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protecting and improving the soil...naturally

Charts of Moisture Usage from Cover Crop Plots August – November 2008

SARE Grant data collected from Watermark soil sensors and data loggers

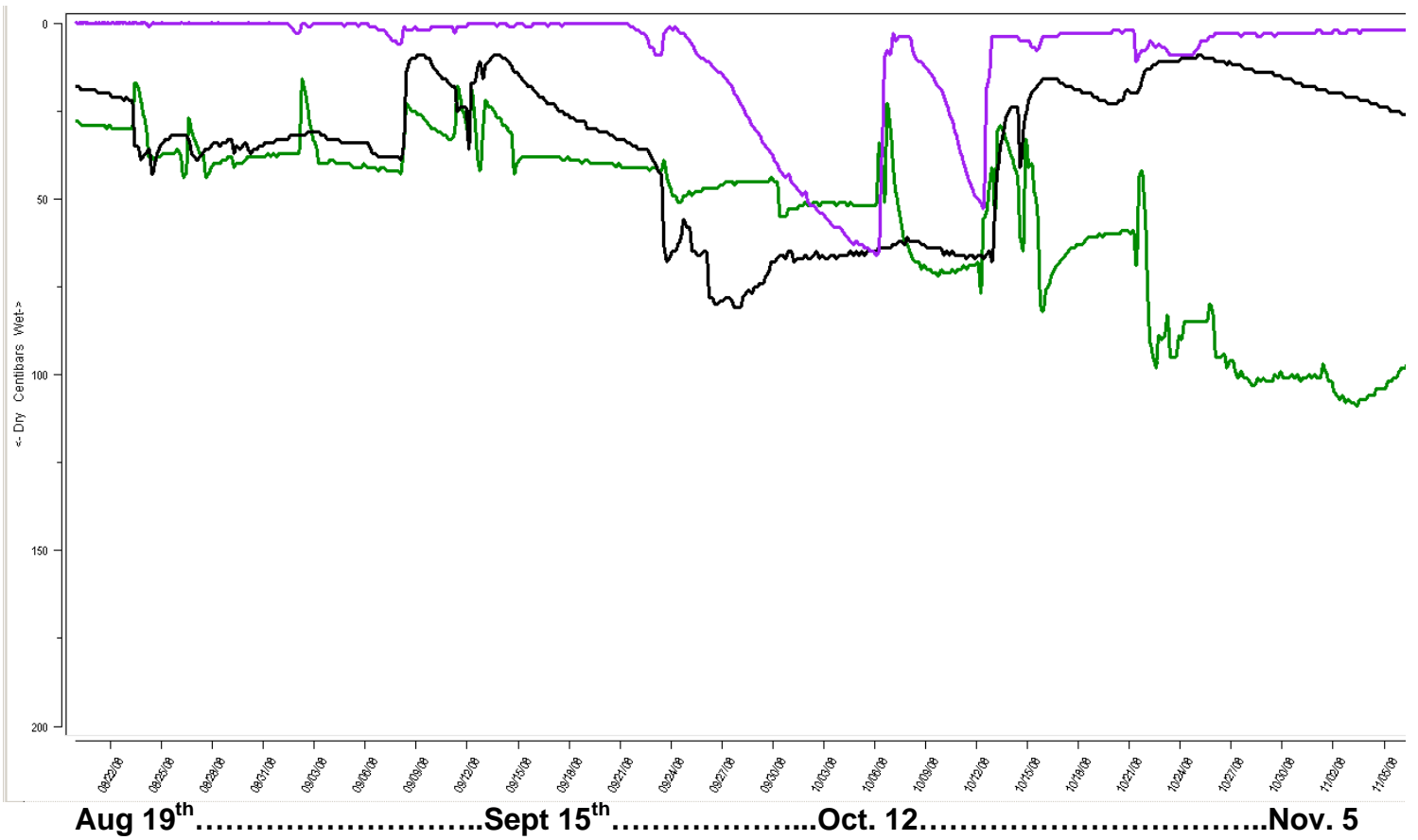
The late summer and early fall of 2008 was a very wet year for us which somewhat skewed a moisture use study, but the charts generated some useful data. The results of our moisture use study were very interesting. In summary:

1. Cover crop mixes showed far less water use than did heavy use crops such as sunflowers and soybeans.
2. Cover crop mix water use charts looked very similar to the water use chart for wheat stubble alone.
3. Some monoculture cover crops did not show much water use but these tended to be crops that had limited growth.

How to read the charts.

- The scale on the left goes from 0 (top) to 200 (bottom).
- A reading of 0 indicates extremely wet soil (saturated).
- A reading of 30 indicates soil at field capacity.
- A reading of 80 is where we would begin to irrigate (when using for irrigation scheduling).
- A reading of 200 is 60% of available soil moisture has been depleted (40% remaining).

Scroll down to see charts – (17 charts total)



