MANAGEMENT OF FRESH WHEAT RESIDUE FOR IRRIGATED WINTER CANOLA

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USDA United States Department of Agriculture
Agricultural Research Service

Washington State Department of Ecology


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Objectives

- Determine how five different WW residue management practices affect WC health and yield.
- Determine the cause(s) for decline in WC vigor and yield as affected by WW residue management.
- Test methods to retain WW residue without adversely affecting WC.
- Disseminate results of research through field days, grower meetings, an extension bulletin, and a scientific journal articles.

Theories

- Straw produces toxic compounds.
- Decomposing straw immobilizes nitrogen.
- Excess straw interferes with drill performance.
- Excess straw keeps soils too wet and cool.
- Straw shades WC seedlings and interferes with photosynthesis.
- Straw serves as a food base for soil-borne pathogens, increasing disease, especially for Pythium and Rhizoctonia.
- Elongated hypocotyl in tall WW stubble makes WC more susceptible to winter damage.

Irrigated Winter Canola Experiment

- Treatments (established on fresh irrigated winter wheat stubble):
  - Burn + double disk
  - Chop stubble + moldboard plow
  - Burn + direct seed
  - Direct seed into standing residue
  - Broadcast into not-yet-harvested wheat (New in CY 2014)

- Randomized complete block design with four replicates (i.e., 20 plots). Each plot 100-ft long.

Equipment hauled from the Lind Station to conduct the experiment

- “Big Red” (fire truck)
- Wheel tractor (75 hp)
- Stubble chopper
- Double disk, 10 ft wide
- Moldboard plow, 4 ft wide
- Smeizer packer (pulled behind disk and moldboard plow)
- Kile hoe-opener drill, 8 ft wide
- Plot sprayer
- Plot combine

Direct seeding into newly-harvested 141 bushel winter wheat stubble cut 15 inches above the ground


