ABSTRACT

Successful stand establishment is one of the most crucial aspects of canola production. While significant research has been done on determining optimal planting dates, rates, and depth, considerably less work has been devoted to looking at allelopathic impacts wheat cultivar may have on canola establishment. In the inland Pacific Northwest, dryland canola is rotated in a cropping system dominated by winter and spring wheat. The objective of this study was to determine if the previous winter wheat variety impacted early season growth and ultimately end of season seed yield, oil content, and protein content in spring canola. In spring 2022, spring canola was bulk planted over the top of the 2021 soft white (SWW) and hard red (HRW) winter wheat variety trials in Pullman and Reardan, WA. Differences were detected in spring canola for stand count, leaf number, canopy cover, seed oil, and seed protein based on previous winter wheat variety, but differences were generally inconsistent across trials and locations. ‘WB4311’, ‘AP Dynamic’, ‘LCS Shine’, ‘Resilience CL+’ and ‘Puma’ all showed some negative impact on early season growth at both sites, while ‘SY Clearstone’, ‘WB4311’, ‘WB4303’, and ‘WA8309’ all showed striking reductions in stand counts at Reardan. Cold weather following planting and flea beetle damage in Pullman likely created unwanted variation that made detecting differences more difficult. More research is needed to examine how consistent these differences are across environments.

RESULTS & DISCUSSION

SPRING CANOLA EARLY SEASON GROWTH
• Previous winter wheat variety impacted subsequent early season spring canola canopy cover (p<0.05)
  ➢ Of SWW varieties tested in both locations, ‘AP Dynamic’, ‘LCS Shine’, ‘Resilience CL+’, and ‘Puma’ were in the lowest group (p<0.05) at both sites for the final canopy cover measurement (Fig. 4 & 5)
  ➢ ‘SY Clearstone’, ‘WB4311’ and ‘WB43394’ had less leaf area than ‘Whistler’ and ‘Battle AX’ in the HRW trial at Reardan (p=0.10) (Fig. 6)
• Number of leaves per canola plant 5 WAP differed by previous wheat variety at Pullman (p=0.08 and p=0.11 for SWW and HRW trials, respectively) (Fig. 5 & 7)
  ➢ ‘VI Voodoo CL+’, ‘ARS-Crescent’, ‘ARS-Solbu 2.0’ were lower than ‘ARS-Castella’, ‘Jasper’, ‘LCS Ardeco’, ‘LCS Jefe’, ‘OR2x2 CL+’, and ‘Puma’ in the SWW trial
  ➢ ‘Canvas’ and ‘WB4311’ were lower than ‘Kairos’, ‘Scorpio’, and ‘SY Clearstone’ in HRW trial
• Spring canola stand counts following certain HRW varieties at Reardan trended (p=0.10) lower (Fig. 8)
  ➢ These varieties included ‘SY Clearstone’, ‘WB4303’, ‘WB4311’, and ‘WA8309’

SPRING CANOLA SEED HARVEST
• There was no difference in spring canola seed yield based on previous wheat variety for SWW and HRW trials at either location (Table 1)
• There were differences (p<0.05) detected for both spring canola seed oil (Fig. 9) and seed protein (Fig. 10) at the Reardan location based on the previous winter wheat variety.
  ➢ ‘StringRay CL+’ and ‘VI Frost’ produced lower seed oil content in spring canola compared to ‘ARS-Crescent’, ‘Devote’, ‘Pritchett’, ‘WB1529’, and ‘Xerpha’
  ➢ ‘ARS-Crescent’ and ‘WB1529’ produced the lowest seed protein in spring canola compared to ‘VI Frost’, ‘Appleby CL+’, ‘LCS Jefe’, ‘Resilience CL+’, and ‘WA8290’
• There was also a trend towards seed protein being 1-2 percentage units higher following HRW than SWW.

CONCLUSION
• Spring canola stand counts were quite variable, likely due at least in part to the use of a hoe-opener drill which is less precise than a disc drill. This, combined with prolonged, exceptionally cold weather following canola planting likely decreased emergence and survival of spring canola seedlings.
• The higher spring canola seeds protein following the HRW trial at Reardan was possibly a result from higher residual N left from additional N applied to those varieties to boost grain protein.
• Though inconsistent, these differences in spring canola growth indicate some potential for differences in allelopathy of wheat varieties and warrant further investigation under additional environments.

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MATERIALS & METHODS

Experimental Design and Analysis
• Trials were conducted at two sites in Eastern Washington State (Pullman and Reardan) during the 2022 growing season and analyzed as an RCBD design.
• Previous winter wheat variety was the main treatment.
• Spring canola was planted on top of the previous year’s winter wheat variety trials. SWW and HRW trials were separate and so data were analyzed separately. Entries differed by location also and so locations were analyzed separately.
• 1.5 x 4.3 m and 1.5 x 5.5 m plot dimensions were used at Pullman and Reardan sites, respectively.
• Analysis of Variance was done using PROC GLM in SAS. PROC MEANS with the STDERR option was used to generate standard deviations.

DATA COLLECTION
• Early season measurements were taken 2, 3, 4, 5, weeks after planting (WAP) at Pullman, but 4, 5, 6, 7 WAP at Reardan due to delayed emergence from cold weather.
• Stand counts were taken from 1 linear m of row from an inside drill row of each plot.
• Canopy cover was determined using the Canopoeo phone app to convert green pixels from plot images into black and white images and converted into percent green canopy.
• Leaf number plant-1 and plant height were done manually.
• Canola plots were mechanically harvested with a small plot Wintersteiger combine.
• Seed oil and seed protein content were estimated using a FOSS NIRS machine.