosinolate hydrolysis from the meal during oil extraction (which releases isothiocyantes), and thus, can be reduced by elimination of glucosinolates.

Non GM

Target

All Oilseeds:

Identity preservation capability

COMMENTS

Identity preservation capability will become increasingly important as the types of oilseeds grown expands (eg traditional and HOLL canola) and GM varieties become available. The Australian oilseeds industry needs to develop the systems to maintain the integrity of the range of oilseeds grown and meet customer requirements.

Chlorophyll

Target

Canola:

Maximum 30mg/kg in extracted oil, desirable 0%

COMMENTS

Australian canola is generally free from chlorophyll i.e. less than 10ppm. The crop grows over winter and matures as summer approaches, so the chlorophyll is removed and the oil is a bright yellow colour. Chlorophyll is extracted from green seed and this is usually caused by frost damage and/or water stress. The AOF is currently undertaking a project to identify if there is any link between high levels of green seed and varieties or their relationship to the environment. Generally, Australian product has a lower green seed level than Canadian product and this is seen as an advantage by some markets including China, where bleaching of oil is not common practice. This can result in a premium for Australian seed, despite the greater variability in oil content.

REQUIREMENTS FOR DOMESTIC MEAL END USERS

This section shows the preferred targets for the various meal products across the different livestock species. The importance of the various quality requirements is outlined under each issue. Ingredients used by the stockfeed sector are easily substitutable and, thus whilst technically feasible, it may not always be economic to breed for very specific end use requirements. Current products are usable by the stockfeed industry although these can be enhanced to provide better value for the stockfeed sector.

Energy

TARGETS

	POULTRY	PIGS	RUMINANTS
CANOLA	7.5 MJ ME/kg	12 MJ ME/kg	11 MJ ME/kg
SOYBEAN	10.5 MJ ME/kg	15.5 MJ ME/kg	13 MJ ME/kg
	7.5 MJ ME/kg	9.2 MJ ME/kg	7.7 MJ ME/kg

COMMENTS

Energy values are a function of protein level, residual oil content and available carbohydrates, so values can vary even though other parameters are in specification. Australia typically produces mid protein meals (36-38% protein) which are lower in energy value. Because of this lower energy value, rations substituted with canola, sunflower or cottonseed meal for imported soybean meal must be compensated with a high energy feedstuff such as stabilised tallow. The economics of substituting with mid pro meal is impacted by the price of oils and the physical limits to how much oil can be added to the diet.

Crude Fibre

TARGETS

	POULTRY	PIGS	RUMINANTS
CANOLA	14% maximum	14% maximum	14% maximum
SOYBEAN	3.5% maximum	3.5% maximum	14% maximum
	17% maximum	17% maximum	20% maximum

COMMENTS

Fibre is present in larger amounts in the hulls of oilseeds and is a limiting factor in diets for poultry and young pigs. Removal of hulls and indigestible fibres from mid pro meal enhances the digestible and metabolisable energy of the meal. Efforts to reduce fibre content include dehullmg and by genetically developing cultivars with thinner seed coats. Fibre is of less concern in ruminant diets as it is readily fermented in the rumen. Fibre is most restrictive in sunflowers and significantly reduces the use of sunflower meal.

Protein

TARGETS

	POULTRY	PIGS	RUMINANTS
CANOLA	35% minimum	35% minimum	34% minimum
SOYBEAN	47.5% minimum	47.5% minimum	46% minimum
	36% minimum	36% minimum	36% minimum

COMMENTS

Protein is very important in poultry and pig diets but as protein is mostly rumen degradable, it is less of a concern in ruminants except in terms of bypass protein.

Low/mid protein meals require more of the meal to obtain the same amount of protein as a high protein meal. Adding more mid pro meal to the ration compounds the energy shortfall and also increases the performance risks associated with anti-nutritional factors.

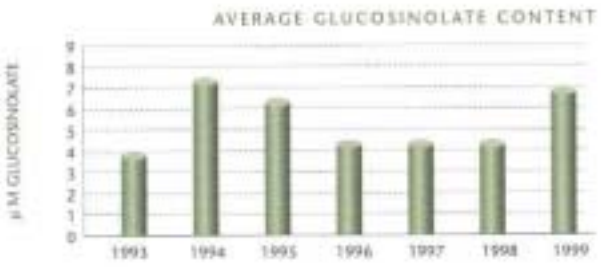
Protein quality may be improved by altering the amino acid composition of the seed, but using synthetic amino acids is likely to be a more economic way of balancing dietary amino acids. The economics of synthetic amino acid components also impacts on the relative value of meals. For example, if lysine is more expensive than methionine, this would favour use of canola meal which is high in lysine.

Total Glucosinolates

Target

Canola:

Maximum 30 µmol/g



COMMENTS

Australian canola glucosinolate levels are very low compared to international standards. Whilst the levels of glucosinolates in current Australian canola varieties are generally less than 15umol/g and perceived to be adequate from a nutrition standpoint, the end use (domestic and export) industries have highlighted odour as a problem in canola meal. This odour may be reduced through reducing glucosinolates.

Tannins

Target

Canola:
Maximum 2%

COMMENTS
Tannins are a negative factor in poultry and pig feeds as they interfere with protein (amino acid) absorption by strongly binding metallic ions. The content of these compounds has been related to perosis-like disturbances in poultry. However, in ruminants they can improve the bypass characteristics of the protein. Tannins occur primarily in the hulls of canola. Removing tannins from canola meal would increase the metabolisable energy of the diet, however, they also act as a defence for the plant and there is a trade-off in reducing the level of tannins and maintaining agronomic strength and flexibility.

Sinapine

Target

Canola:
Maximum 0.5% for poultry,
Maximum 1% for other species

COMMENTS
Sinapine is a phenolic compound with a bitter taste, which reduces palatability. It does not appear to be a problem at current levels in pigs and is likely to be degraded in the rumen in cattle. Sinapine is seen to contribute to the production of a 'taint' in eggs and this sector would like to see current levels of 0.6-1.8% reduced.