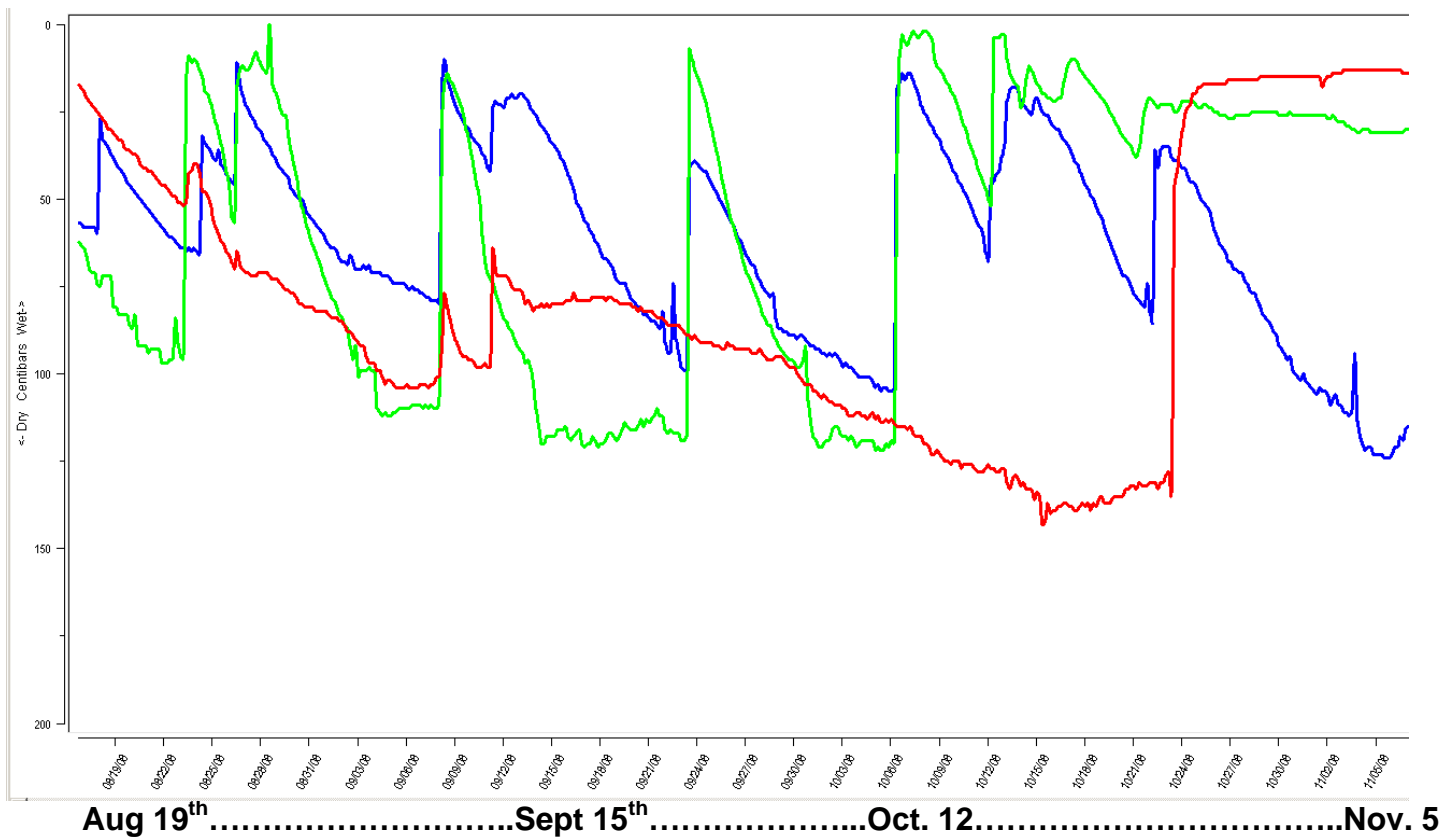
Wheat Stubble

Relative Growth: 1 **2** 3 4 5 6 7 8 9 10

Seed Cost (acre): **\$0** \$4 \$8 \$12 \$16 \$20 \$24

Notes: Some volunteer growth contributed to some water use.

- 1 ft
- 2 ft
- 3 ft

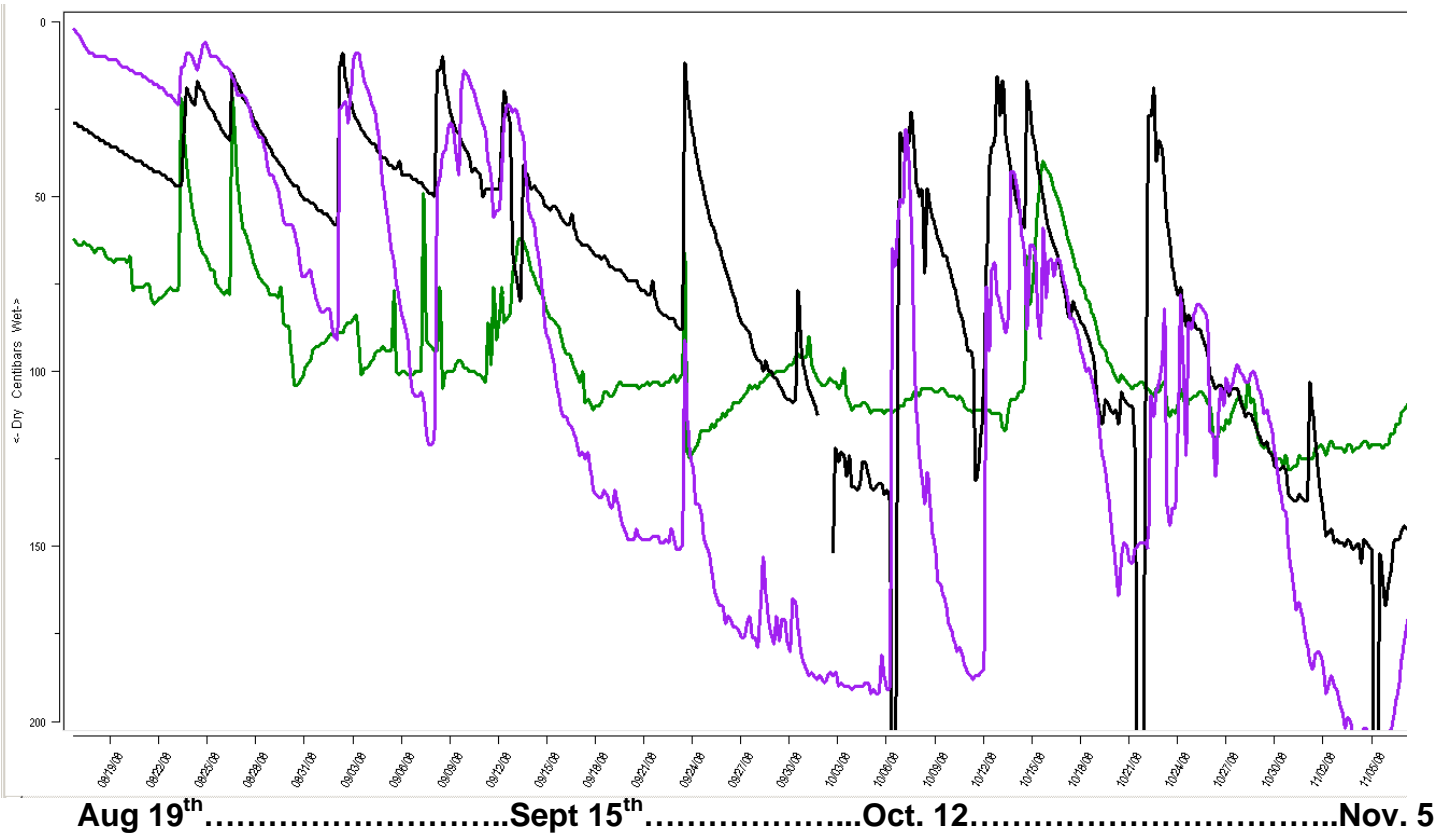


Sunflowers

Relative Growth: 1 2 3 4 5 6 7 **8** 9 10
 Seed Cost (acre): \$0 \$4 \$8 \$12 \$16 **\$20** \$24

Notes: Excellent growth – heavy water user. Heads formed and some viable seed produced – no volunteer problems the next year. Semi-frost tolerant. Seeding rate: 25#/acre. Find bin-run seed to make cheaper.

