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Ian and Mary Hamono own and operate a cropping farm in Northern Victoria, incorporating 390 ha of irrigation, including 160 ha of sub-surface drip, 65 ha under pivot and 163 ha of flood irrigation. The copping program includes a range of winter crops, including wheat, canola, faba beans, chickpeas, oats/vetch. The winter crop on the area which is used to grown maize each year is cut as silage or hay. Summer crops include maize, grown as grit and feed, and also popcorn.

Maize was first grown by Ian in 2000, to produce silage for feed into the dairy. At this time only 25ha was grown, but it demonstrated what yields were achievable and also the cost advantage compared to other types of feed. In 2008 Ian and Mary moved from dairy to a cropping property. The new property was developed and then in 2013 they began to grow maize again.

Soils on the farm are typically duplex, with a clay base that helps retain sub-soil moisture. When they first started cropping the soil contained poor structure, few aggregates, cracking, and potential crusting. Organic matter levels were low which also resulted in poor crop establishment and low plant numbers which limited yield potential of the crops. A large focus initially was on improving the organic matter level, using a double disc system in maize, and a single disc system in winter crops. Winter crops are now harvested, the paddock is then pre-watered and planted 10 days after wetting up, with minimal soil disturbance, hence minimal moisture loss and soil in not left bare and exposed to the sun and wind.

*Figure 1: Maize production in 2013*

*Figure 2: Maize production now*

Maize was selected as the preferred summer crop as:

- Lucerne required more work, caused more sleepless nights, quality was affected by rainfall events, and was more widely grown in the region.
- farm was too far south for cotton
- Chick peas and Faba bean required an extended growing season to obtain high yields
- Tomatoes required too much work and were high risk, requiring specialised machinery

Maize is planted once the soil temperature rises above 12oC, which is typically from the 15 October onwards. Maize planted early enables pollination to occur prior to the hottest summer weather. A range of varieties are planted each year, aimed at different markets, including feed, gritting and popcorn, along with a range of maturities (CRM's), from short to medium season (100-114 days). This helps spread the workload and also helps with harvest if an early autumn break occurs. Each year they aim to dry less than a third of the annual crop.

Varieties are selected based on their grain yield, with IT varieties used strategically for weed control or for controlling volunteers.

The annual maize program commences in the autumn with an application of nitrogen, phosphorus and sulphur(250 kg/ha single super and 100kg/ha Urea) as a base fertiliser, and to accelerate the degradation of the stubble.

The paddock is then strip tilled and an application of 400-500 kg/ha of MAP, Urea and Potassium applied prior to pre-watering to ensure there is consistent moisture for even germination.

Planting is done into the moisture with a 80-150 litres/ha of pop-up fertiliser (10:14 :0 +Zn+Mo), combined with 8grams/ha of Fipronil to control cutworms and wireworms.

During the season an additional 200-250 kg/ha of nitrogen is applied via fertigation.

Depending on the paddock pre-emergent weed control may consist of 3.2 litres/ha of Primextra Gold or 1.0 litres/ha Dual Gold. In crop weed control may also be required, with Comet 400 at 0.3 litres/ha

**Corn grain gross margin 2019-20.**

| | | | | |
|---|---|---|---|---|
| **Estimated Grain Yield (tonnes/ha)** | | **15** | | |
| **Water Price (meg)** | | **120** | | |
| Contracted grain price | | **480** | | |
| | **Rate** | **Unit** | **Price** | **Cost $/ha** |
| Spray Paddock RoundupUltraMax | 2 | Lt | $ 7.70 | 15 |
| Spray contractor | 10 | ha | $ 10.00 | 10 |
| Apply Lime or Gypsum | | T | $ 120.00 | 0 |
| Deep Riping/Strip tilling. | 80 | ha | $ 80.00 | 80 |
| Pre-Plant Urea/Granulock | 0.4 | tonne | $ 675.00 | 270 |
| Cultivation | 0 | ha | $ - | 0 |
| Atrazine500 | 3 | lt | $ 6.00 | 18 |
| Dual Gold | 2 | Lt | $ 16.00 | 32 |
| RoundupUltraMax | 1.5 | Lt | $ 7.70 | 12 |
| In crop chemical | 2 | passes | $ 40.00 | 80 |
| Spray contractor | 10 | ha | $ 10.00 | 10 |
| Corn seed (Gaucho treated) | 1.3 | bag | $ 392.00 | 510 |
| Starter Fertiliser, Zincstar | 0.25 | tonne | $ 800.00 | 200 |
| Planting with precision Seeder | $100 | ha | $ 100.00 | 100 |
| Water run Urea | 0.6 | tonnes | $ 620.00 | 372 |
| Total of above..... | | | | 1709 |
| **Water for Irrigation ML/ha** | **6** | **Meg** | **Rate** | 720 |
| **Growing Cost per hectare.** | | | | **$ 2,429** |
| **Growing cost per tonne grain.** | | | | **$ 161.90** |
| | | | | |
| **Grain Harvesting Cost.** | 15 | tonne | $30 | **$ 450** |
| **Total growing including harvest $/ha.** | | | | **$ 2,879** |
| **Total grain growing cost including harvest per grain tonne.** | | | | **$ 191.90** |
| | | | | |
| | | | | |
| Expected profit per tonne | | | | $ 288.10 |
| Expected profit per hectare | | | | $ 4,321.45 |
| | | | | |
| **Grain drying provision $30/tonne** | | | $30 | $ 450.00 |
| **Profit/ha if grain drying required** | | | | $ 3,871.45 |
| **Total grain growing cost incl harvest/dry per grain tonne.** | | | | $ 161.90 |
| | | | | |
| Current temporary water price | | | | $ 550.00 |
| Temorary water cost per meg | | | | $ 80.00 |
| Profit per ha from sold temporary water only - no corn grown. | | | | $ 2,820.00 |
| Calculated from water price - temp water cost x hectare usage. | | | | |