Colour

Target

Light for export markets, pet food and speciality uses

COMMENTS
Colour is an important factor in some feed applications (eg pet food) and some markets (eg Japan). The colour of canola protein may be able to be improved through development of yellow seeded types. The potential application of yellow seeded types is being investigated by the industry and has been incorporated into breeding programs. It may be possible that yellow seeded cultivars are also lower in tannins and fibre, thereby increasing the value of such cultivars.

STRATEGIES TO MANAGE AND INFLUENCE QUALITY ON-FARM

CANOLA QUALITY

The key to Australian canola remaining competitive on the world market will be our ability to consistently produce quality seed with high oil and protein contents.

While variety, climate and season have a major impact on the final oil and protein content in canola seed, there are a number of factors growers can control to produce high quality seed.

One of the real challenges for growers to target both increased oil and increased protein levels with agronomic management is that research has confirmed the inverse relationship between seed oil and protein, which means as the oil content increases the protein level decreases.

Research has also improved our understanding of the impact of seasonal conditions on oil content. Mild conditions during pod and seed development result in higher oil levels, while oil levels decrease with heat or water stress conditions which cause rapid crop ripening.

VARIETY

The main features to consider in selecting a canola variety are herbicide resistance (or conventional), maturity, blackleg resistance, yield, oil content, protein content, crop height and early vigour. To produce high quality seed that will assist marketing the crop on the international market, the most important features are maturity, yield/oil content and blackleg resistance.

HERBICIDE RESISTANCE

Triazine tolerant (TT) canola varieties produce lower oil contents than similar maturity conventional varieties. The difference is often about 3-4% when varieties are sown at the same time in trials (N Wratten, T Potter personal communication). However, TT canola may allow farmers to sow earlier than conventional canola, so on-farm the difference in oil content may be slightly less than in trials. Other herbicide resistances currently available or in development do not have the same oil penalty as TT canola.

MATURITY

To grow high quality canola requires careful selection of a variety to suit the environment where the crop will be grown. Longer season varieties are inherently higher in yield and oil levels than shorter season varieties. Whilst you can grow a reasonable crop using a shorter season or quicker maturing variety in a district better suited to longer season varieties, the yield and oil content will still be lower than what could be achieved with a better suited variety. In a dry environment, a long season variety will usually result in both poor yield and low oil content.

YEILD VERSUS OIL CONTENT

Significant gains have been made in Australian canola breeding in recent years, and current varieties have much improved yield and oil content over those grown only a few years ago. The oil bonification (bonus/penalty) payment system used in Australia is an incentive for growers to strive to achieve high seed oil levels.

Where the yields of different varieties are similar, the improved financial returns from growing the higher oil content variety will reward growers for their efforts. But yield is the primary factor determining returns to growers as shown in Table 2.

TABLE 2: CANOLA YIELD AND OIL COMPARISON

YIELD (T/HA)	PRICE ($/T)	OIL CONTENT (%)	GRAIN VALUE ($)	OIL BONUS ($)	GROSS RETURN ($)
2.5	300	38	750	- 22.50	722.50
2.5	300	40	750	0	750.00
2.5	300	41	750	+ 11.25	761.25
2.3	300	43	690	+ 31.05	721.05
2.2	300	46	660	+ 59.40	719.40

Trial results published each year by the state agriculture departments are the best guide to select varieties with the highest yield and oil content for a region. Given that seasonal factors can affect yield and oil levels, it is important that growers consider the performance of a particular variety over several seasons and not just the results for a single season.

BLACKLEG RESISTANCE

The major effect of blackleg disease is seen in reduced yields, but it can also have a significant impact on oil and protein levels. As with other diseases, blackleg that occurs late in the season and results in premature ripening or death of plants will lower the seed oil content. To reduce the risk of blackleg and its impact on yield and oil levels, growers need to select varieties that have a high rating for resistance to this disease. Where possible it is best to have a minimum of three years between canola crops to minimise the impact of this disease on quality.

TIME OF SOWING

Time of sowing has a major effect on oil content. Earlier sowing generally allows grain to fill under milder conditions compared to later sowing, and produces higher oil contents. In trials in the mid north of South Australia, oil content decreased by about 0.5% for each week that sowing was delayed (T Potter, unpublished data), while in trials in New South Wales oil content was decreased by about 3% for each month's delay in sowing (Hocking et al 1991).

PRODUCTION

CROP NUTRITION

Canola is a high input crop compared to wheat, so if good yields are to be achieved it requires higher levels of nutrition for every tonne of grain produced. As well as restricting potential yield, inadequate crop nutrition can also result in a significant reduction in both seed oil and protein levels.

The actual rates of fertiliser that need to be applied to a canola crop will vary depending on a number of factors including:

- Soil type where lighter soils may require higher inputs.
- Climatic conditions.
- Yield potential for the area where it is being grown.
- Fertility of the paddock in which the crop is sown.
- The need to correct a particular nutrient disorder that may be a local or regional problem.

As a general guide the following rates of the three major nutrients; nitrogen, phosphorus and sulphur, should be applied to the crop for every one tonne/ha of expected yield:

- Nitrogen 30kg.
- Phosphorus 8kg.
- Sulphur 10kg.

These three nutrients are also important to the plant for the production of oil, which is why higher rates are needed compared to wheat.

The advice of experienced growers, local agronomists and fertiliser companies can help you determine the most appropriate fertiliser type and rate to apply to maximise both yield and oil content. Nutrient management tools such as soil testing, plant tissue testing and nutrient calculators can be used before making big investments in fertiliser programs on canola crops.

WEEDS

Contamination of canola with seeds of Brassica weeds such as charlock, wild radish and turnip weed poses major problems for marketing canola. These weeds contain high levels of erucic acid and glucosinolates and can result in the oil, after crushing, not meeting the canola standard.