- 1 ft
- 2 ft
- 3 ft

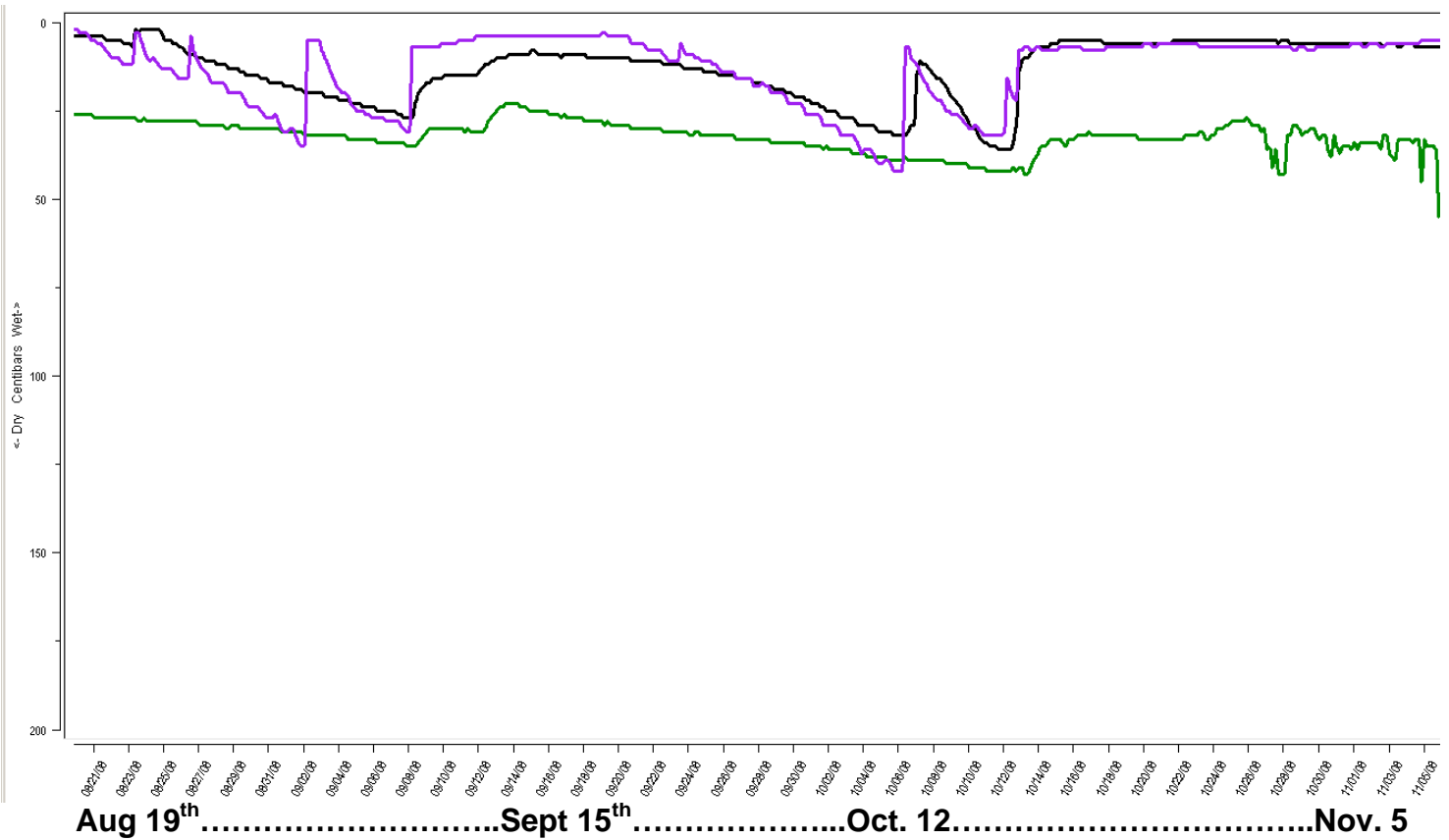


Soybeans

Relative Growth: 1 2 3 4 5 6 7 **8** 9 10
 Seed Cost (acre): \$0 \$4 \$8 \$12 \$16 \$20 **\$24**

Notes: Quick emergence, good growth and heaviest water usage. Nodulated well and produced 70-80# N (Ray Ward estimate). Group 3 bean set pods and made seed (not desirable for cover crop). May have made 15 bu if harvested. Seeding rate: 50#/acre

- 1 ft
- 2 ft
- 3 ft



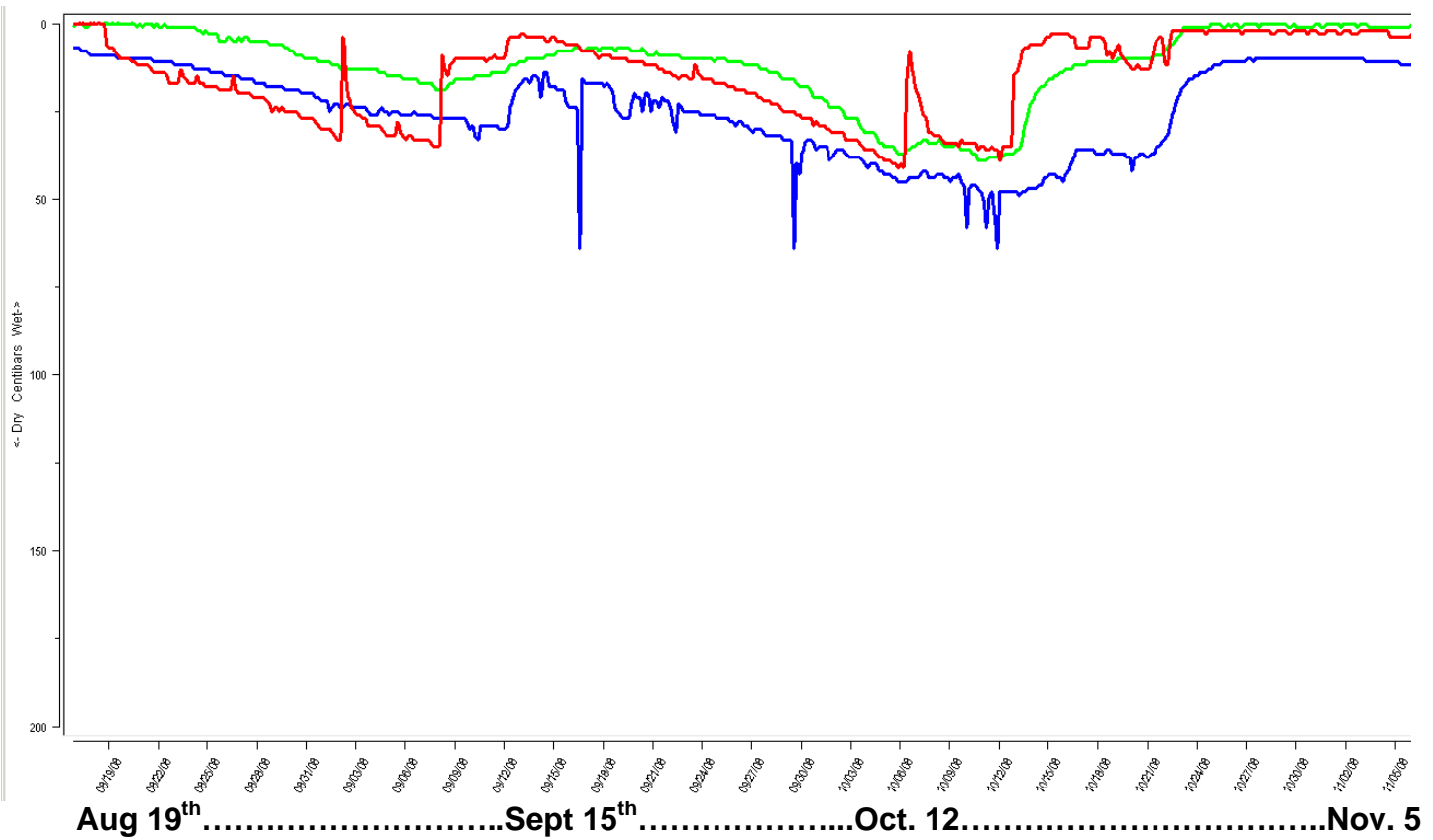
Mix #1: milo, sorghum sudan, pearl millet, soybeans, mung beans, lentils, common vetch, alfalfa, red clover, oil seed radish, dwarf essex rape, Ethiopian cabbage, specialty brassica's, sunflowers

Relative Growth: 1 2 3 4 5 6 7 **8** 9 10

Seed Cost (acre): \$0 \$4 \$8 \$12 \$16 \$20 **\$24**

Notes: Wide variety of species. Good growth with relatively little water usage. Legumes in mix were nodulating well and producing some nitrogen (not measured). Some species froze early while others grew well into November. Seeding rate: 25#

