

BETTER OILSEEDS

Better varieties to lift sunflower as an attractive summer crop option

By Robert Freebairn¹

Better yield, more drought tolerance, improved disease resistance, tolerance to herbicides including new products that control a wider range of weeds, improved crop architecture, and better quality are all features of the next generation of sunflower varieties.

Australian Sunflower Association President and AOF executive member Maree Crawford believes the imperative for sunflower breeders to incorporate a number of improved traits will help ensure the industry is sustainable in the long term.

Sunflowers, once the glamour dryland and irrigation summer crop, is fighting back to regain its status as a more than valuable crop option. Improved varieties, improved agronomic technology and increased market appreciation are combining to improve the worth of this versatile crop.

Improved yield

Errol Corsan, Research Manager Pacific Seeds, notes that world wide research indicates that the genetic yield ability of sunflowers continues to improve by around 11 kg of oil per hectare – or 1.2 per cent gain per annum. Sunflower breeders generally believe this rate of gain will be maintained for at least the foreseeable future. These gains rank sunflowers among the crops advancing at an acceptable rate in contrast to some – such as wheat – where annual genetic gains have fallen in recent years.

But sunflower breeders together with



Hedley Watt, a sunflower grower from Emerald, Central Queensland, says given good soil moisture sunflowers are a robust crop for dryland production. Precision planting is critical for successful establishment, good plant health and yield. (PHOTO: Liz Alexander, Blue Dog Agribusiness)

leading agronomists stress that if sunflowers are to return to increased popularity the best genetics will need to combine with the highest level of agronomic practise.

As Neil Weier, northern NSW Qld Manager for Nuseed stresses, you are unlikely to grow a reliable crop if sowing subsoil

moisture is less than 1.0 metre and if weed issues can't be addressed.

Sunflower breeding companies use a wide range of germplasm, commonly sourced from areas like South America and the US to improve yield. Improved yield of future hybrids will complement well the reputation that sunflowers already enjoy of being drought-hardy provided good agronomy is used.

Improved traits for water stress and heat tolerance are part of the improved genetic yield ability of varieties coming through the breeding programs. These traits combine to promise increased water use efficiency (WUE), or simply more oil per hectare per mm of water.

Improved Tobacco Streak Virus (TSV) tolerance

Ongoing research in Central Qld, funded by the GRDC and led by Murray Sharman, Qld Primary Industries and Fisheries (QPIF), has identified sunflower hybrids that appear to have good tolerance to the recently recognised serious necrosis disease caused by TSV. TSV can devastate Central Qld crops, emphasising the importance of hybrids with high level of tolerance.

Research by Murray Sharman and colleagues indicates TSV is mainly spread from weeds like parthenium. Murray believes TSV is unlikely to be a threat to southern Qld, or further south, unless parthenium was to become a significant problem. Their research also indicates agronomic practices, such as controlling parthenium adjoining sunflower, especially upwind, is also an important control strategy.

Sunflower breeders have noted the tolerance to TSV found in some genetic lines and are increasing the level of hybrid tolerance, especially for Central Qld.

Further research by Murray Sharman's team aims to confirm and better understand the inheritance characteristics of TSV.

Imidazolinone herbicide resistant sunflowers

Australian sunflower breeders will al-
...viii ▷

better OILSEEDS

This sunflower article has been compiled as part of the national Better Oilseeds project, an initiative funded by the Grains Research and Development Corporation and the Australian Oilseeds Federation.

The Better Oilseeds project is addressing the urgent and critical need to lift the productivity of oilseed crops within Australia to ensure critical mass and consistency of production and to improve the quality of grain produced. The project began in 2006 and aims to increase the value of the Australian oilseeds industry through enhancing productivity and value. It initially covered canola, sunflower and soybeans and more recently safflower.

<vii...BETTER OILSEEDS

most certainly release imidazolinone resistant hybrids in the near future. Yield quality and agronomic performance should equal conventional hybrids.

