

Field Evaluation of Early Maturing Sunflower Double-Cropped After Winter Camelina

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Winter Camelina (*Camelina sativa* L. Crantz)

- Mustard family (Brassicaceae)
 - Winter and spring annual forms
 - Winter-types extremely freeze hardy
 - Short life-cycle
 - Ancient crop relatively new to U.S.
- High yielding (1800+ kg ha⁻¹), high oil content (36 – 42%)
 - Industrial and food uses (GRAS status)



Omega-3 FAs
& vitamin E

Cooking
Oil



Animal feed
supplement



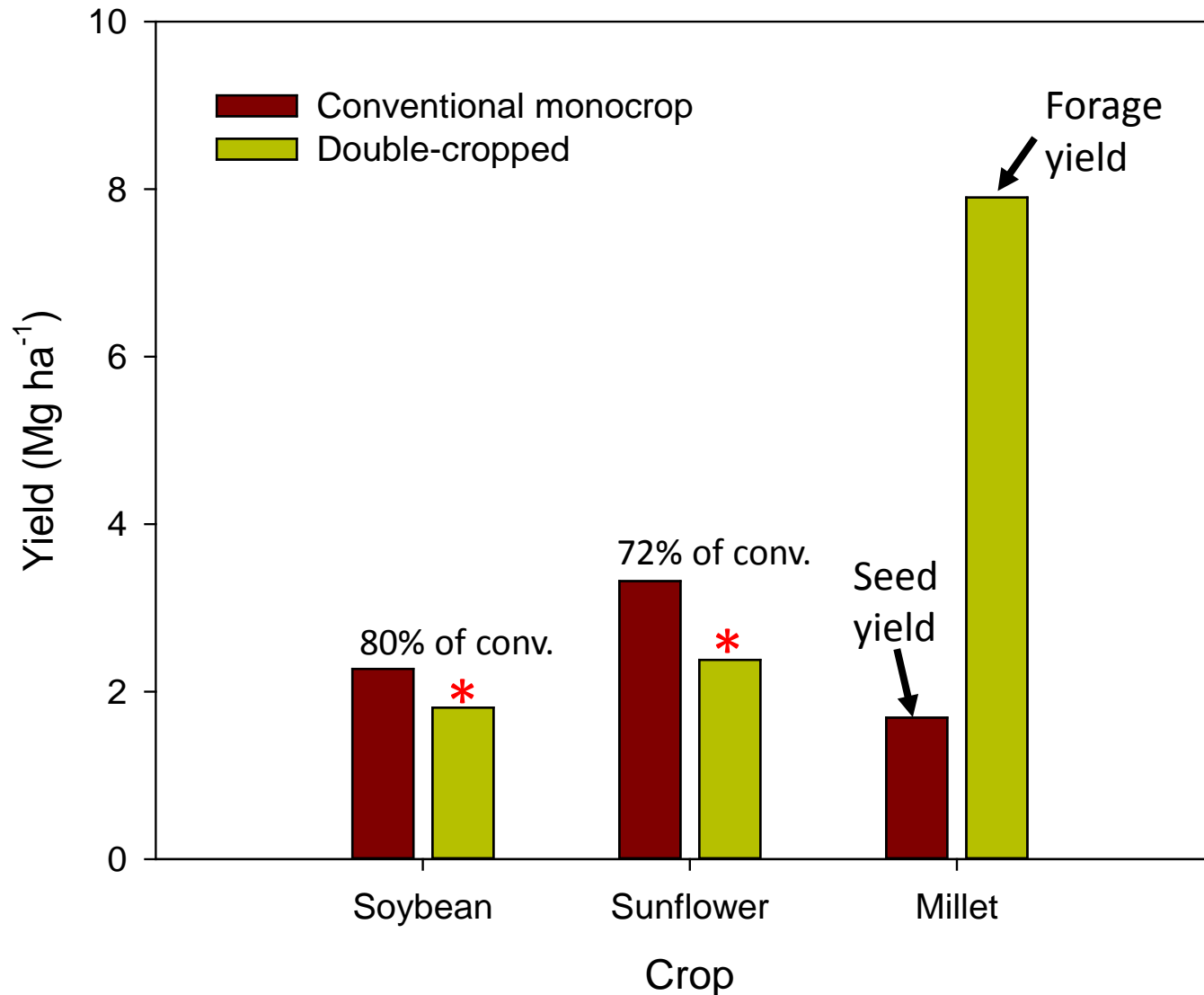
Green Jet Fuel



Bioplastics