 1 ft
 2 ft
 3 ft



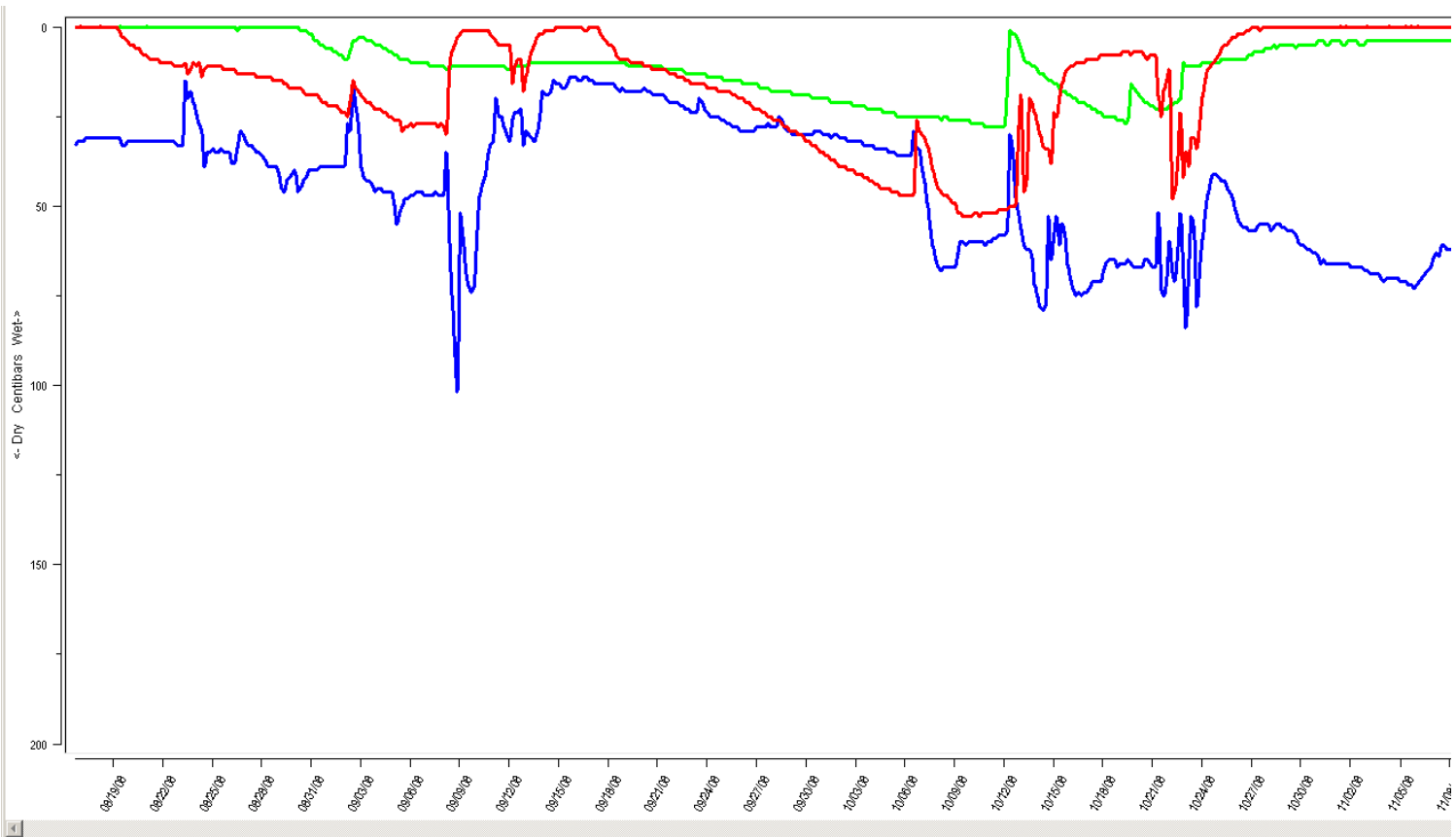
Mix #2: sorghum sudan, pearl millet, German millet, lentils, common vetch, oil seed radish, dwarf essex rape, Ethiopian cabbage, specialty brassica's

Relative Growth: 1 2 3 4 5 6 7 8 **9** 10

Seed Cost (acre): \$0 \$4 \$8 \$12 \$16 \$20 **\$24**

Notes: Wide variety of species. Good growth with relatively little water usage. Legumes in mix were nodulating well and producing some nitrogen (not measured). Some species froze early while others grew well into November. Seeding rate: 25#

█ 1 ft
█ 2 ft
█ 3 ft



Aug 19thSept 15thOct. 12.....Nov. 5

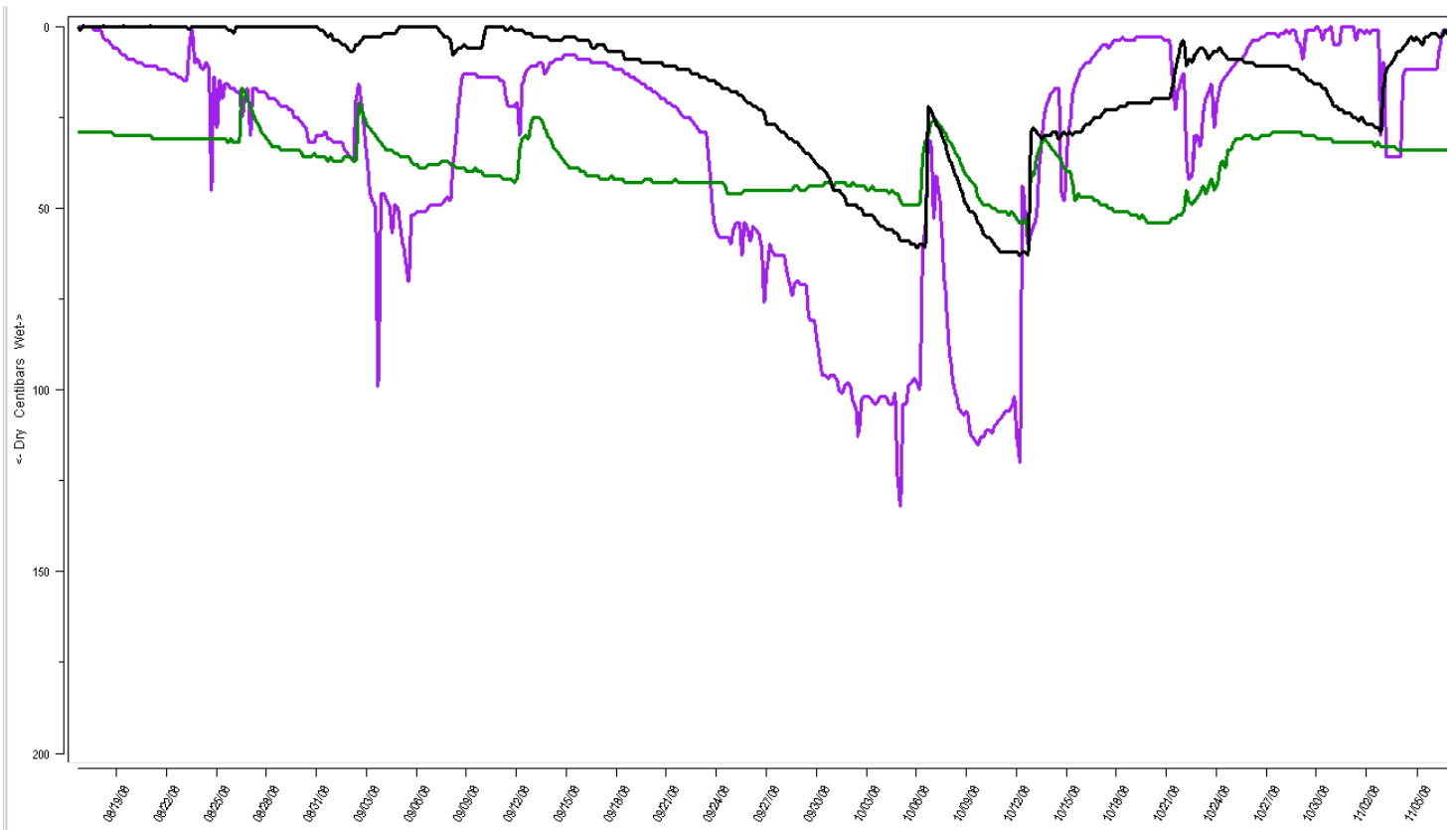
Milo

Relative Growth: 1 2 3 4 5 **6** 7 8 9 10

Seed Cost (acre): \$0 \$4 **\$8** \$12 \$16 \$20 \$24

Notes: Limited growth because of limited N. Few heads formed. Good residue production. Not frost tolerant. Seeding rate: 8#/acre. Find bin-run seed to make cheaper.