Careful paddock selection to avoid problem Brassica weeds or using appropriate herbicide tolerant varieties in these situations will help to minimise the risk posed by weeds. Where weed control has not been effective, grading the seed may be required before delivery especially with ryegrass contamination which can quickly increase admixture penalties.

INSECT PESTS

The major impact of insect damage in canola is usually a reduction in yield, but sucking insects like aphids and Rutherglen bugs can cause plant stress and premature ripening which results in lower oil levels. Regular crop monitoring to check for insects will ensure potential problems are identified and treated before crop damage occurs. In some districts contamination of the harvested sample by live Rutherglen bugs can be a problem for exporters. Delayed delivery of the seed can help minimise this problem.

It is essential that only pesticides registered for use on canola are applied at the recommended rates and that the appropriate withholding period is observed to prevent pesticide residues in the seed or the oil.

GREEN SEED

Oilseed crushers are concerned about green seeds in canola at delivery as the chlorophyll in green seeds can cause oil discolouration during the crushing process. Fortunately this is not a major problem in Australia as our canola crops ripen under conditions of rising temperatures with reduced frost risk, which is the main cause of green seed problems in the Northern Hemisphere.

When a green seed problem does occur a late season frost could be the cause, but it is more likely a result of uneven ripening of the crop. This can happen for several reasons including:

- Uneven seedling emergence causing later maturity of some plants.
- Low or uneven plant densities, for example from insect or disease damage at establishment.
- Regrowth occurring after hail damage or following a period of severe moisture stress especially during pod fill.
- Diseases such as blackleg or sclerotinia, which can make it difficult to accurately assess the optimum time for windrowing.

If uneven ripening is a potential problem the main option is to delay windrowing as late as practicable, closer to 60% seed colour change rather than at 40%. To minimise the risk of green seed due to frost, avoid planting canola in areas prone to serious frost events during the pod-filling period of crop development.

WINDROWING

Windrowing or swathing of canola ensures a more even ripening, reduces potential seed loss from pod shattering and speeds up the harvest operation. In the drier environments, delaying swath timing with short season varieties can help raise oil contents slightly (1-2%).

Correctly made, even windrows will produce a better seed sample at harvest. The sample will be cleaner with less admixture, there will be less damaged seed ensuring better quality and reduced seed losses in material passing through the header.

In contrast poorly made windrows, with lumps or 'haystacks', can result in higher levels of admixture or trash in the sample, increased risk of damaged seed and a poorer quality sample. Besides slowing down the harvest, they increase the risk of header breakdowns and further costs.

HARVEST

Damage to canola seed can increase the risk of free fatty acids (rancidity) developing, especially if it is to be stored for some time before crushing, so it is important to avoid seed damage during harvest and transport. Avoid harvesting in the heat of the day and open the concave up to avoid over-threshing of the seed, as this will minimise losses as well as damage to the seed.

With most of the crop exported, it is important to keep admixture levels to a minimum to avoid problems at export destinations with blockage of augers and other unloading equipment. Monitoring headers during harvest will assist in avoiding problems.

STORAGE

Canola, like all oilseeds, is more difficult than cereal grains to store successfully so on-farm storage is not recommended. The two major concerns are the risk of contamination with insecticides and the impact of moisture content on quality.

The higher the oil content in an oilseed the greater the risk there is of it absorbing any insecticide residue that may be present in the storage facility, and with canola the risk is greater due to its thin seed coat. As many of the insecticides registered for use on cereal grains are not registered for use on canola, storage in silos or sheds which have held treated cereal grain is very risky.

The safe moisture level for storing canola depends on both temperature and oil content. The higher the oil content and storage temperature, the lower the moisture content required. Attempting to store canola at higher than recommended moisture levels particularly where the temperature rises above 25°C can result in moulds and mycotoxins, formation of free fatty acids and increased oil colour which all impact on the quality of the seed and its saleability.

MANAGING SEED

The Australian Oilseeds Federation's recent End User Review identified that erucic acid levels have been increasing over time in some parts of the crop. The commercially available Australian varieties are very low in erucic acid (<0.5%) with the exception of the variety Karoo, which is widely grown in Western Australia.

The reasons for an increase in erucic acid levels in some areas are contamination by Brassica weed seeds, which are high in erucic acid, from farmer retained seed and the potential for genetic drift in canola. Also there can be considerable variation in erucic acid levels due to environmental effects.

To minimise the risk of higher erucic acid levels, the industry will continue to replace any existing cultivars that are high in erucic acid with new, improved cultivars. Growers can also help by improving their management of retained seed.

WEED CONTAMINATION AND GROWER RETAINED SEED

A major risk of grower retained seed is contamination by wild radish seeds or herbicide resistant annual ryegrass seeds.

Grower retained seed may contain traces of annual ryegrass and wild radish seeds from populations that have been exposed to triazine herbicides over a number of seasons. If any of these resistant plants produce viable seed, some may be present in grower retained seed and grown on the following year.

Using commercial seed can reduce the risk of incurring high erucic acid levels from weed contamination. Commercially available seed is grown from pedigree seed each year. The pedigree seed is grown from foundation seed, which in turn is grown from breeders' seed.

To minimise cross-pollination, canola seed crops are grown in isolation from other canola crops and this reduces genetic drift and maintains a variety true to type. Commercial seed crops are inspected several times during the growing season to ensure they are free of undesirable weeds.

Commercially produced seed is graded and cleaned by experienced operators, which may not be matched in quality by grower retained seed that is graded on-farm by mobile seed cleaners. Grower retained seed can be less uniform and of poorer quality where the finish to the season is harsher, and where seed is retained from crops grown on poorer soil types.

YIELD AND GROWER RETAINED SEED

Poor crop establishment using lower quality seed results in lower yield. Results from Marcroft's 1998 trials showed the average yield reduction from farmer retained seed was 12.4%, ranging between 0 and 100%.