Double-Cropping after Winter Camelina in MN



Adapted from Gesch and Archer, 2013, *Ind. Crops Prod.*

* Averaged over 2 years for conventional and no-till systems

Winter Oilseed Cropping System: Ecosystem Services



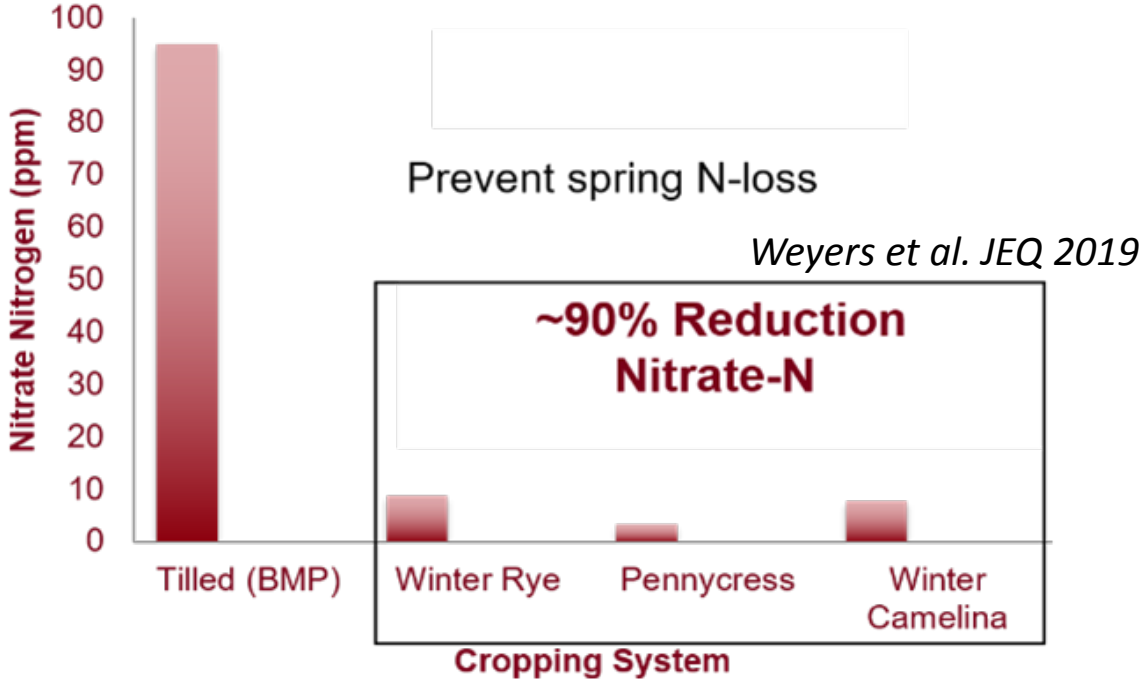
April



May



June



Pollinator forage/habitat



Eberle et al. INDCRO 2015
Thom et al. JAEnto 2017



Goal: Develop systems that enhance camelina & sunflower production, while adding ecosystem services.

Objectives:

1. Determine yield tradeoffs between conventional and double-cropped sunflower
2. Determine impact of double-cropping camelina and sunflower on soil moisture

