

Yield, Oil Content and Water Use of Summer-Planted Winter Canola in Semiarid Oregon

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Introduction

Winter canola has customarily been planted in early September in dryland fields in eastern Oregon. Stand establishment is very difficult at this time because of low seedzone water content and high surface soil temperature. To avoid these severe limitations, winter canola was planted in June and July when seedzone water content and soil temperatures are more favorable. Four winter canola cultivars were sown in a 4 replication split plot experiment at 3 planting dates in 2010, 2011, and 2012. Planting date was the main plot treatment and cultivar the subplot variable. Stand establishment and yield were best when winter canola were planted in June or July and poorest when planted in September in 2010 and 2011. In 2012, stand establishment was equal for all planting dates, and yield greatest in the September planting. Soil water content in June and July plantings were 50 to 75 mm lower in March just prior to bolting than September plantings. After harvest, soil water content was equal for all planting dates. Planting date influenced when soil water was utilized but didn't influence the total water used. Oil content was not affected by planting date. Summer planting of winter canola in dryland Oregon is a practice that increases stand establishment and lowers risk. Soil water is depleted earlier in the crop year, so yields can be expected to be lower in years of early spring drought.



Figure 2. June 17 planting on September 21, 2011

Table 1 Canola Plantings

Year	Planting Dates		
	1	2	3
2011	17-Jun	7-Jul	21-Sep
2012	8-Jun	12-Jul	6-Sep
2013	18-Jun	10-Sep	9-Oct
2014	6-Jun	9-Sep	3-Oct

Procedures

Time of planting of winter canola was investigated in over the 2011 to 2014 and 2012 growing seasons at the Columbia Basin Agricultural Research Center near Pendleton, Oregon (45°43'06" N, 118°37'39" W). Soil type is a Walla Walla silt loam, coarse-silty mixed, superactive, mesic Typic Haploxerolls. A split-split plot randomized block design was used. The main plot treatment was planting date (Fig. 1 & 2), subplot treatment was cultivar and the sub-subplot treatment was seeding rate. Target planting dates were mid-June, July, and early September (Tab. 1). Cultivars were Amanda, Athena, Baldur, and Salute in 2011 and 2012 and Amanda and Baldur in 2013 and 2014. Planting rates were 4, 6, and 8 lb/acre. Minimum plot width was 5 X 20 ft. If soil water content was adequate in the surface 2-inches planting was done with a double disk drill. If soils were dry in the surface 2-inches a John Deere HZ on 14-inch row spacing (Fig. 1) was used. Harvest was done with a plot combine with a 5-foot header and equipped with auger feed and canola sieves. Grain yield, and oil content were determined from the various treatments and compared using appropriate statistical methods. Yields will be based on combine weights adjusted for seed water content. Oil content were measured using NIR Spectrophotometry. In addition soil water use over the growing season was measured on the cultivar Amanda at the 6-lb seeding rate for all planting dates use neutron attenuation. Soil water measurements were determined monthly from planting to harvest. Crop year precipitation was recorded (Fig. 3)



