ALTERNATIVE IRRIGATED SUMMER CROPS

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Key messages

- **Sow as soon as soil temperatures reach the recommended minimum for the crop type**
- **Moisture probes are a valuable tool for irrigation scheduling and monitoring soil moisture**
- **Understand and plan agronomic and irrigation requirements of your selected crop. Short season crops will require less water and may fit into a 'double cropping' program.**

The project aimed to demonstrate the benefits of alternative crop species under centre pivot irrigation. Traditionally broadacre irrigation in the South-East region has been used for specialty small seed production. In recent years, the market and demand for these specialty crops has declined and the returns (Gross Margin/ML water) from irrigated small seeds crops have declined. The project aimed to identify the potential for alternative summer crops in increasing the $return/ML water. It looked at demonstrating summer pulses (suitable for human consumption), summer grain crops (suitable for livestock consumption) and also various grazing fodder species. Species "of interest" that were identified through discussions with local growers and agronomists and as a result sown included:

Corn	Lablab
Sorghum – Seed	Pigeon Peas
Sorghum – grazing/fodder	Mung beans
Sunflower	Adzuki beans
Millet	Navy beans
Quinoa	Soybeans
Cowpeas	Garden beans

The project also aimed to address the issue of sustainable and profitable water use. It is important to ensure that farmers are aware of their options in gaining the best possible return on investment in relation to water use – both for economical and environmental reasons. Being a non-renewable resource, it is extremely important that we are using water in such a way that the best possible outcomes can be achieved to ensure that the resource is available for future generations. This project allowed farmers to explore new opportunities by initially exposing them to alternative and existing crop species and varieties allowing them to make better decisions with regards to sustainable water use.

The summer crops were sown with a precision planter on either 30"(76cm) or 15"(38cm) row spacings depending on the crop. Quinoa (a very small seeded crop) was sown with a conventional seeder on 6"(15cm) spacings. The crops received a total of 185mm water (either by irrigation or natural rainfall) throughout the growing period (Mid November – March 30th). This was measured through the rain gauge that was installed as part of the telemetric moisture probe system.
The crops were sown in late November and Dry Matter cuts or hand-harvesting occurred in April to estimate the yield potential of those species / varieties that looked suitable for the region. This time of sowing was later than ideal, however the ground temperature didn't reach "ideal" levels (over 16°C and rising) until this time.

Over 20 farmers and 10 agronomists/industry representative attended the site for an in crop field walk in February 2014 where they viewed the different crops being grown and discussed management issues around different crops (both agronomic and marketing). Additional smaller field walks were conducted with local producers. In total 50 people visited the site over the life of the project.

Results and Discussion:

Corn

Corn presents an excellent option for an irrigated summer crop in the South East. The main uses for it are grain and silage for stock feed. 7 varieties of corn with different maturities were planted to evaluate the difference in grain and biomass production.

The corn was planted on the 26th November on a rising soil temperature of approximately 16°C. All varieties germinated and established very well. Only 50mm of irrigation was needed to get the crop well established (vegetative period).

Short season varieties P0021, P1070 and PAC 301 performed very well and matured earliest. Yield estimations on this were approximately 8-12t/ha of grain. The longer season varieties grew a lot more biomass and had larger cobs but failed to fill and mature suitably. This could be attributed to lack of finishing moisture and nutrition as further irrigations did not occur after early varieties were finished.

The take home message for corn is select a variety to suit your production system (grain or fodder) and select a maturity that is suitable for the growing season length.

Short season maturity is preferable for irrigated crops in a broadacre cropping system as it allows the corn crop to dry down and be harvested before the next winter crop needs to be planted.

Forage Sorghum

Like corn, Sorghum is a low maintenance option for southern irrigators looking to produce bulk stock feed. All varieties of sorghum established well with the main point of difference being the stem thickness. The Pioneer variety Super Sweet Sudan appeared to have a much finer stem than the Bettagraze variety, which can be of benefit in a grazing situation. Both varieties were evaluated on both 15inch and 30inch row spacings, with the narrower spacing growing a finer stemmed plant. 3-5 weeks after sowing both varieties would have been well enough established to graze. Both varieties produced huge biomass yields, in excess of 20 tonnes/ha.

Grain Sorghum

A grain sorghum variety (Pioneer 85G33) was also planted to assess its suitability. It also established well and produced a mature seed head. Grain sorghum is a very hardy plant and can handle periods of dry. It did best in this trial on 30inch row spacing compared with 15inch. Yield was estimated at 2-4t/ha.

Grain sorghum can have a staggered grain maturity, so desiccation may be necessary as a part of the harvest process.

Millet

French millet was planted so it could be compared to the other forage varieties. It has been commonly grown in irrigated and dry land situations as it is a cheap, hardy forage plant. In this trial, it didn't perform as well as the other forage varieties. It was much slower to establish and biomass production was much less (approximately half of the other forage species). The demonstration results suggested that while the seed cost of some of the newer forage varieties are higher, the gain in biomass production from these newer varieties far outweighs the initial cost when compared to millet.

Sunflowers

Sunflowers are extremely drought tolerant and are suited to both irrigated and dryland summer cropping. They require a similar soil temperature to corn but care needs to be taken that sowing doesn't occur before the last frost. At this site, the sunflowers were the quickest of all the crop types sown to establish and performed fantastically. Bird damage to maturing heads has been a major issue for producers in the past, but negligible damage occurred in this trial. Yield estimates were approximately 2 t/ha.

Lablab and Cowpeas

Lablab and Cowpeas are legumes typically grown in more tropical environments. Once established they are very drought tolerant, suitable for forage and grain. In this trial both plant types performed well. Sown on 30" spacings the plants matured and provide ground coverage with an estimated biomass production of around 3-5 tonnes/ha. They provide an excellent option for a summer forage crop that has the benefit of fixing nitrogen.

Lablab - 4 weeks post-seeding

Mung beans

Mung beans are a grain legume crop suitable for human consumption. They are typically grown in northern regions. With minimal irrigation (100mm) the crop flowered and produced pods. Yield estimates were approximately 1 tonne/ha. More work needs to be done on assessing Mung bean varieties as they are a possible summer crop that could be suited to this region.

Quinoa

Quinoa is an ancient grain and has become very popular because of its health benefits. Three different lines of seed were assessed. One of the lines failed to germinate but the other two established and grew well. Little is known about quinoa as a suitable plant option for this region and more work is needed to be done to assess the varieties and agronomics of growing the crop. Weed control in particular may be a challenge with this crop, as it is a species of Goosefoot (Chenopodium); the same as the common summer irrigation weed Fat Hen.

Soybeans, Adzuki beans, Navy beans, Garden beans and Pigeon peas.

All of these plant types failed to establish and grow. It was observed that the first irrigation coincided with some very hot weather and plants were scorched by the overhead irrigation. They did not recover from this. Some of these varieties have been tried previously, and a similar thing occurred suggesting that they are probably not suited to conditions in the South-East of South Australia.

Conclusions:

From the results it is clear that Corn, Sorghum, Sunflowers and Mung beans are suitable crops to pursue and further evaluate their suitability as grain crops for the region for the region. Suitable fodder options include forage sorghum, but there is also potential for the leguminous crops of Cowpeas and Lablab as a summer forage/break crop.

Specific varietal and agronomical practices need to be further assessed to determine the profitability and sustainability of such crops for the South-East Region.

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