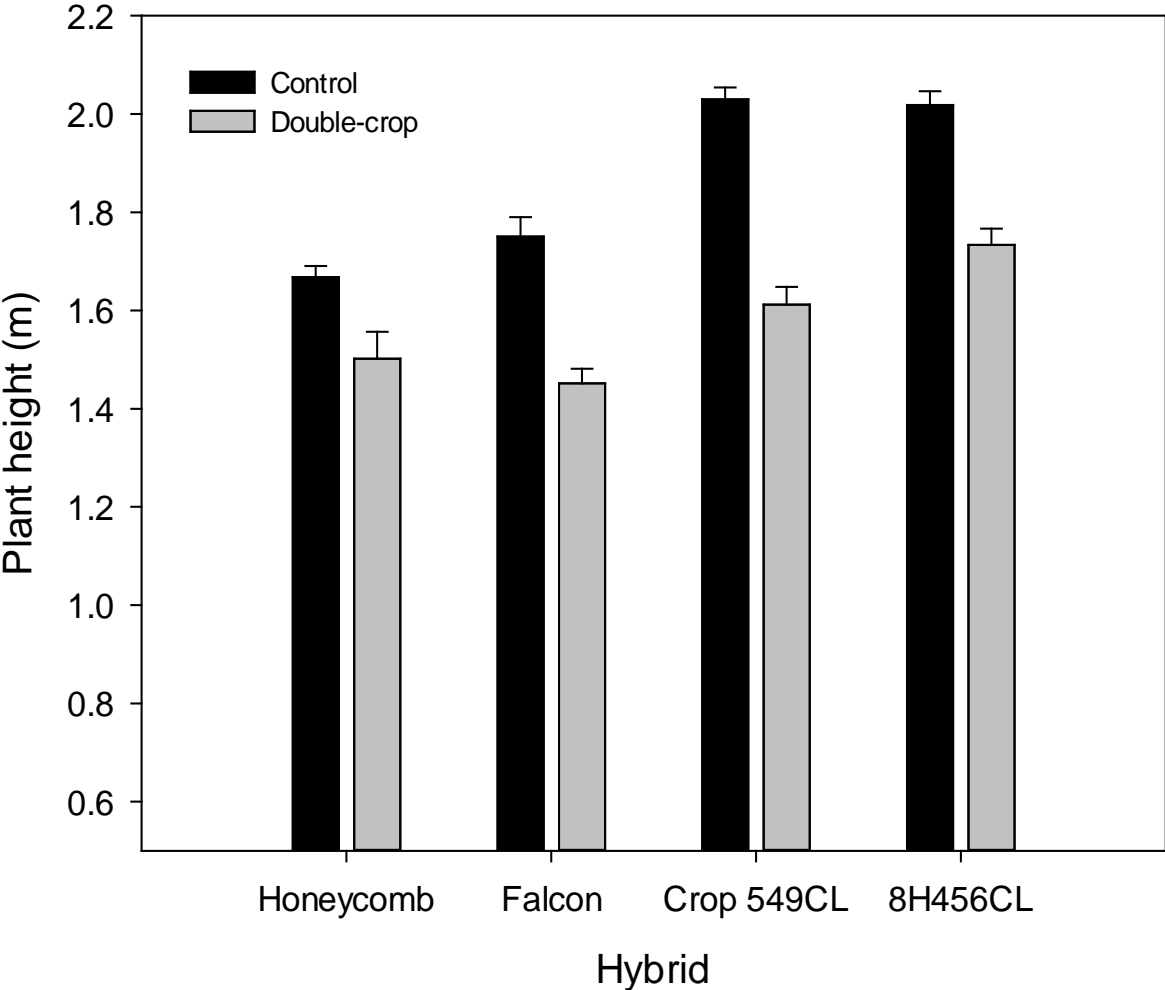
Methodology

Barnes loam soil – west central MN
Spring wheat – previous crop

- Sept 30, 2017 – Plant Joelle winter camelina
 - 7 kg/ha with no-till drill
- June 7, 2018 – Plant control sunflower
 - Tilled and incorporated 112-34-34 kg/ha N-P-K
 - Incorporated Prowl/pendimethalin pre-plant
 - 4 Oil hybrids: Honeycomb (semi-dwarf early), Crop 549CL (Croplan), Falcon (Nuseed America), & MY 8H456CL (Mycogen)
- July 11, 2018 – Harvest camelina & plant DC sunflower
 - Managed same as controls
- Sept 12 to Oct 4, 2018 - Harvest control sunflower
 - Sept 12 – Honeycomb, Sept 17 – Croplan 549CL, Sept 27 – Falcon, Oct 4 – MY 8H456CL
- Oct 16, 2018 & Oct 18-23, 2019 – Harvest DC sunflower
- Soil moisture measured with Delta T PR2 to 1-m depth between Jun 7 and final sunflower harvest