Figure 1. HZ Drill with added packer wheels for planting canola

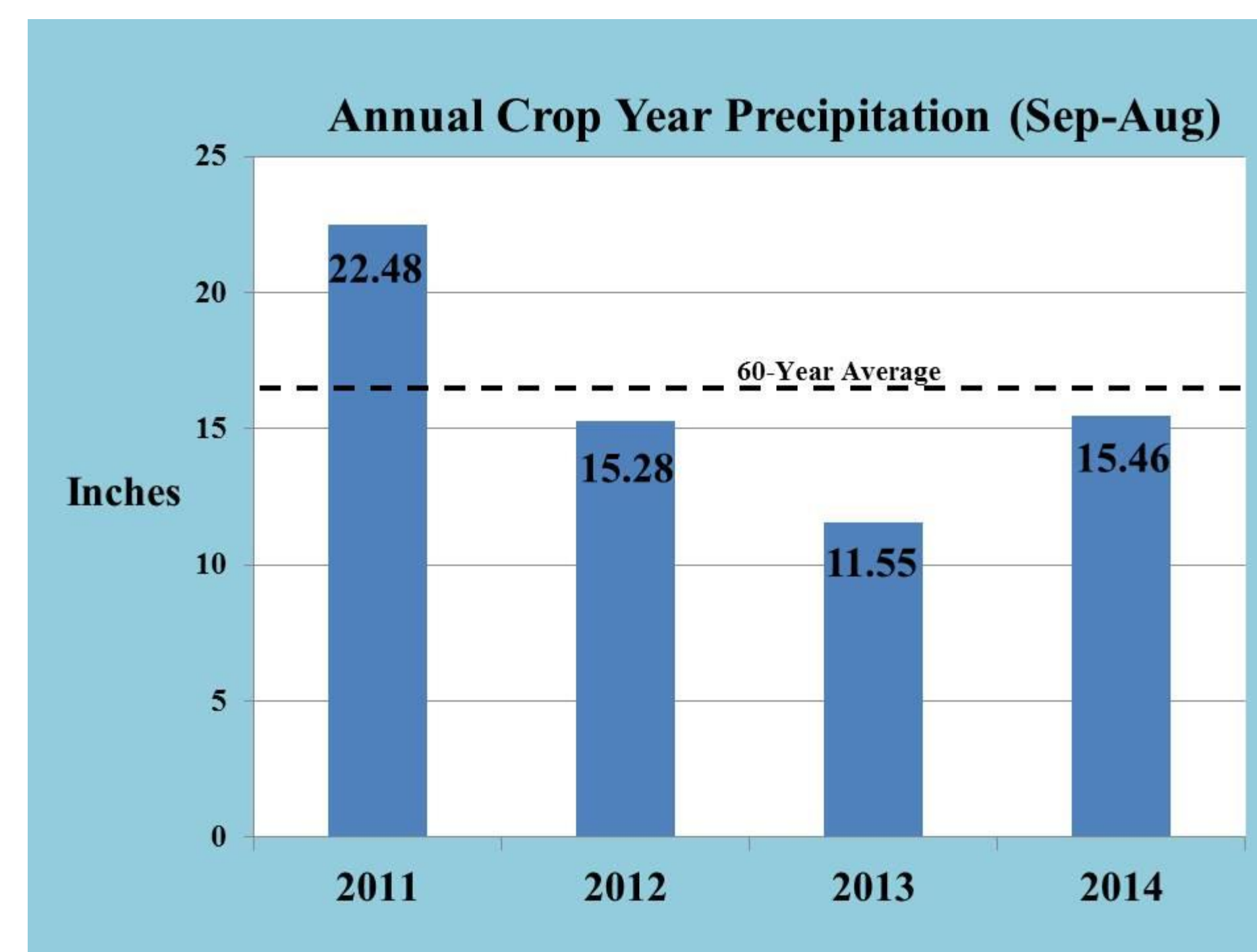


Figure 3. Annual Crop Year Precipitation at plots

Results

Early planted canola consistently out yielded later planting of canola with the exception of 2013 (Fig. 4). The primary reason for better performance of early-planted canola is much better stand establishment (Tab. 2). Later-planted canola consistently had much poorer stands due to hot dry seedbed conditions. In 2013, the September planting performed better due to growing season rain in June, which was too late for the early-planted canola. Seeding rates showed little affect on yield on early-planted canola, but had significantly affected later plantings. Early-planted canola had much better stand and plants were able to branch where stands were thin. Oil content didn't vary by planting date or sowing rate, but slight differences were observed in cultivars. Soil water content at harvest was nearly the same. Later planting used slightly less water than earlier plantings (Fig 5.). Early-planted canola used 2-3 inches of water by September. This accounted for the poor performance of early-planted canola in 2013 when only 11.55 inches of annual precipitation was received.