Canadian research work has confirmed these results by showing an average 7% yield advantage when commercially produced seed was compared to grower retained (Harrison, 1998).

The small seed size and relatively poor vigour compared with most other crops often results in canola plant populations varying widely even when sown at the same rate (Canola Check data). Because of their size canola seedlings are vulnerable to fungal infection, insect attack and fertiliser toxicity, and these factors can cause establishment problems.

As conditions for emergence become less than ideal, seed of lower quality will fall in germination percentage faster than seed of good quality The ability of the seed to produce a vigorous, healthy seedling is crucially important to establish a crop in most sowing conditions across Australia If seed of inferior quality produces lower plant numbers and less vigorous crops, the potential yield loss is considerable

Initial studies from 1995/96 replicated field trials conducted in Western Australia and Victoria showed yield declines in Narendra of 5 to 10% from certified to third generation seed. In Victorian trials, Dunkeld and Oscar varieties showed yield declines of up to 10% from certified to second generation seed

Despite this demonstrated yield decline, a recent industry survey indicated that up to 50% of WA Karoo crops were sown using grower retained seed in 1999, and more importantly 80% of growers indicated they did not germination test the seed.

From a grower's economic perspective, the concerns with retained seed include reduced seed viability and reduced vigour leading to lower yields, while the major issues from an industry perspective are the potential impact on quality from weed contamination and genetic drift

Checklist for using retained seed:

- Use seed from weed-free paddocks
- Keep the seed in vermin-free aerated storage.
- Have the seed properly dried and stored.
- Conduct purity and germination tests to check vigour.

STRATEGIES TO MANAGE AND INFLUENCE QUALITY ON FARM

SOYBEAN QUALITY

The requirements for soybean quality are defined by the end use, as the two broad market end uses are crushing for stockfeed and beans for human consumption. Each category has specific end uses such as full fat beans for poultry rations, production of flour for a range of food products, tofu, soy milk, yoghurts, and a range of other niche products like snack foods. Farming systems and crop management need to target production of the quality sought by the specific market.

VARIETY

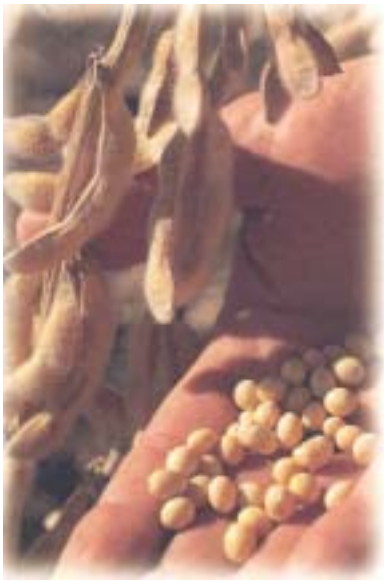
Varieties need to be selected for their adaptation to the particular climatic and geographic region. Soybeans are photoperiod responsive, which means flowering and maturity are affected by day length and latitude. This means that varietal characteristics such as maturity, drought tolerance and weathering tolerance are particularly important.

If maturity and harvest occurs too early and in hot weather, seed moisture may be too low and the seed will crack. Conversely if harvest is too late, autumn/winter rains can lead to downgrading through weather damage. Weathering tolerant varieties should be selected, particularly in areas of high risk such as the New South Wales north coast and Queensland sugar cane regions.

Soybean varieties have their own defining characteristics including edible and/or crushing quality, yield potential, growth duration, lodging and shattering tolerance, disease resistance, protein content, and a host of other minor attributes often only noticed when grown in commercial situations.

Varietal purity is essential to meet market quality standards and avoid rejections at delivery. Certified or quality assured planting seed should be used and replaced every three years to avoid contamination by off-types. Three types of contamination could occur:

- Dark hilum varieties in light hilum seed destined for the edible market.
- Light hilum varieties with inferior processing quality contaminating a higher quality light hilum sought for the manufacture of, for example, tofu.
- Mixed varietal maturity within the one crop leading to potential shattering losses or weather damaged losses from late maturity.



PRODUCTION

SOWING TIME.

Whilst the best quality may not always come from the earliest sowing time, sowing in the early part of the 'sowing window' for the variety and region will maximise both yield potential and quality over the long term. Late sowing delays the harvest time and increases the risk of weather damage.

DRYLAND VERSUS IRRIGATED

As edible soybeans are generally longer season types with more exacting delivery specifications, production under fully irrigated conditions in the drier inland regions is preferred. The edible market favours a large seed size and this can only be produced reliably where soil moisture is available to the crop right up until physiological maturity.

Crushing market beans are suited to both dryland and irrigated conditions, although dryland areas must have high and reliable summer rainfall to produce profitable crops. Dryland production under variable summer rainfall is more suited to the crushing bean market where seed size is not as important as in the edible market.

FIELD SELECTION

Edible soybeans should not be planted in fields that grew crushing beans in the previous season. Unharvested and dropped seed could easily contaminate the following crop, downgrading it and requiring new seed to be purchased. Crushing beans can be grown in fields which grew edible beans the previous season, as there are no quality penalties for this market.

Growers need to pay attention to the chemical and physical quality of the seedbed. Target fields with good soil structure, low nitrogen status and a desirable pH range of 5.0 - 8.0 CaCL2. Liming of acid soils has been shown to benefit both yield and protein content of beans grown in southern New South Wales and northern Victoria. Lime test strips are a useful first step if soil pH is a concern.

Fields with a bad broadleaf weed problem should be avoided, and blackberry nightshade (seed staining caused by the soft berries) and Bathurst burr are two examples of major weed contaminants of edible beans.

CROP HUSBANDRY

Soybeans must be inoculated correctly as good nodulation ensures enough nitrogen is fixed to produce a healthy grain and protein percentage to meet market requirements.