Two-Spotted Mites may also be a problem during the season, with Zeal often used at a rate of 0.35 litres/ha. Also depending upon the season, Heliothis may also require an insecticide application (Gemstar®)

During the 2018/19 season a number of trials were conducted on the farm to "Test the boundaries" and see what yields may be possible. This did result in an increase of yield of around 2.0 t/ha of grain.

*Table 1: Trial to "Test the Boundaries"*

| | Nutrient (kg/ha) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **N** | **P** | **K** | **S** | **Ca** | **C** | **Mg** | **Molasses** |
| **At Sowing** | | | | | | | | |
| 1 litre/ha Copper Chelate EDTA (6% Cu) | | | | | | | | |
| 1 litre/ha Boron Complex (6%N, 14.7% B) | | | | | | | | |
| 1.8 litre/ha Tri Culture (Biological) | | | | | | | | |
| **Post Sowing** | 260 | 40 | 38 | 30.3 | 16.3 | 31 | 15.8 | 105 |

The post sowing applications nutrients was based on what was shown as being in deficit in the plant tissue tests at a 3 key growth stages;

- under 30cm sample the whole top
- over 30 cm but before tasseling
- at tasseling

The first tissue test on the 13/11/18 found that the calcium, magnesium, manganese, copper and molybdenum were 2%, 43%, 3%, 16%, and 1% respectively below the desired levels. While at the same time potassium was approximately 7% above the desired level.

At the second tissue test on the 18/12/18 magnesium, nitrogen and phosphorus were found to be below the desired levels by 18%, 1% and 12% respectively.

At the final tissue test on the 14/1/19 magnesium, nitrogen and phosphorus were 37%, 15% and 15% respectively below the desired levels, whereas copper and molybdenum were 27% and 21% above the desired level.

Nitrogen is applied to the crop during the season via fertigation, through the Sub-surface drip irrigation system.

**Worm's P1467 - Nitrogen & Irrigation Schedule 2019, for 38 hectares of SDI**

| Timing | | Irrigation (mm/hectare) | Kg of actual N/ha. | Total UAN | Litres **UAN** |
|---|---|---|---|---|---|
| Week 0. Sown | 5/11/2019 | 50 | 125 | | |
| Week 0. Emergence | 12/11/2019 | 0 | 0 | 0 | 0 |
| Week 1. | 19/11/2019 | 30 | 0 | 0 | 0 |
| 2 | 26/11/2019 | 0 | 0 | 0 | 0 |
| 3 | 3/12/2019 | 0 | 0 | 0 | 0 |
| 4 | 10/12/2019 | 30 | 20 | 1788 | 1788 |
| 5 | 17/12/2019 | 30 | 20 | 1788 | 1788 |
| 6 | 24/12/2019 | 40 | 20 | 1788 | 1788 |
| 7 | 31/12/2019 | 40 | 20 | 1788 | 1788 |
| 8 | 7/01/2020 | 50 | 20 | 1788 | 1788 |
| 9 | 14/01/2020 | 50 | 20 | 1788 | 1788 |
| 10 | 21/01/2020 | 50 | 20 | 1788 | 1788 |
| 11 | 28/01/2020 | 50 | 20 | 1788 | 1788 |
| 12 | 4/02/2020 | 50 | 20 | 1788 | 1788 |
| 13 | 11/02/2020 | 50 | 20 | 1788 | 1788 |
| 14 | 18/02/2020 | 40 | 20 | 1788 | 1788 |
| 15 | 25/02/2020 | 40 | 0 | 0 | 0 |
| 16 | 3/03/2020 | 40 | 0 | 0 | 0 |
| 17 | 10/03/2020 | 40 | 0 | 0 | 0 |
| 18 | 17/03/2020 | 40 | 0 | 0 | 0 |
| Maturity | 24/03/2020 | 0 | 0 | 0 | 0 |
| Totals | | **720** | **345** | **19,671** | **19,671** |

Any pre spread urea will need rainfall to help move intothe root zone, hence the earlier application of fertigated nitrogen.

Note that the total mm of irrigation required also includes any rainfall events.

*Figure 3: Tri-culture™ added at planting (1.8 litres/ha). Results clearly evident ( 300 mm taller, greater bulk density and colour). Grain yield increase ~ 1+ tonne/ha. No other treatments to adjacent control crop.*