- 1 ft
- 2 ft
- 3 ft



Aug 19th.....Sept 15th.....Oct. 12.....Nov. 5

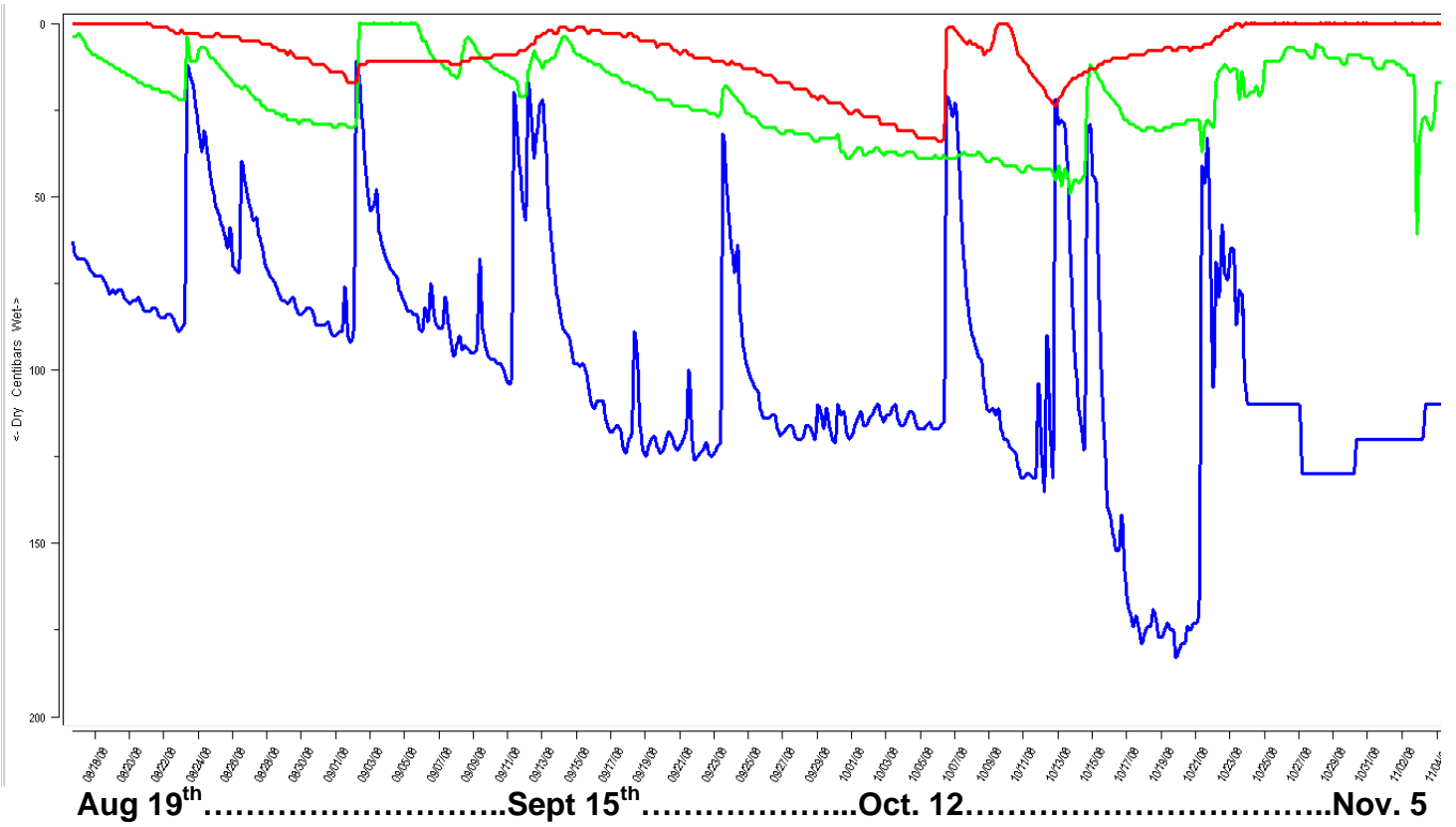
Sorghum Sudan

Relative Growth: 1 2 3 4 5 6 7 **8** 9 10

Seed Cost (acre): \$0 \$4 \$8 **\$12** \$16 \$20 \$24

Notes: Best grass we tested. Growth was somewhat limited because of lack of nitrogen. Not tolerant to frost. Seeding rate was approximately 15 # acre. Produced heads but not much viable seed before killing frost.

