Organic Management of Creeping Perennials Canada Thistle and Field Bindweed: Year 1

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Five treatments were established at the Palouse Conservation Field Station on plots with a history of organic management and the presence of Canada thistle (*Cirsium arvense*) and field bindweed (*Convolvulus arvensis*). The study is to be a four year project that measures the impact of five organic crop rotations on weeds, soil, and crop yield.

Prior to spring planting all plots were subjected to two passes with a rotary harrow at 10mph. Baseline soil samples to 15cm were collected for each plot. Crops were planted in mid-May. For the first year of the study, cropped treatments were: alfalfa (cv. Adapt) + forage barley (cv. Haybet), lentil (cv. Caviar), and spring pea (cv. Banner). Two more treatments were seeded with an eight-species cover crop mix including mustard (cv. White Gold), black lentil (cv. Caviar), winter triticale (cv. HyOctane), sunflower (cv. Peredovik), forage barley (cv. Haybet), yellow blossom sweet clover, and spring pea (cv. Banner).

Baseline population weed counts were collected during the first week of June and again in the late August. Weed biomass was collected in September and dried. Canada thistle and field bindweed stems were counted two additional times mid-season. All plots were rotary hoed three weeks and four weeks after planting. Crop canopy percent cover and height, and crop canopy light interception (PAR) were recorded at 1000, 1500, and 2000 GDD after planting. Light interception was measured as leaf area index (LAI) using a ceptometer instrument. The cover crop plots were terminated at 1500 GDD with two passes using a double disk at 4mph. Abundance and diversity of pollinators on cover cropped plots was observed prior to termination. Follow-up disking was performed two weeks later and prior to fall planting. Crop canopy percent cover, height, and light interception were recorded again at 2000 GDD.

Broadleaf annual weeds and jointed goatgrass (*Aegilops cylindrica*), have been the most problematic in these organic plots this season. Patches of Canada thistle and field bindweed are present in the plots with variance throughout. Alfalfa emergence was limited, though the barley nurse crop helped with canopy closure as the season progressed. Peas had good canopy cover throughout the season, while the lentil canopy started out thinner and increased cover throughout the season. The cover crop allowed for increased flexibility to manage the timing of tillage for weed growth and development.

Table 1. *Creeping Perennial Stem Counts by Crop Rotation*

	Canada Thistle Stem Count		**Bindweed Stem Count**	
Treatment: Year 1	6/25/2019	8/28/2019	6/25/2019	8/28/2019
Alfalfa	28	10	1	0
Lentil	48	3	34	5
Cover crop mix	91	39	0	2
Cover crop mix	61	51	11	2
Spring Pea	9	7	1	1

