Intercropping for low rainfall areas, LRZ Mid North (Warnertown), South Australia
Intercropping for low rainfall areas, LRZ Upper Eyre Peninsula (Wudinna), South Australia

Authors
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Aim
To increase productivity of pulses in the LRZ through increasing podding height, plant height and harvestability.
This work builds on previous successful trials in the SA Mallee.

Treatments
Table 1. Trial site details, including treatments and varieties at Warnertown and Wudinna, 2019.

Treatments	1. Sole lentil 2. Sole field pea 3. Sole vetch 4. Sole canola 5. Sole chickpea 6. Lentil + canola 7. Field pea + canola 8. Vetch + canola 9. Chickpea + canola
Fertilizer (kg/ha)[1]	50
Sowing date	Warnertown: 17 May Wudinna: 21 May
Variety and seeding rate	Sole pulse - standard plants/m^2 Sole canola - standard 2.5 kg/ha Intercrop – pulses at standard plants/m^2 + canola at 1 kg/ha

[1]MAP (9.2, 20.2, 0, 2.7) + Zn (2.5)

Results and Interpretation

- Key messages: Intercropping lentil and canola resulted in increased grain productivity at Wudinna, 2019. Intercrop combinations did not over-yield at Warnertown, 2019. Intercropping warrant exploring in low rainfall environments and their potential ancillary benefits, such as increasing groundcover on erosion-prone soils, nitrogen fixation, and fodder production as a secondary end use benefit.

- Productivity: To determine the relative benefit of intercropping, compared to growing crops as monocultures, land equivalent ratio (LER) values were calculated. The LER is expressed as:
  LER = LA + LB = YA/SA + YB/SB,
  LA and LB are the LER for the individual crop yield components, where YA and YB are the individual crop yields in the intercrop combinations, and SA and SB are the yields of the monocultures (adapted from Mead and Willey, 1980). An LER value of 1.0 means the productivity of the intercrop components was equivalent to the monocultures. An LER value of <1.0 means the productivity of the intercrop components are lower than the monocultures, while an LER value >1.0 means the intercrop components are more productive than the monocultures, which is referred to as 'over-yielding'. Confidence limits (CL) were used to determine over-yielding effects for LER values. We concluded that over-yielding occurred when the 95% lower CL was >1. The intercrops did not over-yield on a biomass basis at either site in 2019 (Figure 1). However, over-yielding, as measured by LER, occurred for lentil-canola intercrops at Wudinna (Figure 2). This supports results from previous work at Waikerie demonstrating over-yielding potential in lentil-canola intercrop combination. Further crop combinations warrant exploring in low rainfall environments, as do the potential ancillary benefits, such as increasing groundcover on erosion-prone soils, nitrogen fixation, and fodder production as a secondary end use benefit.

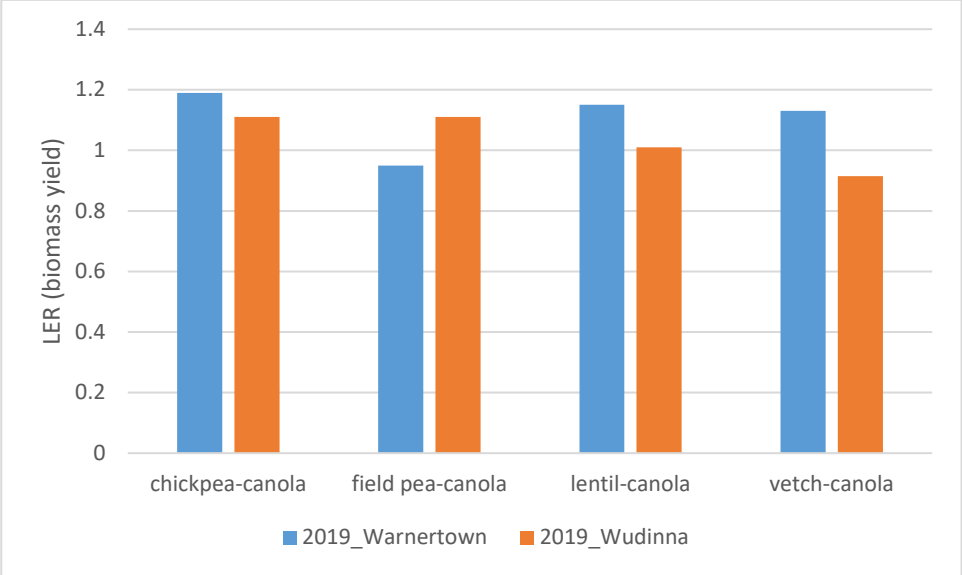

Figure 1. Intercropping biomass LER for intercrop combinations at Warnertown and Wudinna, 2019. Treatments did not over-yield for biomass (determined by 95% confidence limit greater >1).

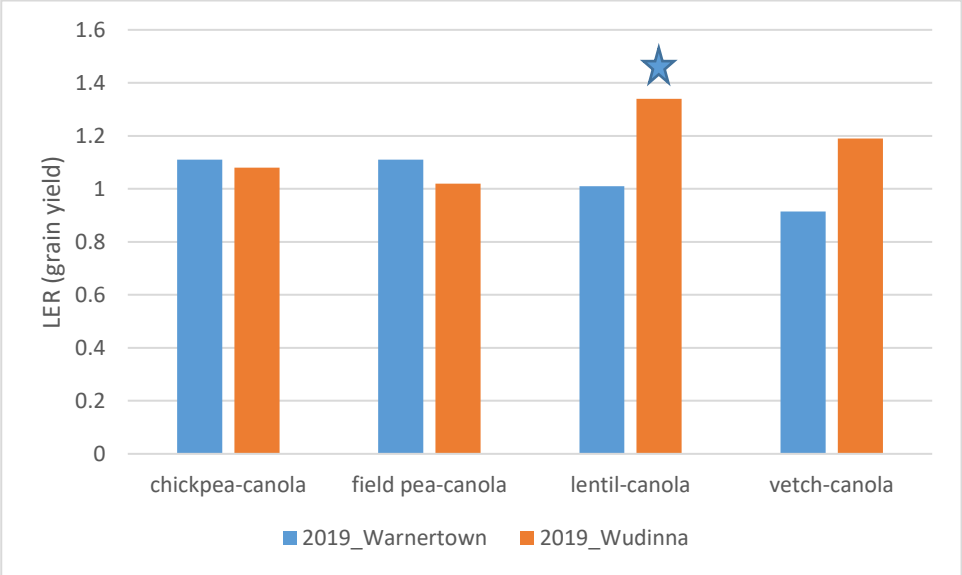

Figure 2. Intercropping demonstrates grain yield benefits for lentil-canola intercrop combination at Wudinna, with land equivalent ratio (LER) values of greater than one, treatments marked with * were determined over-yielding (95% confidence limit greater >1).

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