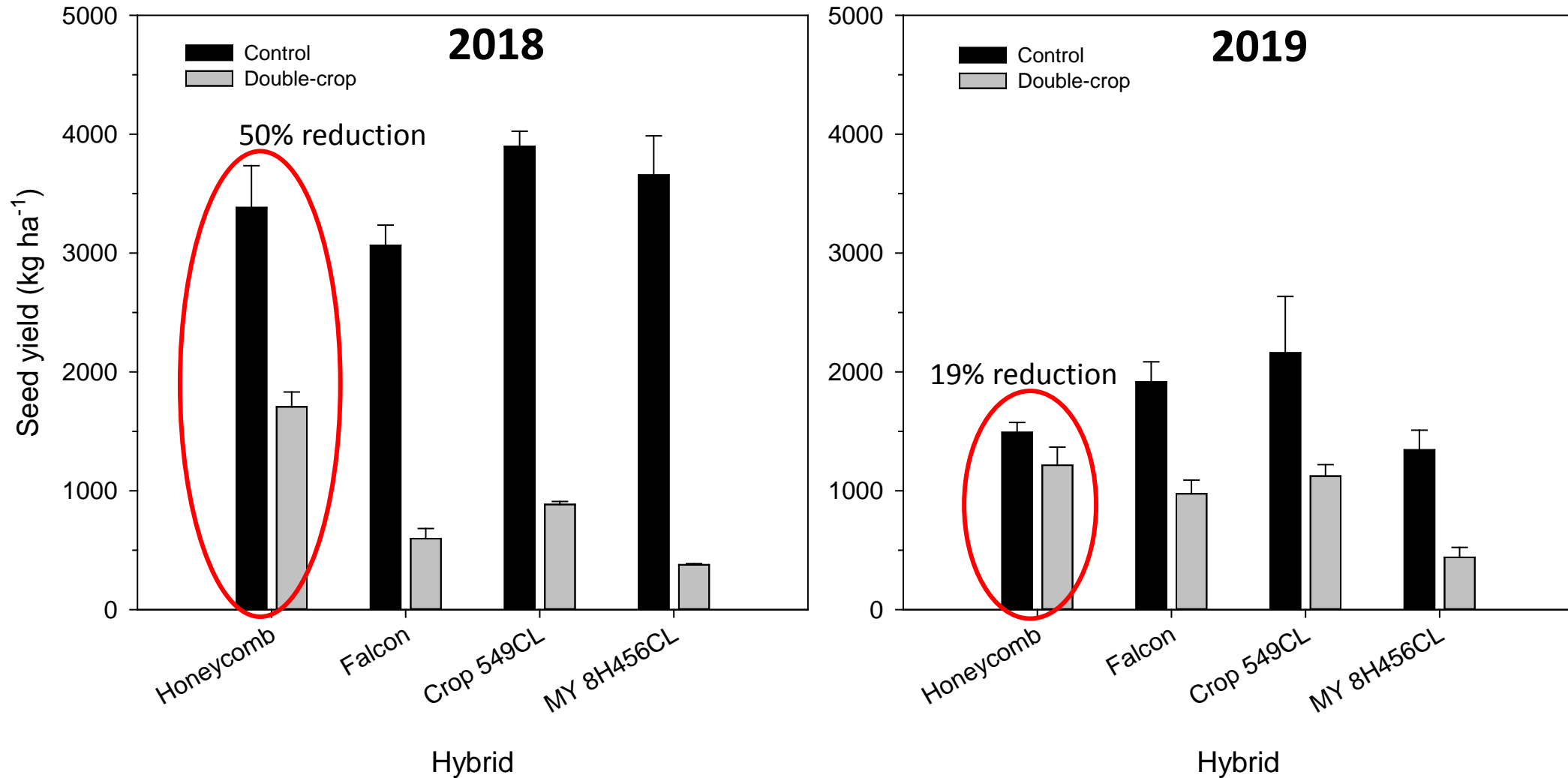


Sunflower Growth



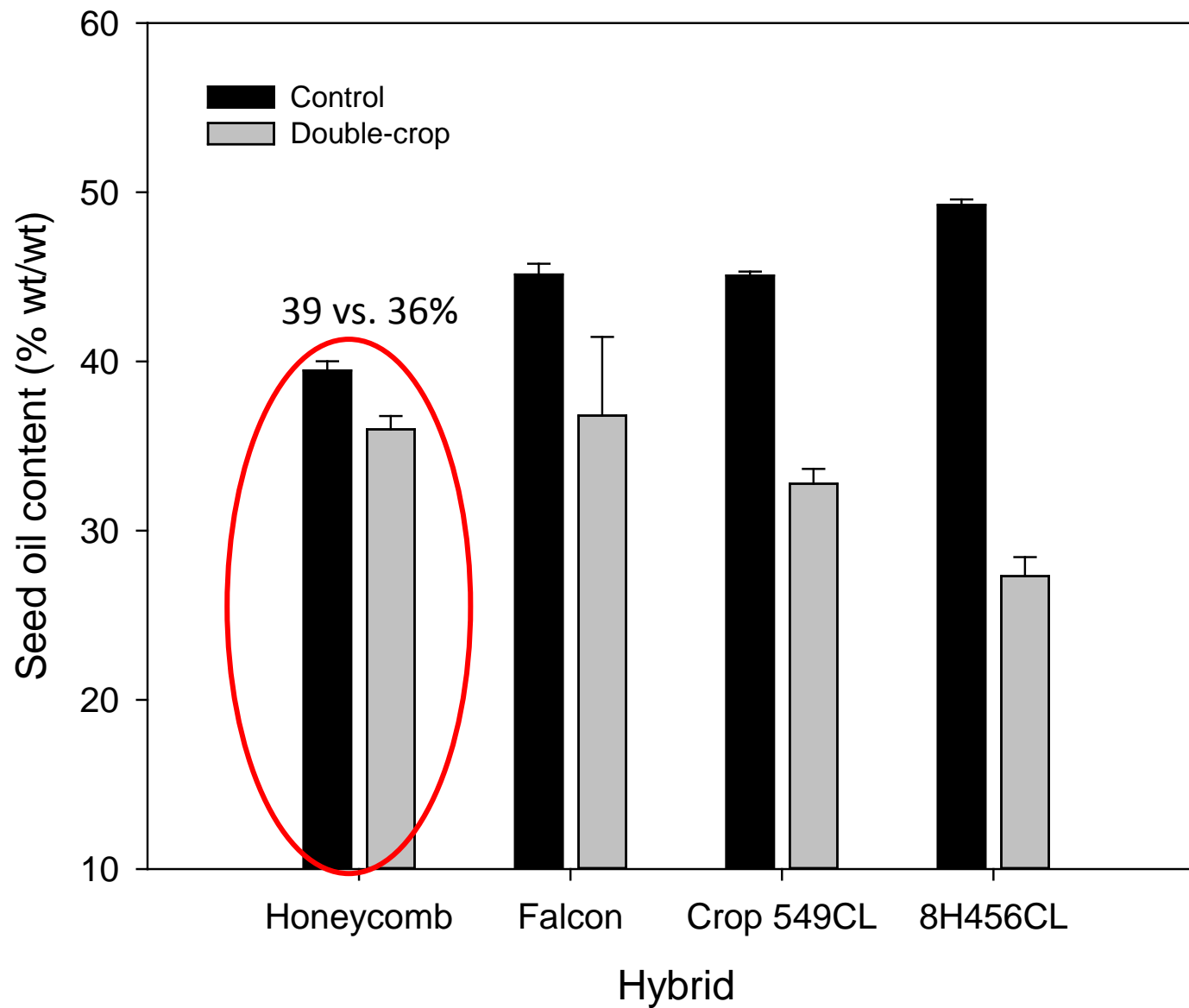
Hybrid	50% Flw Control	50% Flw Double crop
Honeycomb	Jul 23	Sept 6
Crop 549CL	Jul 28	Sept 14
Falcon	Jul 30	Sept 15
MY 8H456CL	Jul 31	Sept 15