Best practice fertiliser use, weed management. irrigation management, and insect control programs should be used and will vary between regions.

Crushing market beans have higher tolerance levels for Bathurst burr seed, blackberry nightshade stains and other weed contaminants. These weeds must be controlled in edible crops using selective herbicides or hand weeding.

Irrigated crops must have access to good soil moisture right up to physiological maturity. Poor irrigation management during pod filling can significantly reduce seed size and the beans will fail to meet edible quality standards.

INSECT MANAGEMENT

Insect attack can occur at any time throughout the life of the crop and result in reduced establishment, delayed maturity, pods set too close to the ground, pod abortion, and small, shrivelled, marked and damaged beans. The net result is loss in yield and quality.

Different markets have different tolerance levels for insect damage. For example the edible market has much lower tolerance levels for damage caused by pod-sucking bugs and chewing insects such as heliothis caterpillars, whereas beans targeted at the crushing market can sustain higher populations of pod-sucking bugs later in the life of the crop without a significant effect on yield.

Each soybean region has insect management guidelines or is developing an Integrated Pest Management (IPM) Strategy designed to reduce pesticide use and reduce the potential impact of pesticide residues. Some markets are becoming more discerning about the types of pesticides used on the crop and growers are addressing these concerns by developing Quality Assurance plans.

MACHINERY USE

Ensure all sowing, harvesting and handling machinery is set to manufacturer specifications, is free of weed seeds, other crop seeds and other soybean varieties.

HARVESTING

To ensure high quality, the crop should be harvested when the seed reaches 13% moisture, unless aeration is available. Some end users may require lower moisture content. If the crop is harvested too dry, seed cracking can occur which will affect the germination percentage.

Foreign material (soil) and damaged grain from incorrect header settings or delayed harvest contribute to inferior quality grain and must be avoided. Crop desiccation and/or access to drying facilities can reduce the risk of a delayed and weather damaged harvest by allowing earlier harvest or harvest at higher seed moisture content.

STORAGE

To maintain quality, keep storages covered at all times to avoid external contaminants from rodents and birds. The moisture content must be below 13% if aeration is not available, and only use insecticides approved by the end user.

Belt conveyors are particularly important when transferring edible quality soybeans in order to minimise grain damage, which can occur with metal spiral augers. If using an auger is unavoidable, make sure it has a wide diameter and operates at modest speeds as this will significantly reduce grain damage. Plan the harvest, storage and transport to minimise the number of handling operations and reduce damage.

MANAGING SEED

It is important to maintain the varietal integrity of seed for sowing. This may require hand rouging to remove off-types and problem weeds over the seed increase area. Sowing seed needs to be handled in the same way as for edible market quality, to maintain germination percentage and vigour.

Seed for sowing the following year should be harvested at 13-15% moisture, but stored below 13% and preferably between 10-12% to maintain germination and vigour. Germination and vigour tests are essential shortly after harvest and again one month before sowing to ensure retained seed is suitable for sowing and confirm whether germination and vigour has fallen significantly during storage, which soybeans of dubious quality are apt to do. Seed kept for sowing should be replaced if germination falls below 80%. Soybean seed will lose germination and vigour if kept beyond one season. Even after six to seven months changes in germination percentage can occur depending on harvest factors and storage conditions.

STRATEGIES TO MANAGE AND INFLUENCE QUALITY ON FARM

SUNFLOWER QUALITY

For sunflower growers oil content is the main quality characteristic, but for end users the emphasis on quality characteristics shifts with different end markets.

For crushers and margarine manufacturers using polyunsaturated sunflower, linoleic acid content is the most important characteristic followed by having very low free fatty acid levels. With monounsaturated sunflower, the level of oleic acid is critical for end users. In the confectionery market, seed size and dehulling ability are currently the most important characteristics. Ideally kernels should have high oleic content to compete better in the health food trade. The Australian Oilseeds Federation determines the quality standards together with the industry.

Sunflower is grown over a wide range of areas from central Queensland to northern Victoria and is sown from August in the north west plains of New South Wales and the western Darling Downs to March in central Queensland. The agronomic best management practices will vary from region to region but the principles outlined here will help growers produce high quality sunflower seed to meet end users' requirements.

POLYUNSATURATED SUNFLOWER

High linoleic sunflower has been the main type grown since the sunflower industry began in Australia. Declining demand has led to loss of market share to monounsaturated sunflower and to other vegetable oils. The domestic oil market needs about 70,000 tonnes of polyunsaturated sunflower in 2001 (Meeting End User Requirements, AOF December 2000).

OIL QUALITY

The objective is to produce oil with a minimum of 62% linoleic acid. For growers to meet these specifications, polyunsaturated sunflowers need to fill seed when the temperatures are mild with the average minimum temperatures between 10 to 15°C. High minimum temperatures during summer usually significantly reduce the linoleic acid levels well below 62% and often below 50%. In the main production areas, sowing in summer with seed fill in autumn will usually achieve high linoleic oil.

Severe infestations of Rutherglen bugs during seed fill can significantly reduce linoleic acid content and reductions of up to 7% of linoleic acid have been recorded in irrigated crops.

Seed from crops heavily infested with Rutherglen bugs tends to have higher levels of free fatty acids, which is of major concern to crushers who have a maximum limit of 2%.

Strategy: Adjust sowing times so that seed fill occurs when minimum temperatures are normally mild and to control Rutherglen bug infestations.

HIGH YIELDS WITH YIELD STABILITY

Sunflower breeders have been relatively successful in releasing new hybrids with higher yields while maintaining high oil content. To manage for high yields and oil contents in highly variable seasonal conditions is a very big challenge for growers of dryland crops. Good growing conditions that produce high yields usually also result in high oil content. Growers can improve their crop yields by sowing into soils with good subsoil moisture and the likelihood of good seasonal rainfall based on SOI climate forecasts. Sunflower crops grown on well-structured soils can utilise deep soil water better than most other crops.

