Sunflower in the Central Queensland Farming System

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Abstract
Sunflower has historically been an important crop in Central Queensland. In recent years the sunflower area in Central Queensland has been reduced due to low and variable prices and increased competition from alternate summer crops. Issues of tall persistent stubble that provides little ground cover and a lack of in-crop weed control options have also contributed to declining popularity of sunflower in an area where adoption of zero tillage practices continues to increase. However, recent improvements in farming practices have impacted favourably upon sunflower production and profitability, and while sunflower faces challenges, it is a valuable option Central Queensland farmers should retain.

Introduction
For many years sunflower was second only to grain sorghum in terms of area under summer crop in Central Queensland (CQ). Sunflower provided an option for late summer planting opportunities, had reliable production and was profitable when compared to other summer crops. However, the continuing refinement of management practices for sorghum (Spackman et al., 2001), maize, and mungbeans has lifted the popularity of these crops to the extent that over the previous 5-10 years the sunflower area has declined from a typical 70-100 000ha to current levels of 40-60 000ha. Although currently at similar potential profit levels to other summer crops, sunflower presents the following significant management problems:

- It has a tall, robust, persistent stubble that is difficult to manage in a minimum tillage system
- The stubble is also sparse and often does not provide adequate levels of soil protection
A lack of in-crop weed control options
The above points culminate to the effect that soil moisture profiles are difficult to recharge following sunflower crops due to low cover levels, weed growth and tillage that may be necessary to reduce stubble size

These are significant but not insurmountable problems. Instead, they demand a ‘rethink’ of how sunflower can best fit into the CQ farming system. This paper aims to focus on what we believe are important considerations for the best management practice of sunflower in CQ.

Considerations for Best Management Practice

Rotational Fit

The problem of cover
The fact that sunflower provides low levels of effective cover means that it should be considered in zero tillage systems, where cover levels are already high. In situations where sunflower is double cropped into wheat stubble, there are usually useful levels of stubble cover present in the fallow following the sunflower crop. Useful cover will also exist in zero-till paddocks that have several seasons of crop residues still intact on the surface. Controlled traffic farming systems facilitate the sowing of sunflower between rows of standing stubble.

Planting window
The planting window for sunflower runs from mid-late January through to very early March, similar to the maize window. Recent experience indicates that sunflower is a better choice for planting dates beyond the end of February, as it is more tolerant of frost than maize.

Control opportunity for grass weeds
Grass weeds, (e.g. summer grasses and Sorghum alnum), have become significant problems in CQ farming systems. This system is becoming increasingly dominated by sorghum and maize, and in many situations atrazine has not proven effective on summer
grasses. There are effective, competitively priced options for grass weed control in sunflower crops. In an opportunity cropping system, this is a more attractive option for grass weed control than a summer fallow.

**Cost of planting**
Sunflower is significantly cheaper to plant than maize, due to lower seed cost and lower nitrogen fertiliser requirement. While maize grain is currently well priced and comparatively profitable, the cost of getting into the crop makes sunflower more attractive to farmers on shallow soils of low fertility. On the open downs soils of CQ, these lower up-front costs mean that sunflower may present less financial risk than maize for the February planting window.

**Soil Insects**
Soil insects have been a massive problem for sunflower growers, and this applies especially in zero-till situations. The advent of truly effective control measures (unfortunately still off-label) has greatly reduced the incidence of crop losses and poor plant stands that tended to be prevalent where cover levels were high. Control of soil insects is imperative when aiming for the low to moderate plant populations which have become the norm.

In situations where high soil insect pressure is anticipated, insecticide treated baits are required. There may be scope for baiting in the fallow preceding sunflowers to reduce pressure before sowing.

**Nutrition**
Sunflower has a lower nitrogen requirement than that of sorghum or maize when grown under similar conditions of water availability. Many of the cropping soils of CQ are of low to moderate fertility, and are shallow, providing only moderate water holding capacity, and therefore yield potential. Risk of crop failure is relatively high, and reduced spending on fertiliser N can be viewed as an advantage.