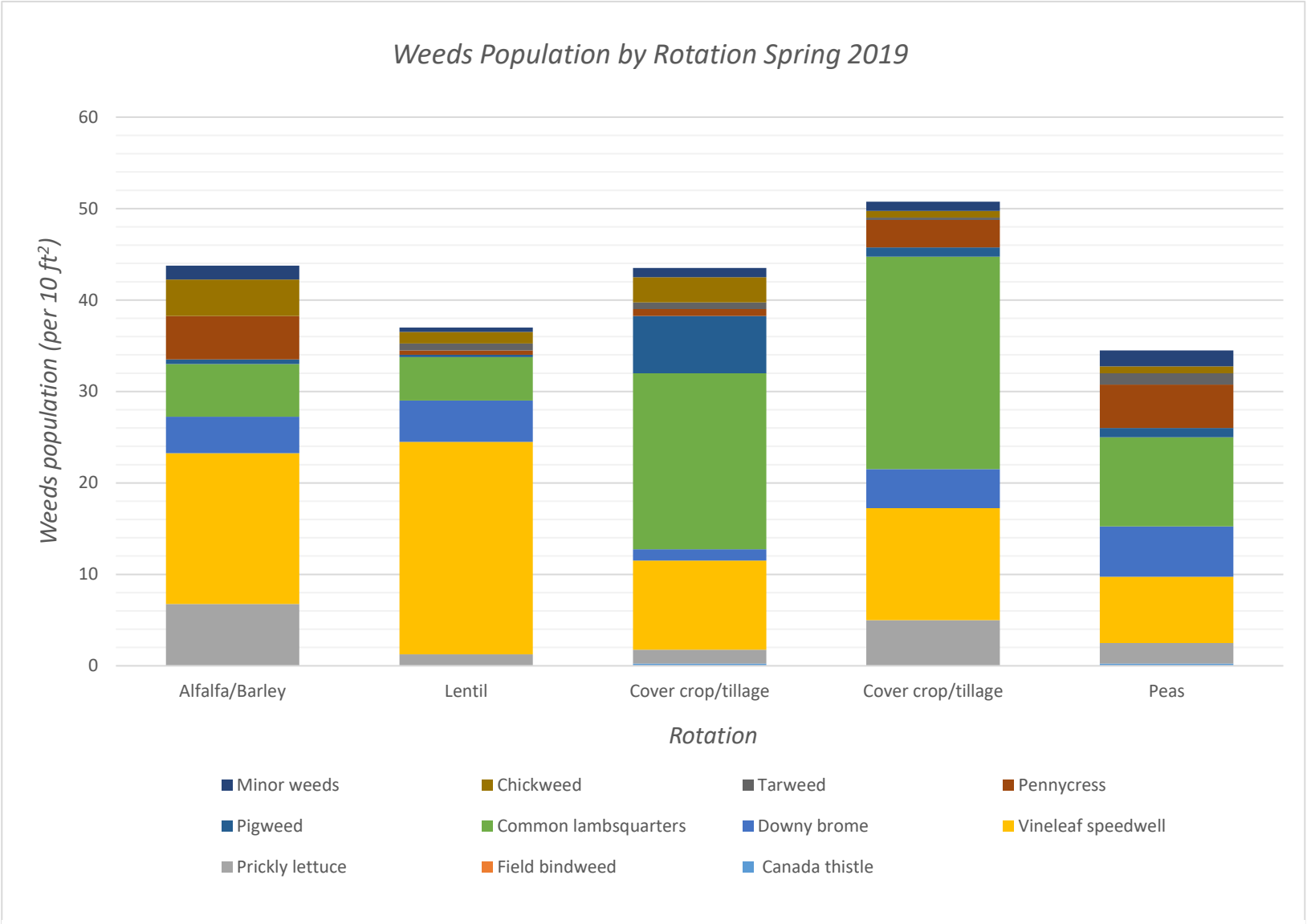

***Figure 1**. Weeds Population Composition by Crop Rotation in Spring 2019*

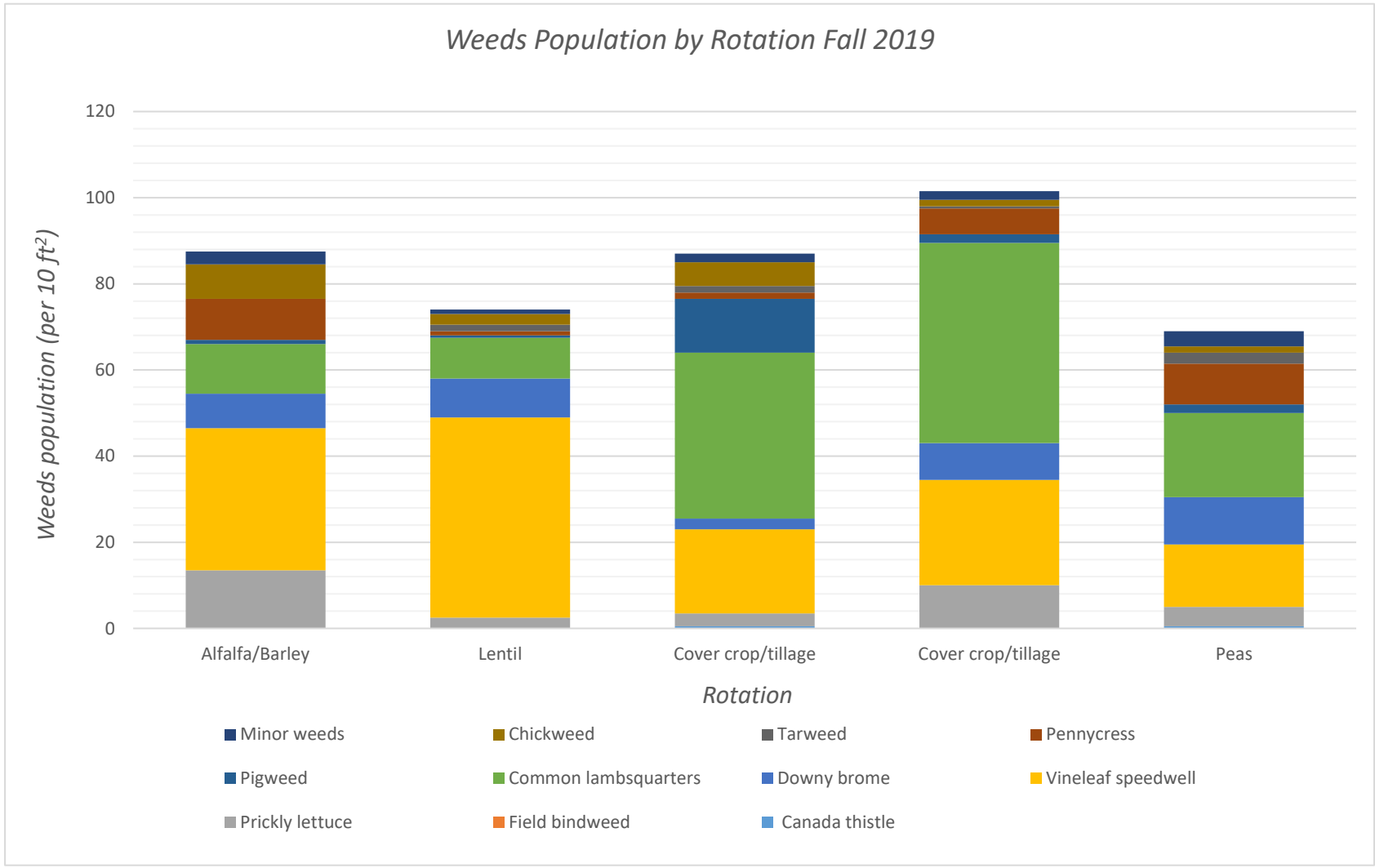

***Figure 2**. Weed Population Composition by Crop Rotation in Fall 2019*

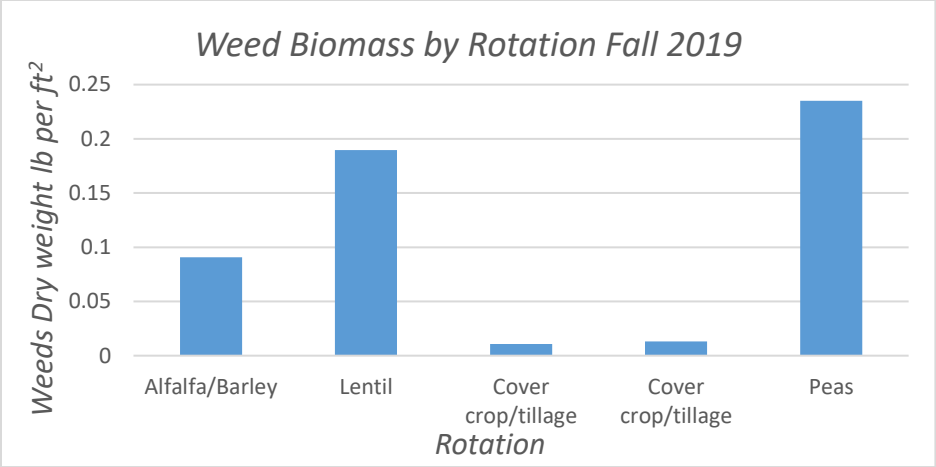