Strategy: Sow adapted high yielding hybrids using conservation tillage practices such as no-tillage and controlled traffic to improve water use efficiency.

HIGH OIL CONTENT

Various factors can decrease the oil content of sunflower including too much nitrogen, high maximum temperatures during flowering and seed fill, moisture stress in the latter stages of seed fill, diseases and insects. Normal rates of nitrogen fertiliser of up to 60-100kg N/ha for dryland crops and 100-140kg N/ha for irrigated crops significantly increases crop yields but tends to decrease the oil content slightly. However, rates of nitrogen fertiliser 50-100% above the normal rates for high yielding crops will often reduce the oil content by 1 -2% units without any further yield increase. Growers need to adjust nitrogen rates to provide a balance between seed yield gain and oil content loss.

Continual high maximum temperatures above about 30°C during flowering and seed fill can reduce the oil content. The ideal temperature regime appears to be maximum temperatures of 20-30°C and minimum temperatures of 10-20°C. Very low temperatures also usually reduce oil content.

Moisture stress during flowering to early seed fill tends to produce a small thin hull with small seed which may increase the oil content to as high as 50%. However, if the moisture stress occurs from mid seed fill onwards, oil content is usually reduced with small seed forming in a large hull. Under these conditions yield is usually significantly reduced.

Many diseases including rust, Alternaria, charcoal rot and Rhizopus head rot lower oil content as well as yield.

Rutherglen bugs have reduced the oil content in dryland crops by 12 to 32% and this seed would be unacceptable to crushers. Rutherglen bugs can also cause an increase in the free fatty acid levels in stored seed. Heliothis caterpillars may indirectly reduce the oil content with the development of head rots in dryland crops.

Recommended higher plant populations usually increase crop oil content by forming a higher number of smaller seeds, which have a higher seed to hull ratio. Adequate levels of soil phosphorus will usually raise the oil content.

Strategy: Sow disease resistant hybrids at recommended high plant populations into good soil moisture with adequate nitrogen and phosphorus nutrition, so that crops are seed filling during a period of likely good moisture and mild temperatures. Rutherglen bug infestations in both irrigated and dryland crops should be controlled when the insect thresholds have been reached.

HIGH PROTEIN CONTENT

Increasing nitrogen fertiliser rates increases the protein content of sunflower seed particularly when comparing nitrogen deficient crops with crops with adequate levels of nitrogen. Luxury rates of nitrogen increase the protein content by 1 -2%. While a higher protein sunflower seed will raise the protein content of sunflower meal, this is not of direct financial benefit to the grower.

Strategy: Not to seek high protein seed by using luxury levels of nitrogen fertiliser.

MONOUNSATURATED SUNFLOWER

HIGH YEILDS WITH YIELD STABILITY

The current monounsaturated hybrids yield about 10-15% less than the better medium-slow maturity polyunsaturated hybrids. Most have a high oil percentage but it tends to drop significantly under poor growing conditions. Increasing resources are being put into breeding better hybrids. Conditions that produce high, stable yields of polyunsaturated sunflower also apply to monounsaturated sunflower.

Strategy: Sow high yielding hybrids that perform well under adverse conditions.

OIL QUALITY

The oleic acid levels of monounsaturated sunflower crops appear to be unaffected by temperature during seed fill. Oleic levels appear to be relatively stable at 85 to 90%.

HIGH OIL CONTENTS

The oil content of monounsaturated hybrids has been relatively as high as the better polyunsaturated hybrids. The factors that affect the oil content in polyunsaturated sunflower appear to affect monounsaturated sunflower in the same way.

SEGREGATION

Monounsaturated crops should be isolated from other sunflower crops by about 80 to 100 metres to reduce cross-pollination and lowering of the oleic acid content. Never sow a monounsaturated hybrid and a polyunsaturated hybrid in the same paddock or strip. To reduce cross-pollination by bees, sow the monounsaturated crops earlier or later than other nearby sunflower crops so that there is about two weeks' difference in flowering time.

Seed from a monounsaturated crop must be segregated from any other sunflower seed so that no contamination occurs and this means headers, bins, trucks and silos must be free of other sunflower seed.

Strategy: Always isolate monounsaturated crops from other sunflower crops and segregate the seed from other sunflower seed.

CONFECTIONARY SUNFLOWER

HYBRIDS FOR DEHULLING

The hybrids selected for dehulling tend to have an air space between the hull and the kernel. Currently in Australia grey striped birdseed and polyunsaturated hybrids are grown for the confectionary market, as there are no large seeded confectionary hybrids commercially available. The ideal confectionary hybrid should be high in oleic acid for long shelf life and perceived health reasons. A small breeding effort is being made to develop suitable confectionary hybrids.

Strategy: Grow hybrids recommended by the dehuller.

SEED SIZE

Dehullers need plump seed that will not pass through an 8/64 inch slotted screen. This is usually achieved by establishing much lower plant populations than for other sunflowers, which unfortunately means crop yields will probably be slightly reduced.

As with other sunflowers, diseases such as rust can significantly reduce seed size as well as yield.

Strategy: Sow lower plant populations than for oilseed sunflower and sow into soils with at least 100cm depth of wet soil using disease resistant hybrids.

SEED QUALITY

Rutherglen bugs can cause more significant damage to confectionary sunflower than to oilseed sunflower. Kernels for the confectionary trade should be free of visible signs of physical damage or seed will be rejected. The suggested threshold for control is only five bugs per plant. The earlier comments on yield losses caused by Rutherglen bugs also apply for confectionary sunflower.

Strategy: Constantly monitor crops for Rutherglen bugs and spray as soon as the threshold is reached.

HARVESTING AND ON-FARM STORAGE

As confectionary sunflower seed is for food use seed should have minimal cracking, be free of weather damage, insects, weed seeds and sclerotinia.