	1 ft
	2 ft
	3 ft



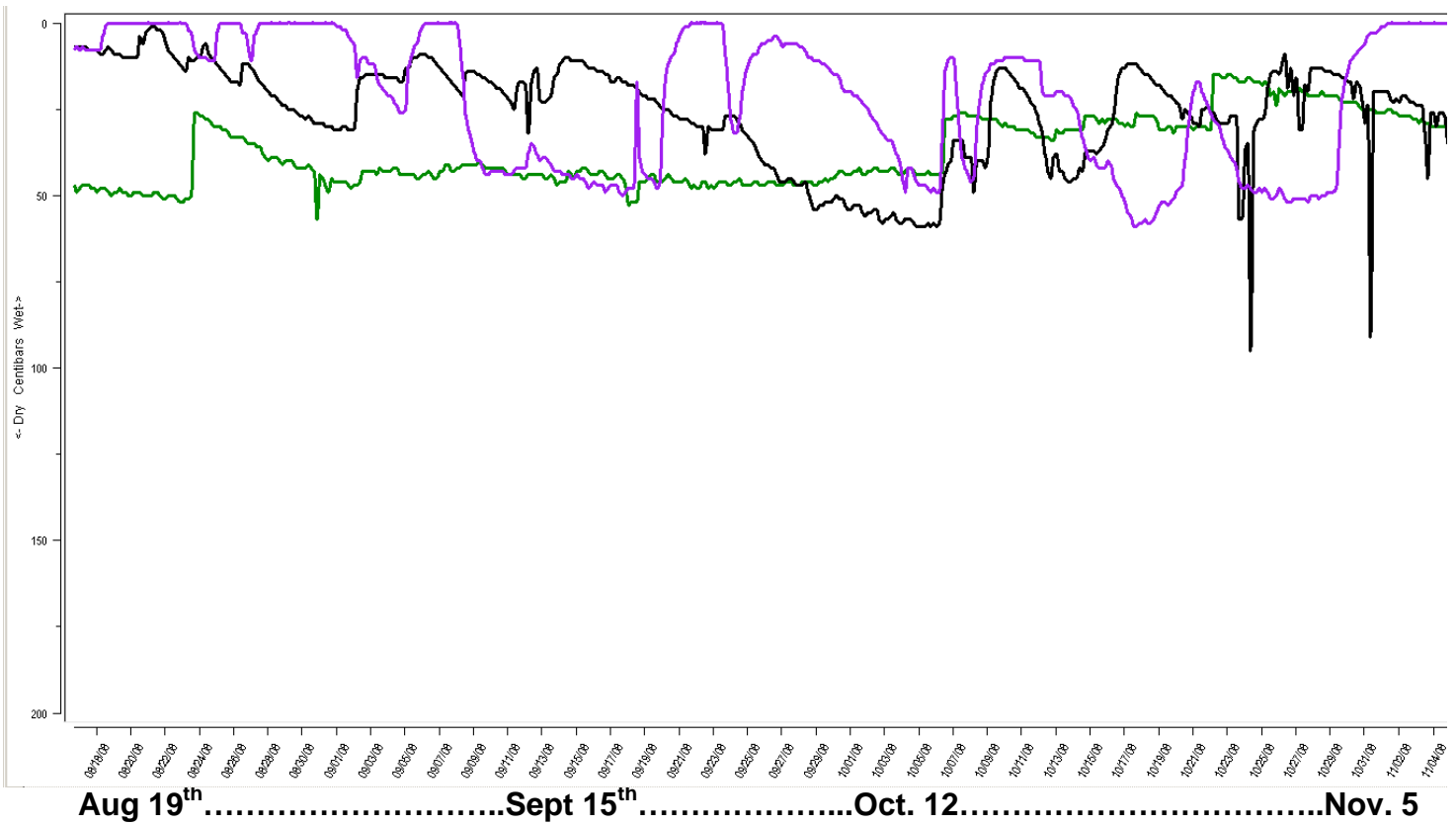
Proso millet

Relative Growth: 1 2 3 **4** 5 6 7 8 9 10

Seed Cost (acre): \$0 \$4 \$8 **\$12** \$16 \$20 \$24

Notes: Short growing millet. Makes seed heads and viable seed. Not good for grazing cattle on.

- 1 ft
- 2 ft
- 3 ft



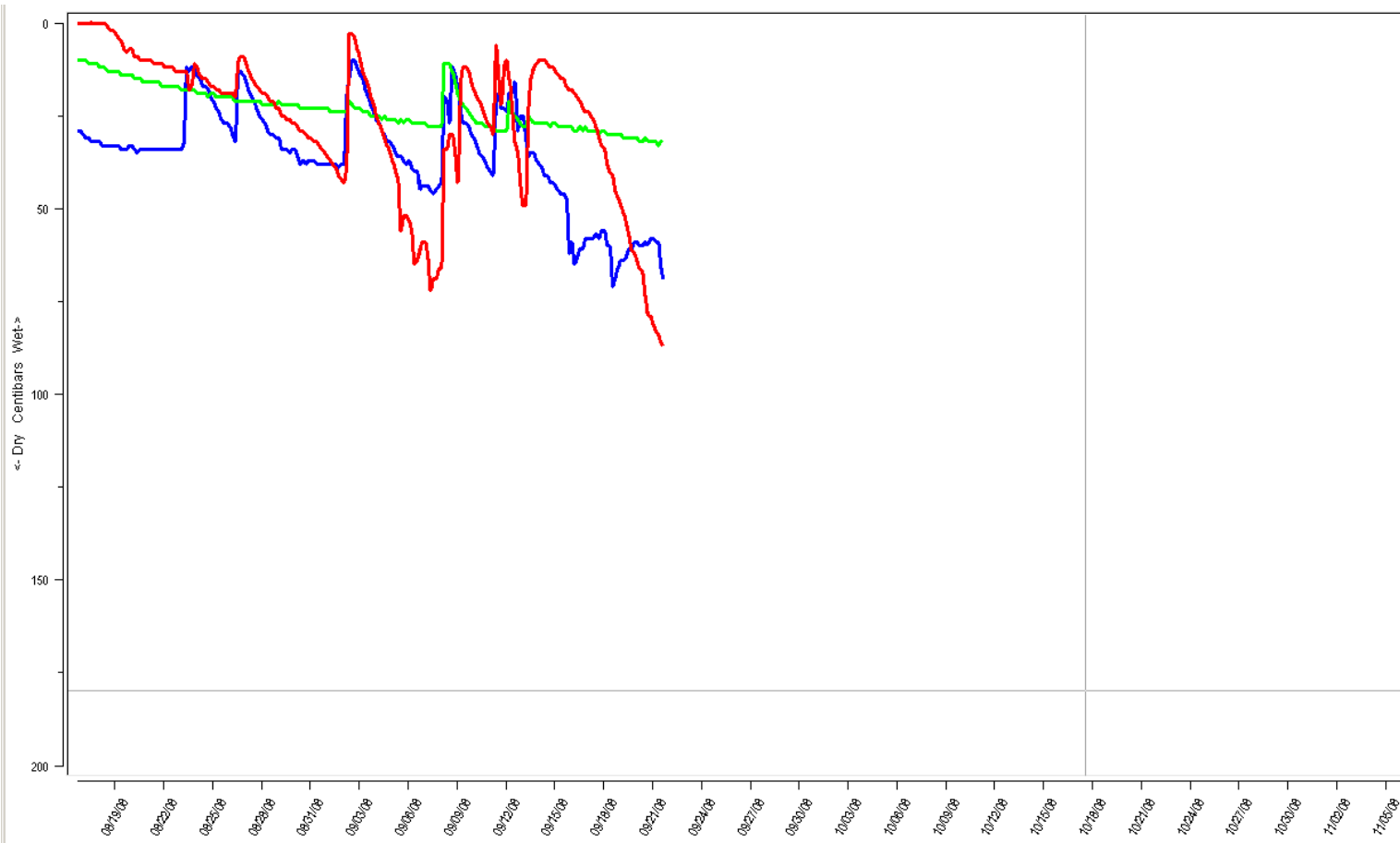
German millet

Relative Growth: 1 2 3 4 **5** 6 7 8 9 10

Seed Cost (acre): \$0 \$4 **\$8** \$12 \$16 \$20 \$24

Notes: Growth was limited because of lack of nitrogen. Not tolerant to frost. Seeding rate was approximately 15 #/acre. Produced viable seed before killing frost.