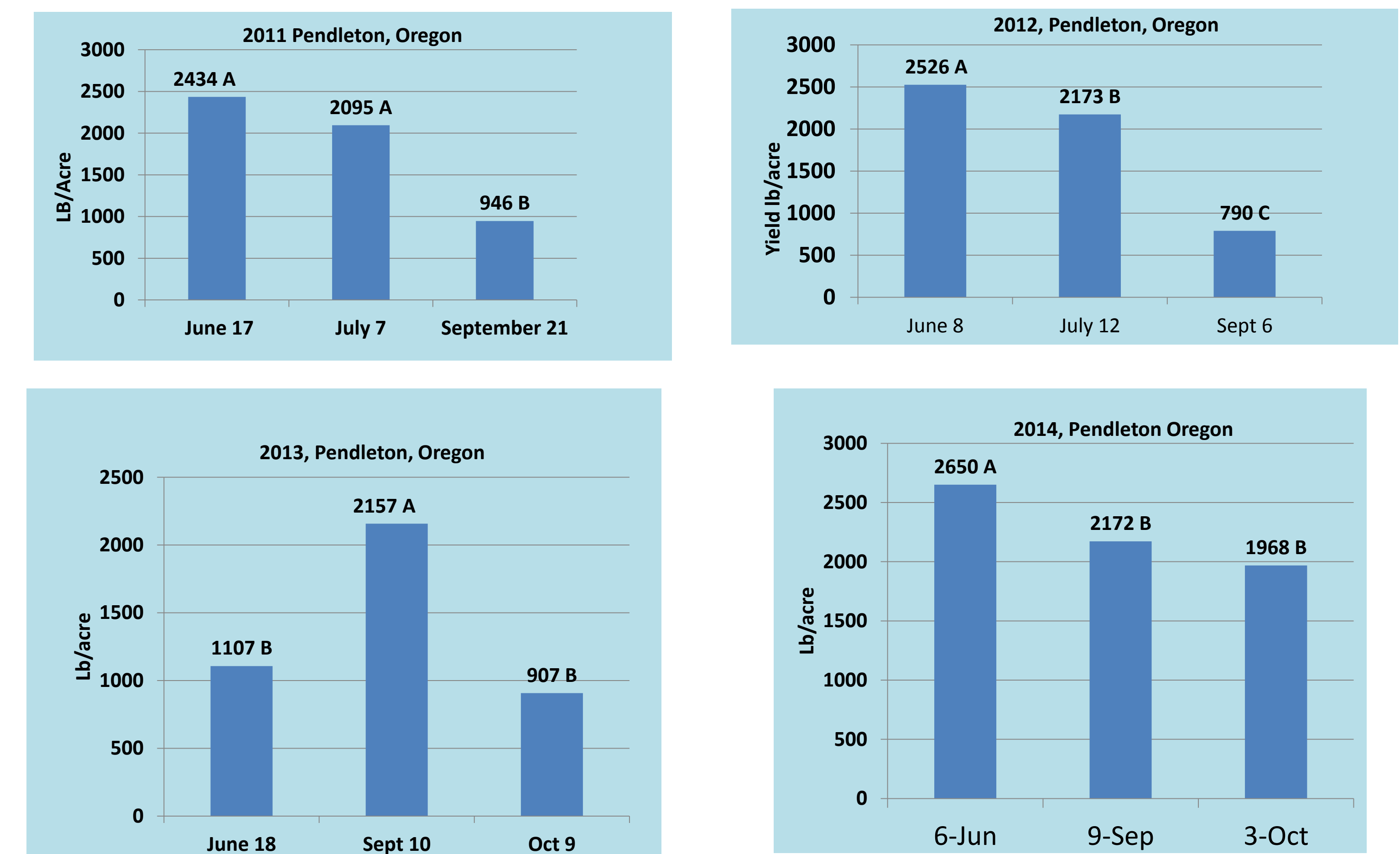


Figure 4. Yield of winter canola by planting date for 2011-2014.