Store seed at 7 to 9% moisture content and at temperatures as low as practical to reduce the production of free fatty acids and stored insect infestations. Storages should be free of mice, rats and insects and importantly only use chemicals that are registered for stored oilseeds. Growers supplying this sector of the industry will probably require HACCP accreditation.

Strategy: Store seed at 7 to 9% moisture and at temperatures as low as practical.

QUALITY ASSURANCE AND IDENTITY PRESERVATION

WHILST QUALITY ASSURANCE AND Identity Preservation are not new concepts to the food industry, they are relatively new to the grains industry at the farm gate level. Increasingly growers arE responding to consumer concerns about the origin, quality and safety of foods by providing evidence of how crops have been grown and managed. Growers arE becoming more aware that they arE producers of food and/or industrial products, not just a commodity.

The demand for Quality Assurance (QA) and Identity Preservation (IP) is driven by market signals including;

- Consumer demand for safe, clean food and for increasingly more tightly specified products.
- Increased emphasis on quality and product traits, for example nutritionally enhanced, unique ingredients.
- The advent of gene technology and pending commercialisation of GM canola in Australia has heightened awareness and the need for broader adoption of quality management systems in the oilseeds sector.
- A move away from commodity transactions. Processors and end users will contract specific requirements based on variety, quality and production system.
- Increasing focus on relationships as the nature of doing business moves to a more direct customer/producer basis.

QA and IP are two acronyms we need to become more familiar with and it's important to make the distinction between them as they both serve different purposes, despite the process being similar.

It is expected there will be an increasing level of integration of these systems where there is a need to better manage food safety and product quality, together with absolute product integrity and higher value in the supply chain. This is in response to increasing sophistication in product differentiation, for example canola for industrial use versus human consumption, and the need to be able to identify that differentiation (value) right through the supply chain. A key feature of both QA and IP systems is traceability throughout the supply chain.

QUALITY ASSURANCE

Quality assurance is a system of activities where the purpose is to provide the producer and user of a product or service the assurance that it meets defined standards of quality with a stated level of confidence. In the past this assurance has been provided through a system of controls where consistency of output has been maintained through end point inspection. QA seeks to provide a total assurance of process and product from start to finish, ensuring that the approach to producing a crop is right at all stages. QA recognises the need to provide the market with evidence of the integrity of the system.

QA is a process that growers can easily manage on-farm through internal checks that are verified by independent auditing. This external verification provides independent and objective proof to customers about the integrity of the system. Good business practice is an underpinning principle of QA, so for many growers QA simply formalises what they are already doing.

Many Quality Assurance systems in the food industry are based on a code known as HACCP (Hazard Analysis Critical Control Point). This tool is internationally recognised by food and health organisations as the foundation block for managing food safety and providing compatibility in quality management systems.

IDENTITY PRESERVATION

IP is driven by specific customer requirements and does not guarantee safety in its own right. IP is used to preserve the identity of products from farm gate as they move through the chain to delivery to a specific end market requirement. The requirements can be quite varied and may include:

- Content - what is in the product.
- Quality - something that is unique and differentiates the product.
- Method - how it has been produced, for example the cold filtered brewing process.
- Origin - where the product has come from. Can either be a point of difference in the market or simply a need to comply with local food regulations.

An IP system can add costs to a supply chain where significant segregation is required, but this is relative to what the market actually requires and the number of steps and players in that specific chain. In the grains industry IP has been a tool used by the seed industry to ensure requirements such as varietal purity.

The basic elements of IP are now being logically incorporated into QA programs such as Great Grain. The application of IP will be particularly important where product variations exist, for example in high oleic/low linolenic canola or in the event of GM crops being grown.

WHAT BENEFITS DO QA AND IP SYSTEMS OFFER GROWERS?

QA and IP systems are part of the farm management toolkit, rather than a defined process relating to farming practices. These systems can be integrated with other tools such as agronomic decision support systems, and in many cases they will draw on the same information used for other activities.

QA and IP systems provide an on-farm framework and a set of checks and balances for every step of the production process right through to delivery. They are critical to managing consistency and quality of product, and they promote best management practices and compliance with legislation such as chemical application and storage.

Most importantly QA and IP can provide you with market recognition and access. Increasingly buyers will seek to develop a quality assured preferred supplier base and in some cases (GM canola) these systems are likely to be a mandatory part of doing business.

HOW TO IMPLEMENT QA AND IP SYSTEMS

With an increasing focus on food safety and quality, there is a proliferation of systems across the food and fibre industries. You may have already received some directives from your marketers and end users about a specific QA program. There are three key considerations when choosing a QA system:

- It must be a HACCP based system and preferably be a HACCP certifiable system.
- It must be externally audited to provide third party verification of what you do.
- It must fit the market you are looking to target incorporating both food safety and product quality issues that need to be handled on-farm.

It is important to define your own level of commitment to QA. Keep in mind QA systems are dynamic and change according to market needs and legislation. Getting the certificate on the wall is not the end of it! This level of commitment is also going to be relative to the perceived cost/benefit to your enterprise of accreditation and ongoing maintenance.

The starting point is to identify your market need. Talk to your marketer and/or end user to better understand the trends (both consumer and legislative) in the market place and how these will impact on what you do on-farm. It will also provide a guide to the issues unique to your supply chain and the appropriate type and level of program.

MAKING QA RELEVANT TO YOUR FARM

For any QA program to be relevant, it must reflect the activities and approach to the market of your individual enterprise as much as compliance to a system. You'll need to develop a quality policy that articulates the importance you attach to the management practices of your farm.

Identification of food safety and quality hazards that can occur on-farm with grain is an important step in determining the scope of the QA program and requires knowledge of customer requirements.

A food safety hazard is a biological, chemical or physical contamination of food with potential to cause a health hazard.

A quality hazard results in failure to meet customer requirements.

Generally in the grains industry there are four hazards of concern:

- Chemical.
- Physical.
- Microbiological.
- Quality.