09/21/2016


Burn- Disk
Burn- Direct Seed


Burn- Direct Seed
10/19/2016


Chopped-Plow


Chopped-Plow
Burn-disk
10/19/2016

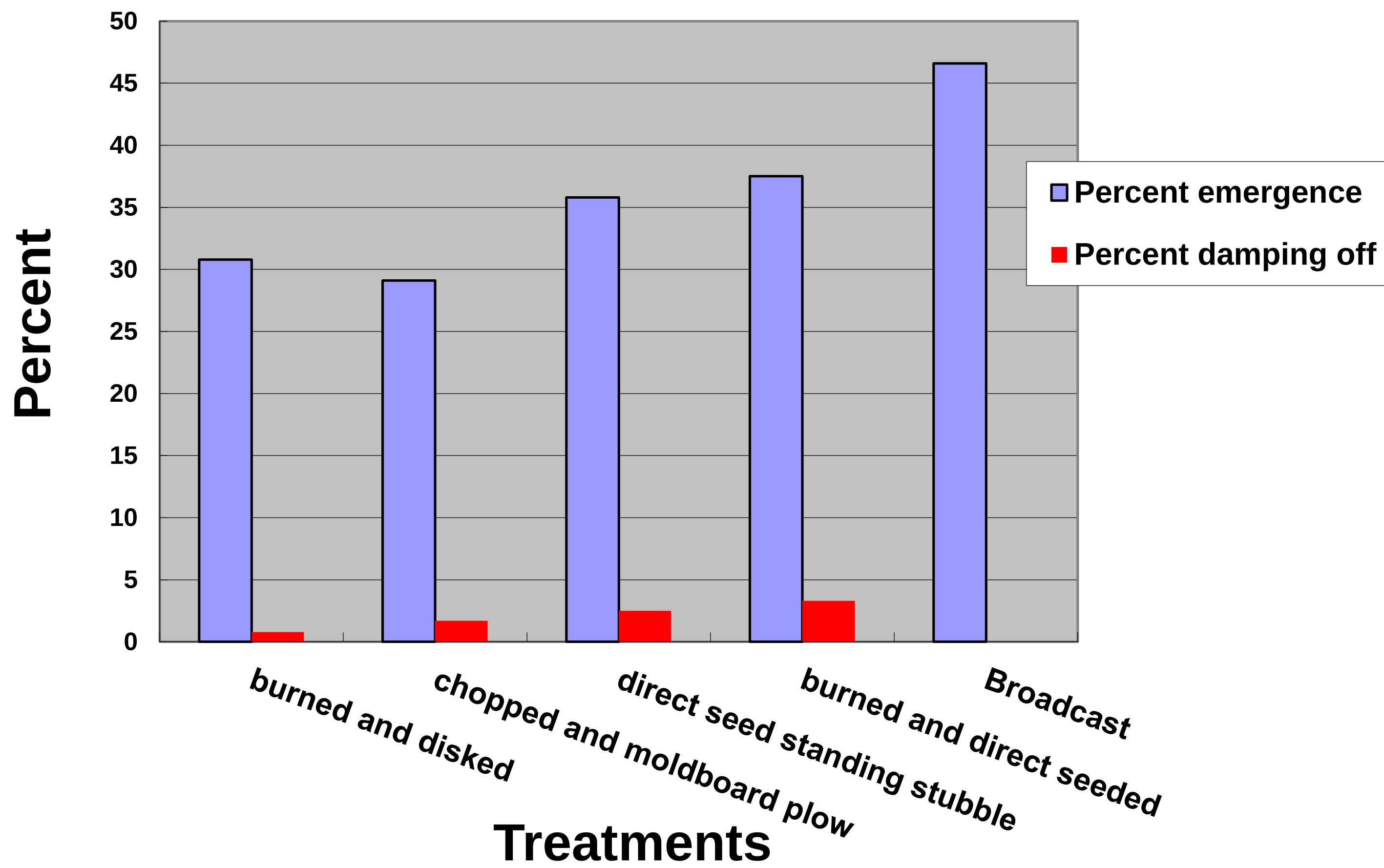

Direct Seed

Irrigated canola plant population measurement for three years at Jeff Schibel's farm near Odessa, WA.

	Plant population (plants/m^2)		
	2013	2014	2-yr avg.
Stubble burned + disked	45	73 a	59 a
Stubble burned + direct-seeded	34	47 b	41 b
Stubble chopped + moldboard plowed	36	49 b	43 b
Direct seeded into standing stubble	40	63 ab	52 ab
Broadcast into standing wheat	*	**	
Statistical significance	ns (p = 0.15)	p = 0.008	p < 0.001

* The broadcast into standing wheat before harvest treatment was not present in 2013.
** Canola killed by cold temperatures in 2014.
ns = No significant statistical differences at P<0.05.

Effect of Residue Treatments on Emergence and Damping-Off of Canola, Schibel Plot, Sampled Oct., 2016




10/19/2016


3
5 XXXX
treatment was disked
Firebreak
4
1
Rep 3
Firebreak
2
5
2
Rep 2
3
Firebreak
1
4
1
4
Firebreak
10/19/2016


10/19/2016


03/16/2017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03/16/2017


04/26/2017


04/26/2017


04/26/2017


04/26/2017


Broadcast
05/23/2017


Direct
Seed
05/23/2017


Chopped-
Plow
05/23/2017


Burn-
Disk
05/23/2017


Burn–
Direct
Seed
05/23/2017


05/23/2017


05/23/2017


May 29, 2014

Irrigated canola seed yield measurement for three years at Jeff Schibel's farm near Odessa, WA.

	Seed yield (lb/acre)			
	2013	2014	2017	3-yr avg.
Stubble burned + disked	3092	2832	2776 ab	2900
Stubble burned + direct-seeded	3020	2678	2795 ab	2831
Stubble chopped + moldboard plowed	3246	1830	3158 a	2745
Direct seeded into undisturbed stubble	2988	**	2218 bc	
Broadcast into standing wheat	*	**	1939 c	
Statistical significance	ns (p = 0.40)	ns (p = 0.06)	$p < 0.001$	ns (p = 0.52)

* The broadcast into standing wheat before harvest treatment was not present in 2013.
** Canola killed by cold temperatures in 2014.
ns = No significant statistical differences at P<0.05.

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