Table 2. Plant stand by planting date 2011-2014

Year	Planting Date		
	1	2	3
	-----Plants/ sq. ft-----		
2011	7.1	2.0	0.6
2012	6.3	3.4	2.2
2013	5.3	5.8	4.1
2014	6.8	3.1	4.1

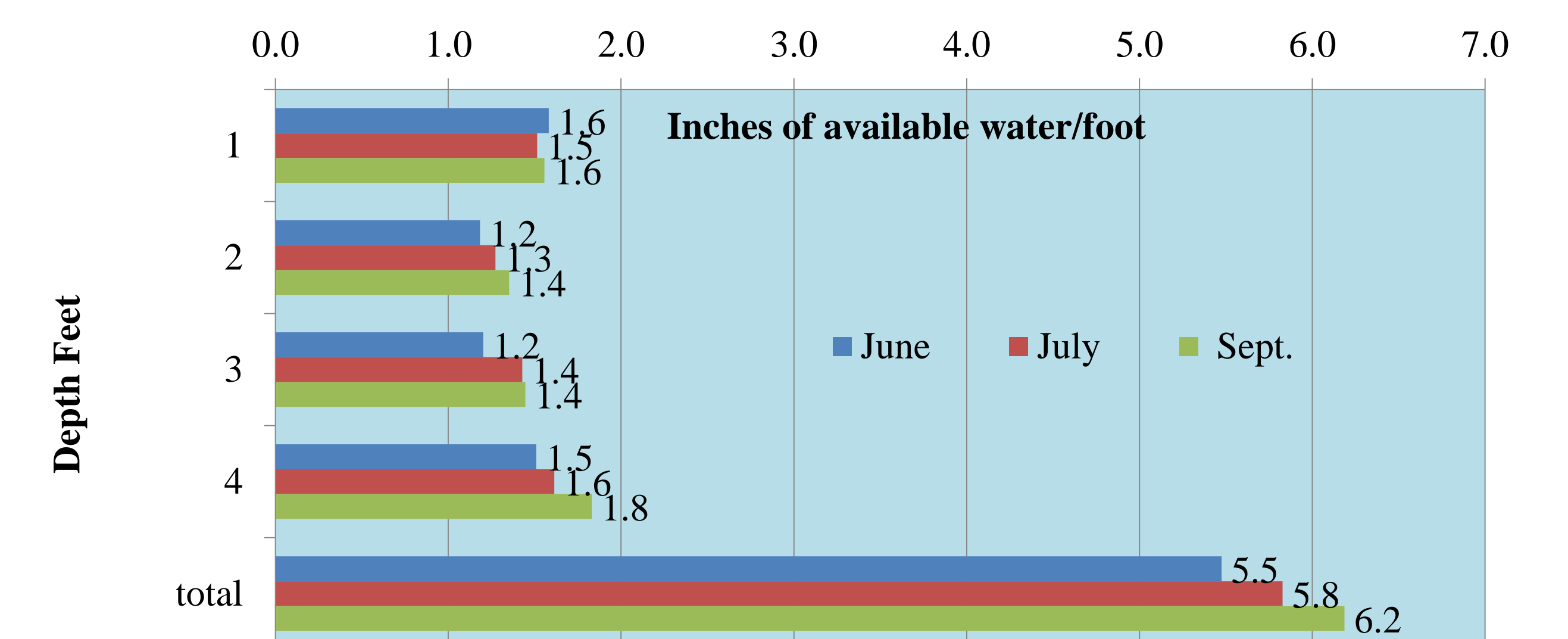


Figure 5. Soil water remaining after harvest of winter canola by planting date for 2011

Summary

1. Winter canola performed better when planted in June except in 2013, an extreme drought year
2. Better performance is attributed to consistent stand establishment due to better seedzone water content at planting and cooler soil and air temperatures compared to later plantings.
3. Early-planted canola uses 2-3 inches of water over summer, which was detrimental in 2013 because of drought. This may be more significant in lower rainfall zones
4. Seeding rate and cultivar choice had little affect, compared to planting date, provided plant stand was sufficient.
5. Early-planted canola achieved adequate plant stands at even low sowing rate, while later plantings had poor stands at even the highest sowing rate
6. Oil content did not vary by planting date