HAZARDS IDENTIFIED IN THE GEAT GRAIN PROGRAM

Food Safety

Chemical contamination:

- Chemical residues that exceed MRLs.
- Naturally occurring contaminants/toxins.

Physical contamination

- Dirt, stones, metal objects, glass, sticks, wood, plastic and other miscellaneous materials.
- Animal material – hair, bones, excreta.
- Insects – dead locusts, cockroaches etc.

Microbiological contamination:

- Fungal.
- Grain-related diseases.
- Bacteriological eg salmonella.

Product Quality

Foreign material:

- Stones and other unmillable material.
- Dirt, sticks etc.

Damaged grain:

- Broken/split grain.
- Insect or disease damaged grain.

Protein and oil levels, and grain size.

Once the hazards are identified, the QA program develops a food safety and quality plan to manage the issues that can cause these hazards. Some common elements of QA programs for the grains industry are:

Crop Activities

- Chemical use and handling.
- Paddock, crop and grain treatment.
- Paddock selection.
- Crop management – weeds, pests and disease.
- Machinery/Equipment – hygiene, calibration and maintenance.
- Grain storage and handling.

General Activities

- Product traceability/identification.
- Input/service suppliers.
- Training.

RECORDS

The system will have a number of supporting management requirements that specify how the process is managed, the rigour required and the procedures to be adopted. An important part of the system is keeping records to provide evidence that the system is working and to identify problems.

AUDITS

The audit process is a check on how well the system and its implementation is working. It highlights non conformances, which can be used to improve processes. The audit provides verification for customers that the system is working. A QA system will generally involve both internal audits and an external (certification) audit.

WHAT PROGRAMS ARE AVAILABLE?

Currently there are three systems relevant to the Australian grains sector:

1. Great Grain:
   Pulse, oilseeds and cereals program (HACCP system) owned by Pulse Australia, the Australian Oilseeds Federation and the Quality Wheat Cooperative Research Centre. Great Grain is co-badged with SQF1000.

2. SQF1000 and SQF2000:
   Safe Quality Food code of practice (HACCP system) owned by Agriculture Western Australia.

3. Graincare:
   A code of practice developed by the Grains Council of Australia.

As a co-owner of Great Grain, AOF has participated in development of this program to ensure it meets the needs of the oilseed industry.

LINKS TO THE SUPPLY CHAIN

The most important thing to remember with QA and IP is that beyond complying with legislation and good management practice, adoption of these programs must be considered with the end user in mind. Consumers of your product are ultimately the group that must drive the decision process back on-farm.

The broader adoption of QA is likely to have a marked impact on the way our grain supply chains behave in the future, implying more transparency in transactions and creating the opportunity for producers to generate more value for their efforts. Adoption of QA on-farm is helping to fill in the missing links in our food chains.

HOW READY IS YOUR FARM FOR QA – COMPLETE THIS CHECKLIST:

Do you have a copy of your customer specifications/receival standards?

Are you familiar with the requirements of these standards?

Do you check inputs/services on receival?

Do you record grain deliveries?

Do you take and keep samples of grain delivered off farm?

Have you and all your staff handling and applying chemicals completed the Farm Chemical Users course?

Are chemicals kept in a separate area, which has a sealed floor, is lockable and has appropriate signage?

Are chemical containers disposed of responsibly?

Are chemicals used responsibly:

- **Crop production**
- **Storage**
- **Seed treatments**
- **Around the farm**

Do you record chemical use, for example by maintaining a spray diary?

Do you keep an inventory of chemicals used or record of chemical movements?

Are all withholding periods observed?

Do you check conditions prior to using chemicals and adjust equipment/actions to avoid spray drift?

Do you clean all machinery and equipment prior to and after use?

Do you regularly check machinery/ equipment during use?

WHERE TO FIND MORE INFORMATION

Industry contacts for further information on quality requirements and managing oilseed production:

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USEFUL WEBSITES

Australian Oilseeds Federation
www.aof.asn.au
Grains Research and Development Corporation
www.grdc.com.au

STATE AGRICULTURE DEPARTMENTS
Western Australia www.agric.wa.gov.au
Victoria www.nre.vic.gov.au
New South Wales www.agric.nsw.gov.au
South Australia www.pir.sa.gov.au
Queensland www.dpi.qld.gov.au

AUSTRALIAN OILSEEDS FORECAST AND AUSTRALIAN OILSEEDS NEWS

The AOF publishes a monthly Australian Oilseeds Forecast and a quarterly Australian Oilseeds News, which are available free to anyone in the industry via email, the internet or fax.

The monthly Australian Oilseeds Forecast is a one page report on crop forecasts for canola, sunflower and soybeans, and key factors affecting the market outlook for the past and coming month.

The quarterly Australian Oilseed News looks at the global and domestic oilseed industries and reviews factors impacting on supply, demand and prices.

To subscribe to these free newsletters contact the AOF on phone: 02 4575 2008, fax 02 4575 2003, or email: bryce@aof.asn.au.

ABOUT THE AOF AND THE OILSEEDS DEVELOPMENT FUND

This Grower Quality Guide was prepared with support from the Oilseeds Development Fund (ODF) and GRDC. The ODF is a partnership between the Australian Oilseeds Federation and the commercial industry that funds development of the Australian oilseeds industry.

The AOF charter is to promote the growth of the Australia oilseed industry. AOF achieves this by harnessing the cooperation of its industry partners and investing in activities that add value across the entire industry. The AOF plays an important role in industry development and since the early 1990s it has initiated a major strategic planning process to ensure the industry is profitable for all players in the supply chain. The AOF is representative of all sectors of the industry and provides leadership and coordination for the industry.

ODF CONTRIBUTORS INCLUDE:

Meadow Lea Foods
Unilever Foods
Cargill Australia
Peerless Holdings
Caines Pty Ltd
Millmaster Feeds
Davison Oils
Riverland Oilseeds Processors

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