	1 ft
	2 ft
	3 ft



Aug 19thSept 15thOct. 12.....Nov. 5

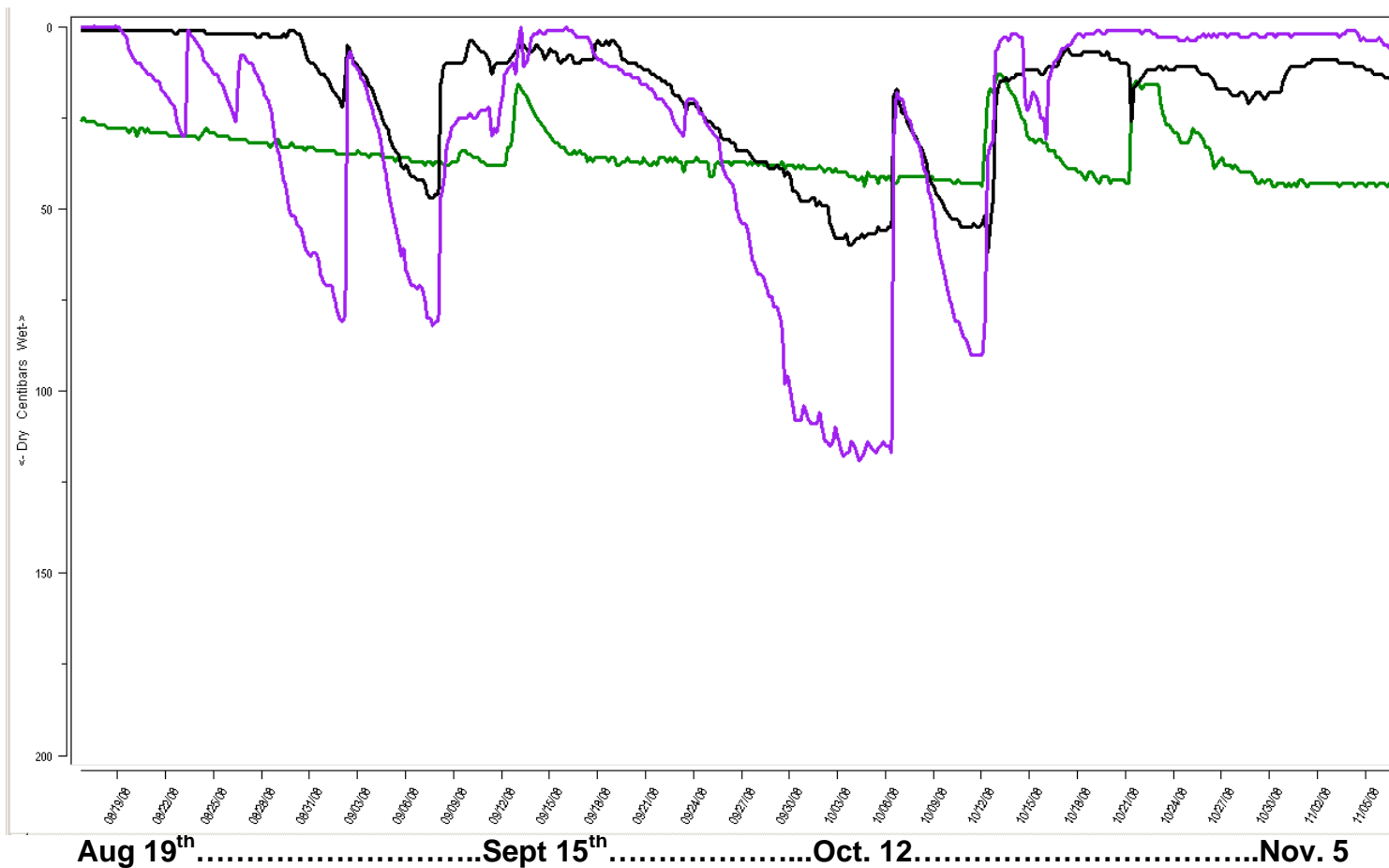
Indianhead Lentils

Relative Growth: 1 2 3 4 5 **6** 7 8 9 10

Seed Cost (acre): \$0 \$4 \$8 \$12 **\$16** \$20 \$24

Notes: Cows were out and broke sensor wires in Sept. Very frost tolerant – green well into November. Nodulated well and produced 60-70# N (Ray Ward estimate). Seeding rate: 20#/acre. Low growing, viney – liked to climb stubble. Not as aggressive as vetch.

█ 1 ft
█ 2 ft
█ 3 ft



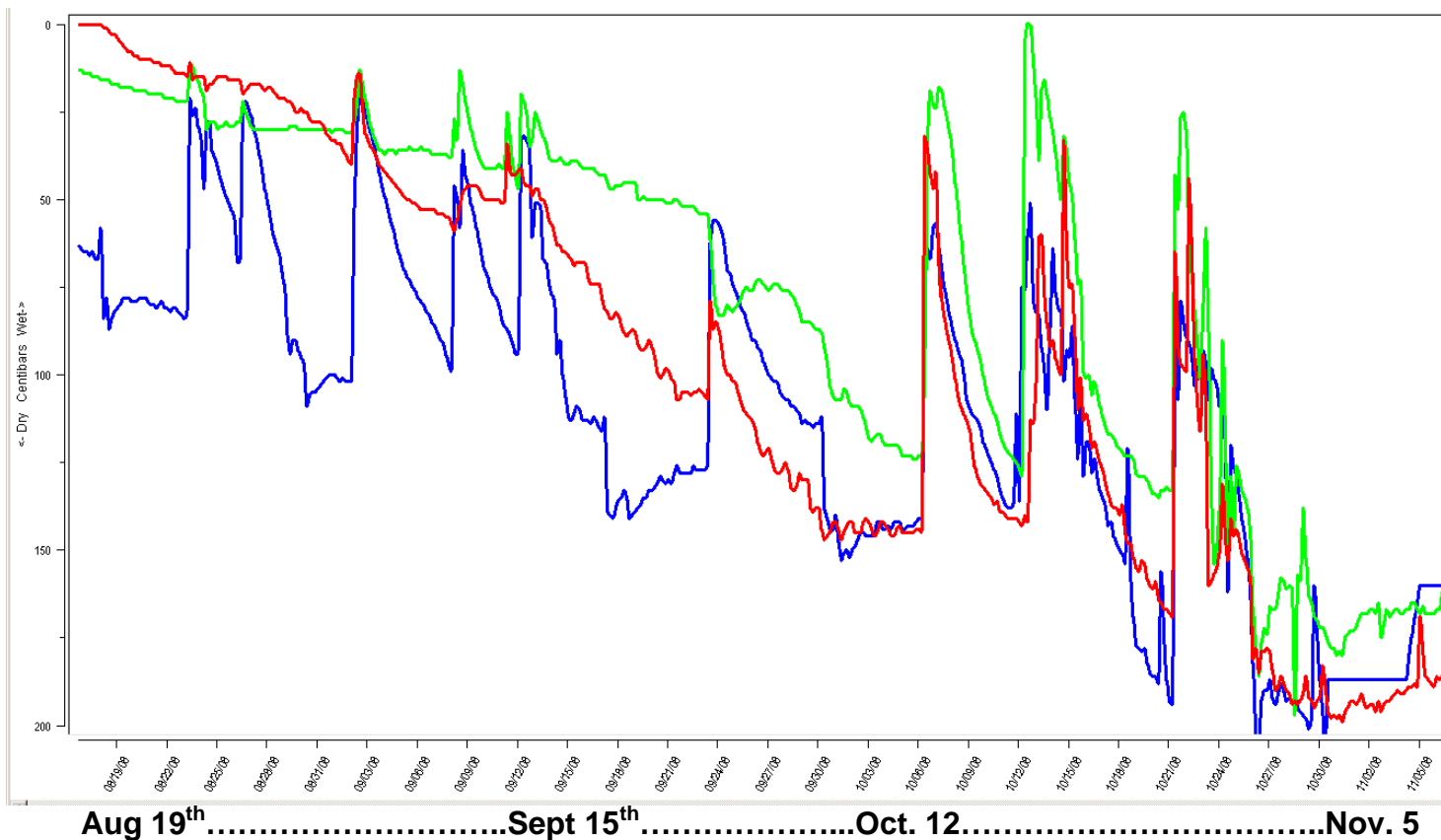
Dwarf Essex rape (Canola)

Relative Growth: 1 2 3 4 **5** 6 7 8 9 10

Seed Cost (acre): \$0 \$4 **\$8** \$12 \$16 \$20 \$24

Notes: Growth was limited because of lack of nitrogen. Very tolerant to frost. Seeding rate was approximately 10 # acre. We will use canola in the future because it is very similar but cheaper seed.