Figure 3. *Dry Biomass of Weeds in Fall 2019*

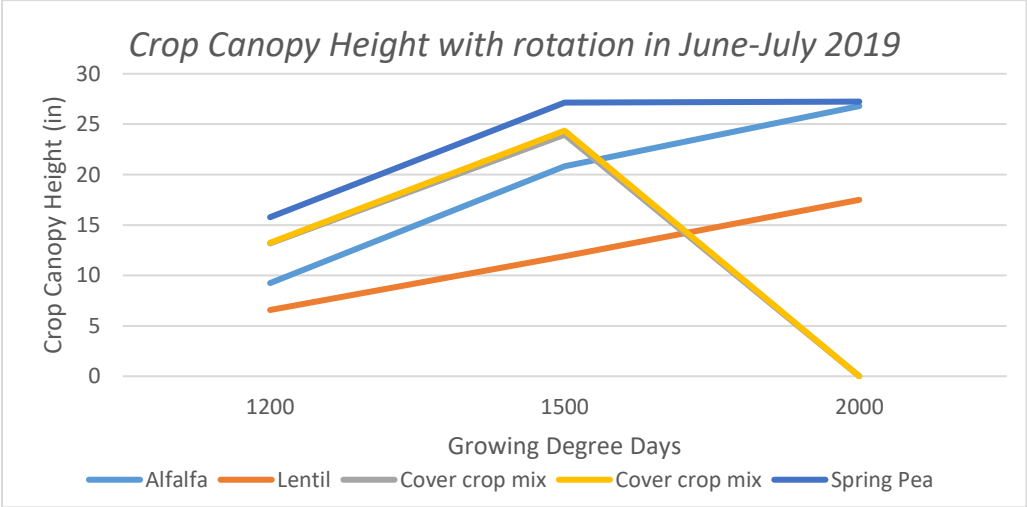

Figure 4. *Crop Height through the 2019 Growing Season*

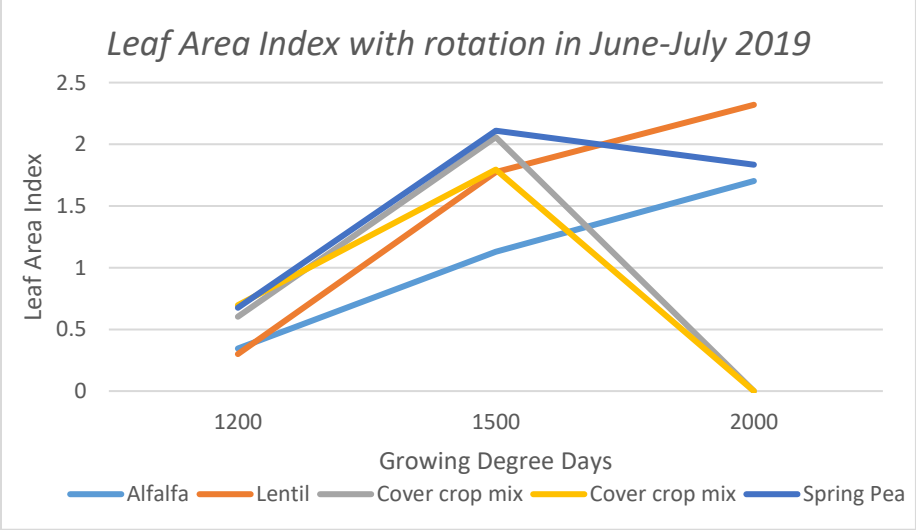

Figure 5. *Leaf Area Index through the 2019 Growing Season*

Figure 6. *Photos – top row: Cover crop (left) and alfalfa+barley (right) with frames placed for weed counts; middle row: Lentil crop (left), pollinator on cover crop mix (right); (bottom left) termination of cover crop with double disk*