Application of phosphate containing fertilisers at sowing is good practice, and is extremely important where preceeding fallows are longer than 10-12 months (potential for low VAM spore numbers).
**Weed control**

Greatest weed problems in sunflower occur when good rain falls in the first month after planting, particularly where a full disturbance planting operation creates a situation where weed seeds are placed into a position where they can germinate.

The incidence of this problem is reduced where knockdown herbicides are applied pre-plant or post-plant, pre-emergence. This practice is facilitated by controlled traffic. Zero tillage systems further reduce in crop weed problems due to (often) lower weed seed numbers, and minimal soil disturbance.

Farmers operating under a controlled traffic system also have the option of using shielded sprayers for in-crop weed control while the crop is young. Inter-row cultivation is feasible but will significantly reduce any cover present in the form of previous crop residues.

Autumn or winter rain will usually result in infestation of winter weeds. In these situations there is some experience to indicate that aerial herbicide application onto senescing sunflower crops can result in conserved soil moisture for following crops, and a reduction in the potential weed seed bank and the amount of green material present at harvest. There is anecdotal evidence that the practice can also result in an earlier harvest, largely by eradicating late maturing sunflower plants which contribute little to yield. In wet autumn/winter periods the benefits can be similar to those obtained through pre-harvest sprayout of sorghum.

**Plant population and row spacing**

Extensive trial and commercial experience indicates that plant populations in excess of 25 000 established plants/ha provide no advantages in CQ. Moderate populations frequently provide highest yield levels in seed company varietal evaluation experiments, under a range of seasonal conditions.
Planters with precision seed metering capabilities have proven valuable for sunflower (and maize) where consistent plant spacing becomes important when low populations are targeted. These planters also complement the shift in industry focus from a planting rate based on kg/ha of a certain seed size, to seeds/ha.

One metre is becoming a standard row spacing for all crops except wheat. Experiments with sunflower under wide rows and skip rows have not yet pointed to clear advantages from these practices, although further work is warranted. At 1m centres, growers have more options in terms of shielded and directed sprays, inter-row cultivation, potential for post-sowing or in-crop fertiliser application, and cheaper zero-till planting equipment.

**The Future**

**Weeds**
A better fit into zero till farming systems and improved weed control are crucial for the long term prosperity of the sunflower industry.

In the current phase of the GRDC funded Central Queensland Sustainable Farming Systems Project, sunflower has been identified as a weak link in the achievement of sustainable long term weed management. Lack of effective in-crop weed control options in sunflower adds to the costs of strategic weed management for future summer crops. Not only is yield (sunflower) compromised in the short term, but weed control costs in future summer crops increases due to the increased weed burdens resulting from the weed seed set during the sunflower phase. During the second phase of the CQ Farming Systems Project (2002-), the weed agronomy team (Vikki Osten & Megan McCosker) will be addressing issues such as weed – crop competition, and in-crop weed control in sunflower. While an Integrated Weed Management approach will be taken, it is envisaged that herbicides will be a key component. Herbicide selection will be based on appropriateness for the farming systems of the region (Osten, personal communication, June 2001).
There is also some focus on selection for herbicide tolerance in private breeding programs which should prove positive for sunflower in the long term.

**Insects**
There are highly effective insecticidal seed dressings which are readily available, cost effective, and in commercial use to combat soil insects. Registration of these products for use in sunflower should be an industry priority.

Similarly, locusts are an ever present problem in CQ. There are cheap, highly effective control measures registered for use in other crops (fipronil) that are not available to the sunflower grower.

Rutherglen bug may be responsible for a lot more sunflower crop damage in CQ than they are given credit for. There is scope for improved grower and agronomist awareness of economic thresholds and control measures.

**Conclusion**
Central Queensland farming systems are increasingly centred around zero tillage and practices which maximise storage and efficient use of soil water. Traditional methods of growing sunflower struggle to find a place in this system and while market prices for sunflower are below about $300/t on farm, the sunflower area may continue to decline due to increased area under sorghum and maize.

Through embracing recent advances in management practices, sunflower is viewed as a valuable opportunity in situations where ground cover levels are high, anticipated weed pressure is low, or where control of grass weeds is desirable. Sunflower is an option that the CQ farming system can not afford to lose.

**References:**