Sunflower Yield

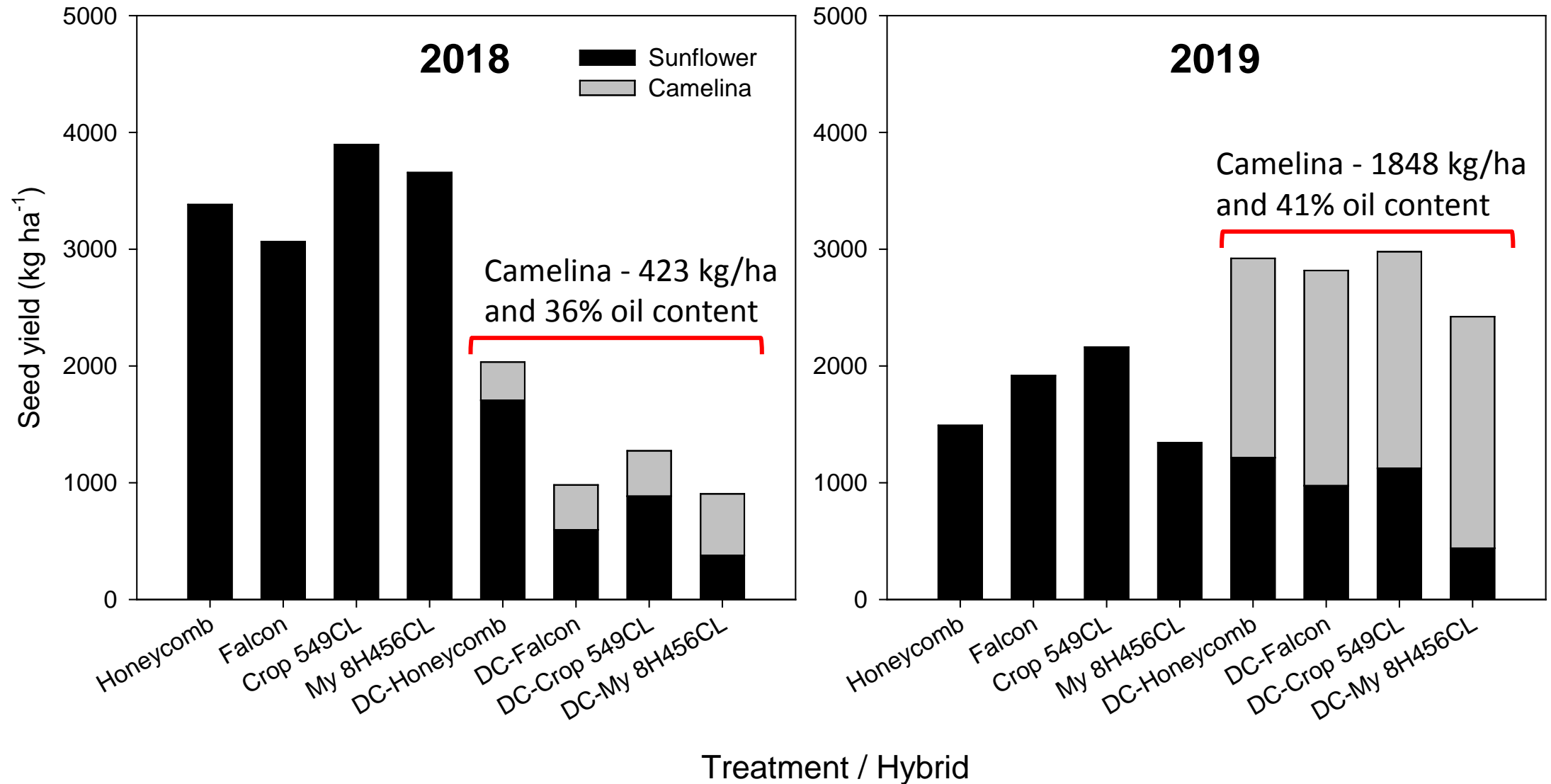


- Early killing frost on Oct. 4, 2108 – HC was the only hybrid to reach PM
- GDD (6°C base) for DC sunflower was 1076°C d in 2018 and 1087 °C d in 2019
- 30-Yr avg. GDD between Jul 7 and Oct 18 is 1175°C d

