# Finley Irrigated Research Centre NSW

*Irrigated trials conducted at the Finley irrigated research centre 2021 were managed by FAR Australia, hosted by Southern Growers.*

## Trial 1. Optimum Plant Population for canola under Overhead Irrigation

**Project Objective:** To compare identical plant population x cultivar trials under overhead and surface irrigation (lateral overhead trial)

**Location:** Finley IRC
**FAR Code:** FAR IRR C21-01-1
**Sown:** 30th April
**Cultivar:** HyTTec® Trophy and 45Y28 RR
**Harvested:** 4th December
**Rotation Position:** Faba Beans (2020), Fallow (2019), Faba Beans (2018)
**Soil Management:** Faba Bean stubble incorporated with speed disc in Autumn
**Irrigation:** Overhead irrigation, 5 applications totalling 82.5mm
**GSR:** April-October 192 mm. Total water available 274.5mm

**Key Messages:**

- *The highest yield of 5.20 t/ha under overhead irrigation was achieved when 45Y28 RR hybrid was sown at 80 seeds/$m^2$ and established a plant population of 51 plants/$m^2$.*
- *There was no interaction between variety and plant population with both varieties achieving increased yields as the plant population was increased.*
- *The oilseed yield of 45Y28 RR hybrid (4.77 t/ha) averaged across 4 plant populations, was significantly higher than HyTTec® Trophy (4.05 t/ha).*
- *Seed yield of HyTTec® Trophy showed little difference (0.21t/ha) when grown at populations between 37-58 plants/$m^2$ with 0.7t/ha drop associated with populations of approximately 20 plants/$m^2$.*
- *With 45Y28 RR hybrid the drop in seed yield associated with a population of 13 plant/$m^2$ was relatively small but there was a trend for a seed yield increase up to 50 plants/$m^2$.*
- *HyTTec® Trophy had a higher plant establishment (82%) than 45y28 RR hybrid (64%), averaged across 4 seed rates.*
- *There was no significant difference in seed oil content across plant population or variety and oil content ranged from 44.5% to 46.2% (data not shown).*
- *HyTTec® Trophy had a low seed test weight (60.3kg/hL) and was well below the minimum receival standard of 62kg/hL, 45Y28 RR hybrid achieved an average test weight of 63.3kg/hL.*

Two canola varieties 45Y28 RR hybrid and HyTTec® Trophy were grown under an overhead lateral at planting rates of 20, 40, 60 and 80 seeds/$m^2$.

**Table 1**. Influence of plant population and cultivar on grain yield (t/ha) grown under overhead irrigation.

| | | Grain Yield (t/ha) | | |
|---|---|---|---|---|
| **Plants/m² (Actual)** | | **HyTTec® Trophy** | **45Y28** | **Mean** |
| **Trophy** | **45Y28** | **TT hybrid** | **Roundup Ready® hybrid** | |
| 19 | 13 | 3.45 - | 4.43 - | **3.94 -** |
| 37 | 29 | 4.14 - | 4.59 - | **4.37 -** |
| 51 | 36 | 4.35 - | 4.86 - | **4.61 -** |
| 58 | 51 | 4.26 - | 5.20 - | **4.73 -** |
| **Mean** | | **4.05 b** | **4.77 a** | |

| | | | | |
|---|---|---|---|---|
| **Cultivar** | P val | <0.001 | LSD p=0.05 | 0.11 |
| **Seed Rate (Plant pop)** | P val | <0.144 | LSD p=0.05 | ns |
| **Seed Rate x Cultivar** | P val | 0.212 | LSD p=0.05 | ns |

**Table 2.** Plant populations (plants/m²) established from four seed rates and two cultivars sown under overhead irrigation.

| | | Established Population (plants/ m²) | |
|---|---|---|---|
| **Seed Rate** | HyTTec® Trophy | 45Y28 | **Mean** |
| | TT hybrid | Roundup Ready® hybrid | |
| **20 Seeds/m²** | 19 - | 13 - | **16 d** |
| **40 Seeds/ m²** | 37 - | 29 - | **33 c** |
| **60 Seeds/ m²** | 51 - | 36 - | **44 b** |
| **80 Seeds/ m²** | 58 - | 51 - | **54 a** |
| **Mean** | **41 -** | **32 -** | |

| | | | | |
|---|---|---|---|---|
| **Cultivar** | P val | 0.0764 | LSD p=0.05 | ns |
| **Seed Rate** | P val | <0.001 | LSD p=0.05 | 0.32 |
| **Seed Rate x Cultivar** | P val | 0.7199 | LSD p=0.05 | ns |