Canola is the most recognised imidazolinone resistant crop (Clearfield) but a number of others including wheat, maize and sunflowers are available in the US. Imidazolinone is not a GM trait and is recognised within the conventionally developed group of varieties.

Countries like Canada and the US value imidazolinone resistance in summer crops as it provides a wider range of herbicides for controlling broadleaf and grass weeds.

Rodney Coe, Managing Director HSR Seeds, feels added options for weed control will help Australian sunflower growers add yield stability to their business, especially by reducing one of the biggest constraints to reliable yield – weeds.

While imidazolinone resistance provides added herbicide control options, their use also comes with normal herbicide management protocols to protect against weeds developing resistance to group B herbicides and doesn't substitute for sound rotations and integrated weed management practises. Issues like crop tolerance and plant-back period for following crops also needs careful consideration.

Oilseed quality

Sunflower breeders generally feel markets will continue to seek higher supplies of monounsaturated oil sunflowers (high oleic), although there will be ongoing markets for polyunsaturated sunflowers.

Breeders have strived to develop mono

hybrids that yield (oil per hectare) as high as poly types. Initially, mono hybrids came from a lower yield base. But breeders believe they have now beaten that barrier and there is no reason that both types will not continue to improve at similar levels.

Specialised sunflower markets

There are a variety of valuable niche markets for sunflowers including birdseed, confectionary and specific ones like the horse industry. For example, confectionary sunflowers have considerable potential for expansion into Asia.

Australian sunflower breeding companies have and continue to develop hybrids better suited to these markets. Whilst attributes vary, confectionary types generally require longer, bigger and more uniform seeds where the hull comes away from the kernel.

New varieties in the pipeline indicate improvement in several aspects of quality relevant to these markets as well as improved yield and agronomic type.

Disease resistance

Sunflower breeders are improving tolerance to sclerotinia stem and head rot. Resistant germplasm has not been found but useful tolerance has.

Sclerotinia is a sporadic disease and, to a degree, is controlled by rotations and avoiding late sowing where it is likely to be a problem.

In recent years, red rust has not been a major issue in many Australian sunflower areas although in previous wet and humid summers, it has been. Breeders have focussed heavily on rust resistance in Australia and use a range of genes to convey tolerance (durable resistance is difficult because

of dozens of rust strains and the rapidity with which they change). Breeders are mindful of the need to pyramid as many rust resistance genes into single hybrids as possible to provide adequate protection. Management can also help reduce rust risk.

Alternaria leaf blight can be a serious sunflower disease with several varieties having good tolerance. Plant breeders are incorporating further levels of protection in future hybrids.

Verticillium is a serious sunflower fungus overseas. Good resistance has been identified and is included in some Australian breeding programs.

Powdery mildew tolerance is incorporated into some Australian hybrids with further improvements likely.

Crop architecture

Australian sunflowers range in height from moderately short to tall. Unlike sorghum, yield genetics is not related to plant height. Some breeders feel the main requirement is to develop hybrids with high yield (oil per hectare) with height a lesser consideration. Generally the taller the plant the smaller the head diameter, which in some seasons will adversely affect yield.

Sunflower has many advantages

Even with today's varieties, leading farmers, agronomists and plant breeders believe sunflowers are an underrated crop with enormous potential to improve farmers' income.

They are profitable in their own right. Price relativities vary but oilseeds currently are less depressed than most grains. Sunflowers can be sown earlier and later than grain sorghum and therefore have a more flexible sowing window to take advantage of either early or later seasonal breaks. They suit double cropping should seasonal conditions allow because of relatively low residue levels left behind after harvest.

Sunflowers also suit zero-till farming into heavy stubble loads because of their adaptability to wide rows. One of sunflower's major advantages is their rotational value, particularly between cereal crops, both summer and winter. They are also a valuable tool to combat weed herbicide resistance because of their different herbicide use pattern.

Provided good agronomy is practiced, the sunflower industry has a bright future and will be even more enhanced with the next generation of hybrids.

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Provided good agronomy is practiced, the next generation of sunflower hybrids points to a bright future for the industry (PHOTO: Sue Knights)