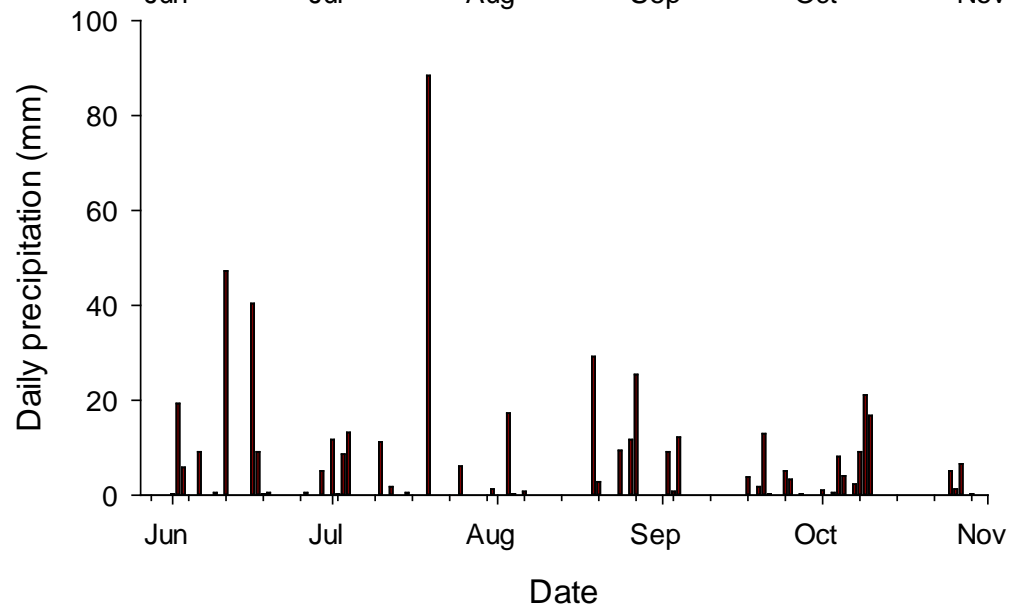
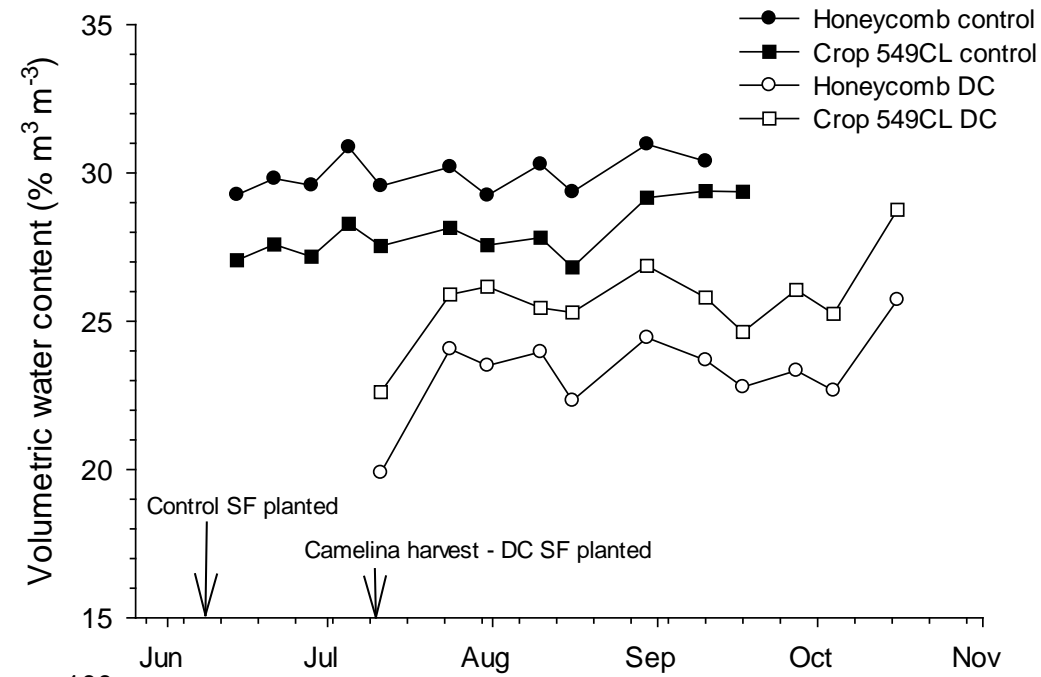
2018 Sunflower Seed Oil Content



Total Seed Yield for Double-Crop System



Soil Moisture 0-100 cm, 2018



Rainfall from Jun 1 - Oct 31

Cumulated in 2018 = 504 mm

Cumulative in 2019 = 584 mm

Cumulated 30-Yr avg. = 419 mm

Summary

- Camelina was harvested later than normal and conditions were challenging for double-cropping, however,
- The early maturing hybrid, Honeycomb, reached full maturity both years even under unusually short growing seasons.
- Total camelina + DC sunflower seed yield was not greater than that of monocrop sunflower in 2018 but was much greater in 2019.
- Double-cropping in 2018 reduced soil moisture to a greater extent than monocrop sunflower, but probably had little affected on yields.
- Double-cropping winter camelina with early sunflower can add a “cash” cover crop while perhaps making the system more attractive to producers.
- Early maturing sunflower harvested in early to mid-Sept **would allow time** to establish winter camelina as a cover crop.