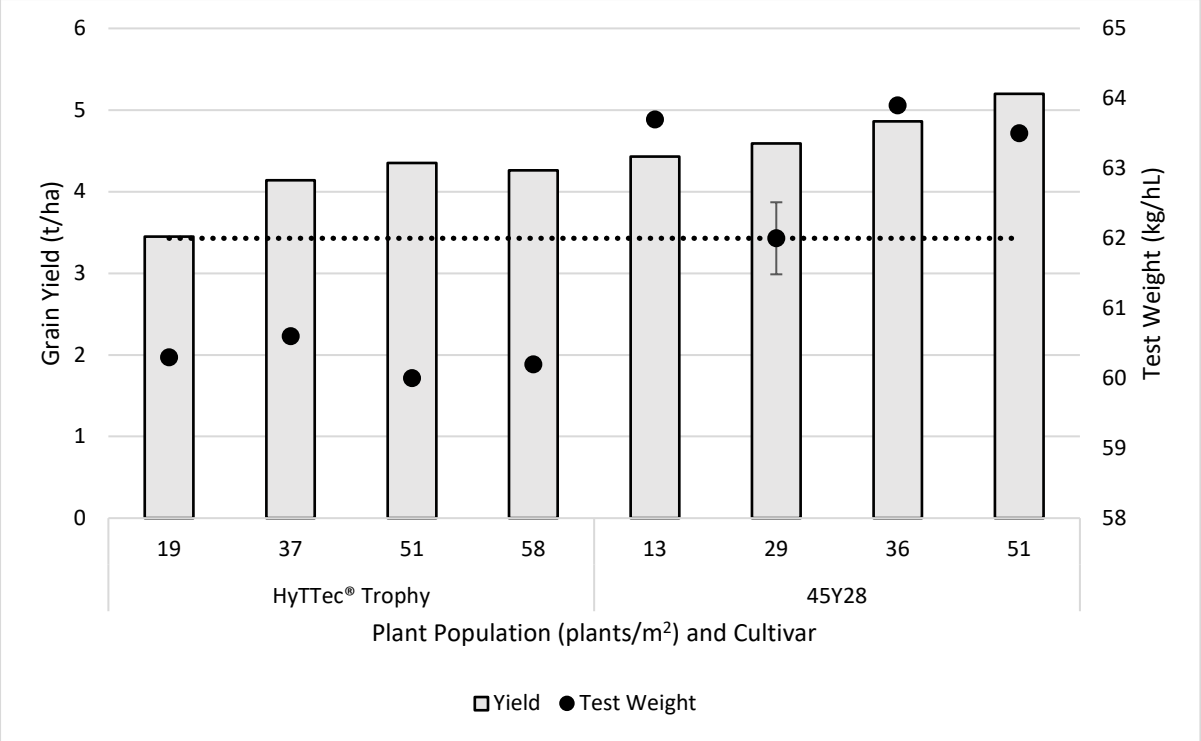


**Figure 1.** The influence of plant population and cultivar on grain yield (t/ha) and test weight (kg/hL) grown under overhead irrigation. Dotted line represents test weight lower limit for depot receival. Error bar represent test weight LSD when $p<0.05$ ($p=0.013$)

Lower plant populations branched at a lower height than the higher populations, but then 'caught up' with the higher populations when podding with no significant difference in lowest pod height or final crop height between the different plant populations (Figure 2).

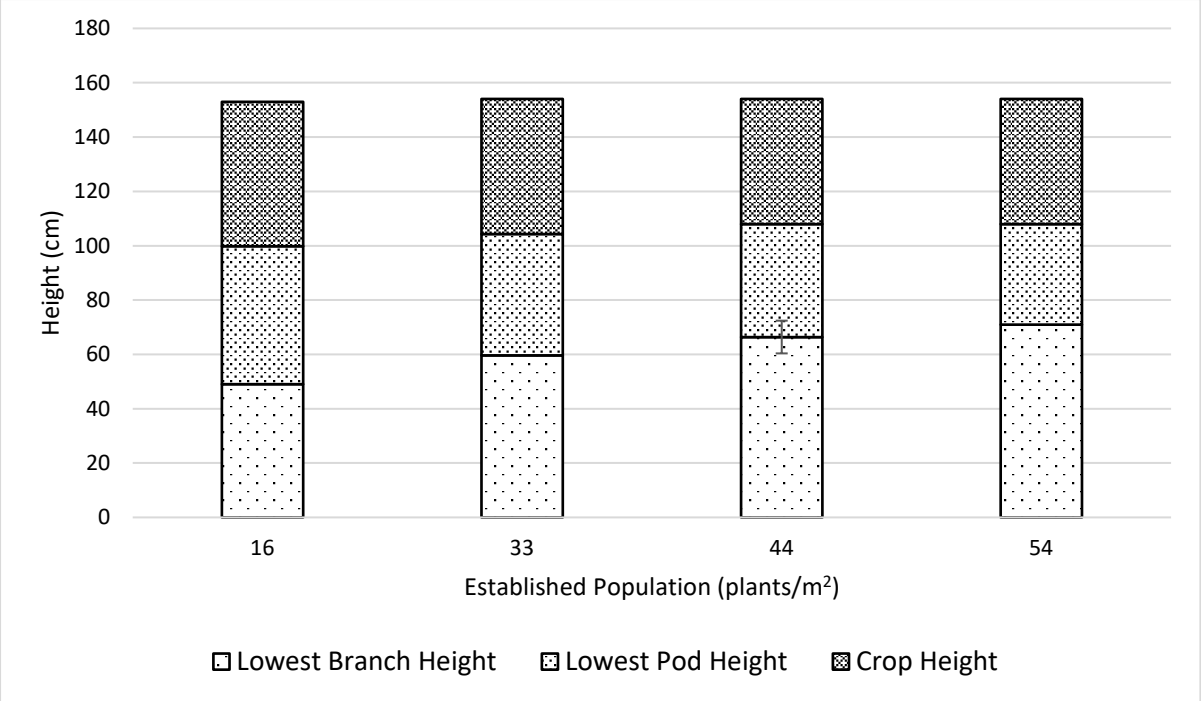


**Figure 2.** The effect of plant populations on canopy structure (height of lowest branch, lowest pod, and crop canopy). Error bar represent lowest branch height LSD when $p<0.05$ ($p=0.007$), Lowest pod height and crop height n.s. (mean of two cultivars)

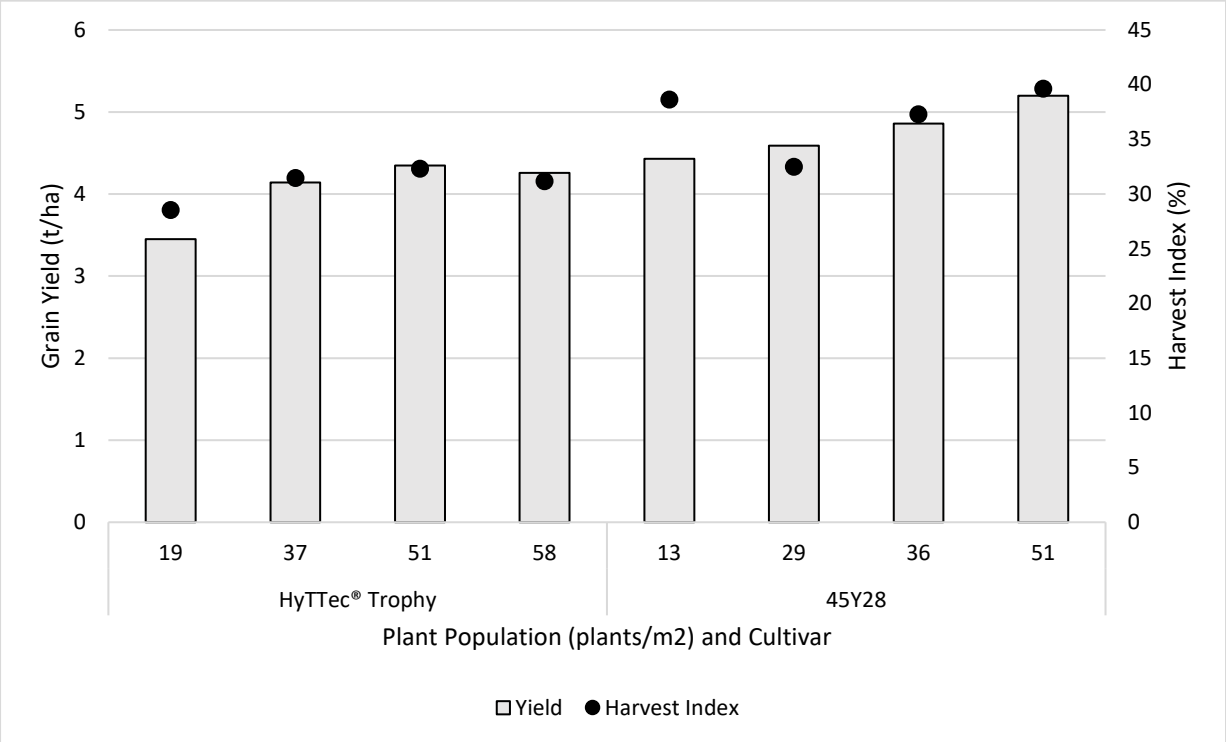


**Figure 3.** The effect of plant populations and cultivar on grain yield (t/ha) and Harvest index (%)

**SAGI statistical analysis (Predicted values for Yield, Harvest dry matter, test weight and oil content)**

The following statistical analysis of key harvest assessments has been carried out by SAGI. This analysis uses spatial statistical analysis to refine predicted values for key assessment values.

Table 1: Harvest Traits for the Treatments

| Cultivar | SeedingRate | Grain Yield (t/ha) | Test Weight (kg/hL) | Harvest DM (t/ha) | Oil (%) |
|---|---|---|---|---|---|
| RR | 20 | 4.72 ± 0.19 - | 63.53 ± 0.54 - | 12.54 ± 1.2 - | 39.31 ± 0.55 - |
| TT | 20 | 3.6 ± 0.2 - | 60.27 ± 0.54 - | 11.15 ± 1.21 - | 38.04 ± 0.56 - |
| RR | 40 | 4.79 ± 0.2 - | 62.99 ± 0.54 - | 12.41 ± 1.21 - | 38.04 ± 0.56 - |
| TT | 40 | 4.13 ± 0.19 - | 60.52 ± 0.54 - | 11.98 ± 1.2 - | 38.55 ± 0.55 - |
| RR | 60 | 4.66 ± 0.2 - | 62.87 ± 0.54 - | 12.94 ± 1.21 - | 38.18 ± 0.56 - |
| TT | 60 | 4.19 ± 0.2 - | 60.13 ± 0.54 - | 13.77 ± 1.21 - | 38.01 ± 0.56 - |
| RR | 80 | 4.86 ± 0.2 - | 63.69 ± 0.54 - | 11.51 ± 1.2 - | 39.47 ± 0.56 - |
| TT | 80 | 4.44 ± 0.19 - | 60.08 ± 0.54 - | 13.05 ± 1.2 - | 37.99 ± 0.55 - |

Note: values expressed as mean ± standard error of prediction
- no subscripts relevant for this response

A summary of the experiment statistics is below:

Table 2: Key statistics for each response analysed

| Statistic | Grain Yield (t/ha) | Test Weight (kg/hL) | Harvest DM (t/ha) | Oil (%) |
|---|---|---|---|---|
| LSD | 0.600 | 1.400 | 3.400 | 1.600 |
| Mean | 4.400 | 61.800 | 12.400 | 38.400 |
| Cultivar_p-value | 0.000 | 0.003 | 0.889 | 0.276 |
| SeedingRate_p-value | 0.144 | 0.777 | 0.574 | 0.393 |
| Interaction_p-value | 0.308 | 0.602 | 0.580 | 0.148 |
| CV | 12.834 | 2.940 | 18.391 | 3.022 |