1 ft
 2 ft
 3 ft



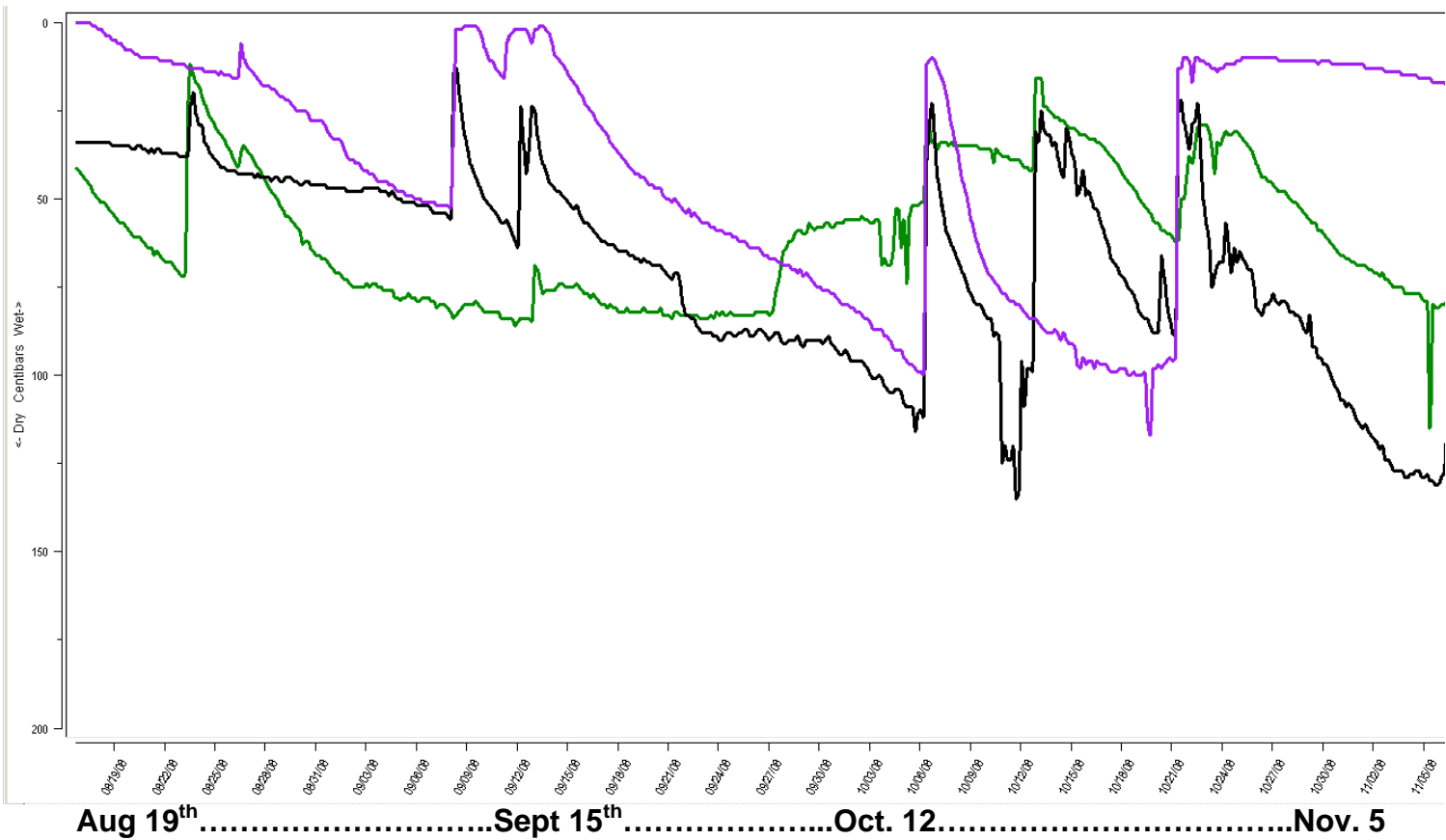
Common vetch

Relative Growth: 1 2 3 4 5 6 **7** 8 9 10

Seed Cost (acre): \$0 \$4 \$8 \$12 \$16 **\$20** \$24

Notes: Very frost tolerant – green well into November – notice late season water use on chart. Nodulated well and produced 70-80# N (Ray Ward estimate). Seeding rate: 20#/acre. Low growing, viney – liked to climb stubble. Slow emerging but grew well as days got shorter and temps got cooler.

	1 ft
	2 ft
	3 ft



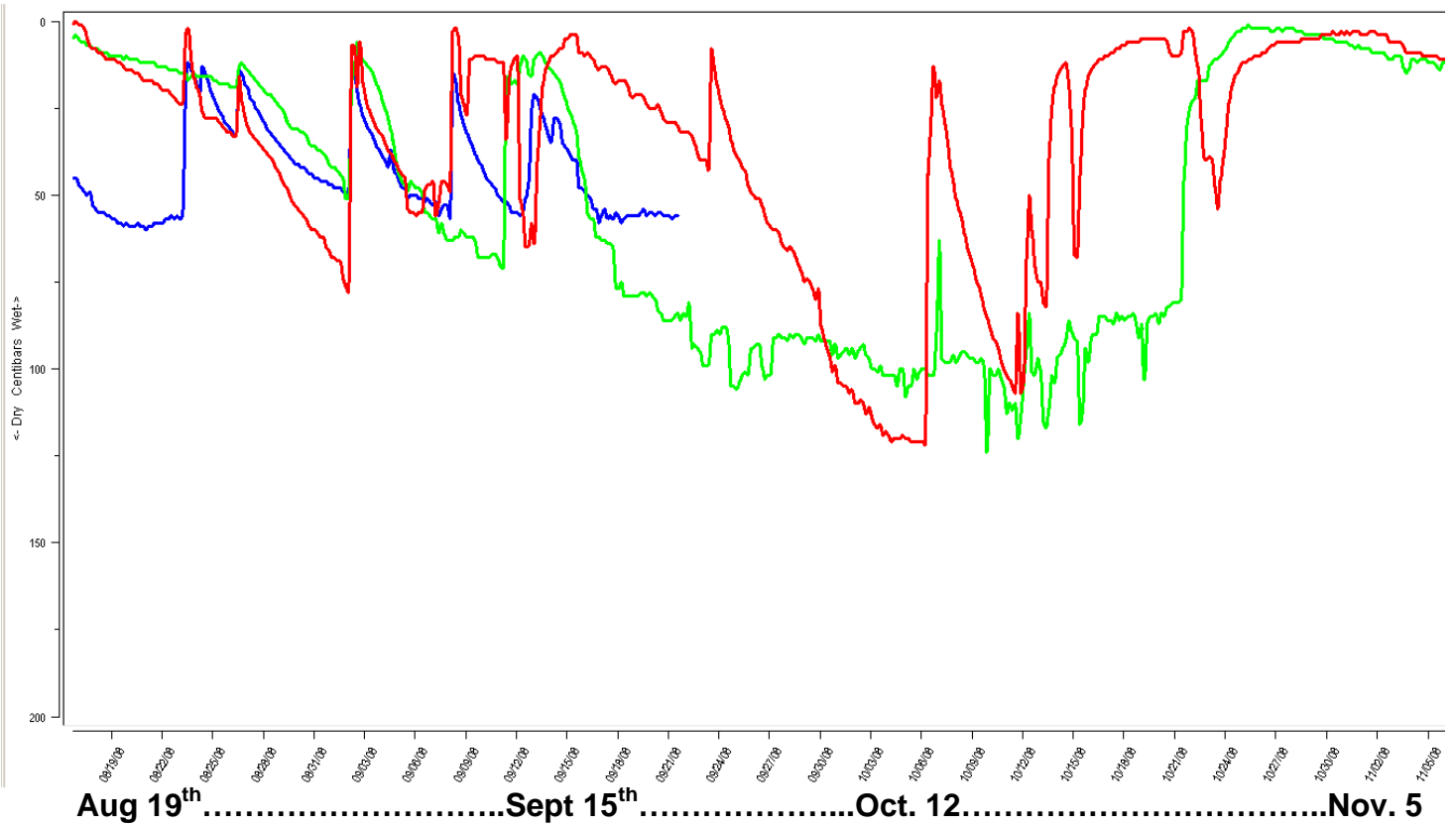
Mung Beans

Relative Growth: 1 2 3 4 **5** 6 7 8 9 10

Seed Cost (acre): \$0 \$4 \$8 \$12 **\$16** \$20 \$24

Notes: Very fast emergence and early growth. Growth was limited because we did not have proper inoculant. Very susceptible to first frost. Seeding rate was approximately 40 # acre.

	1 ft
	2 ft
	3 ft



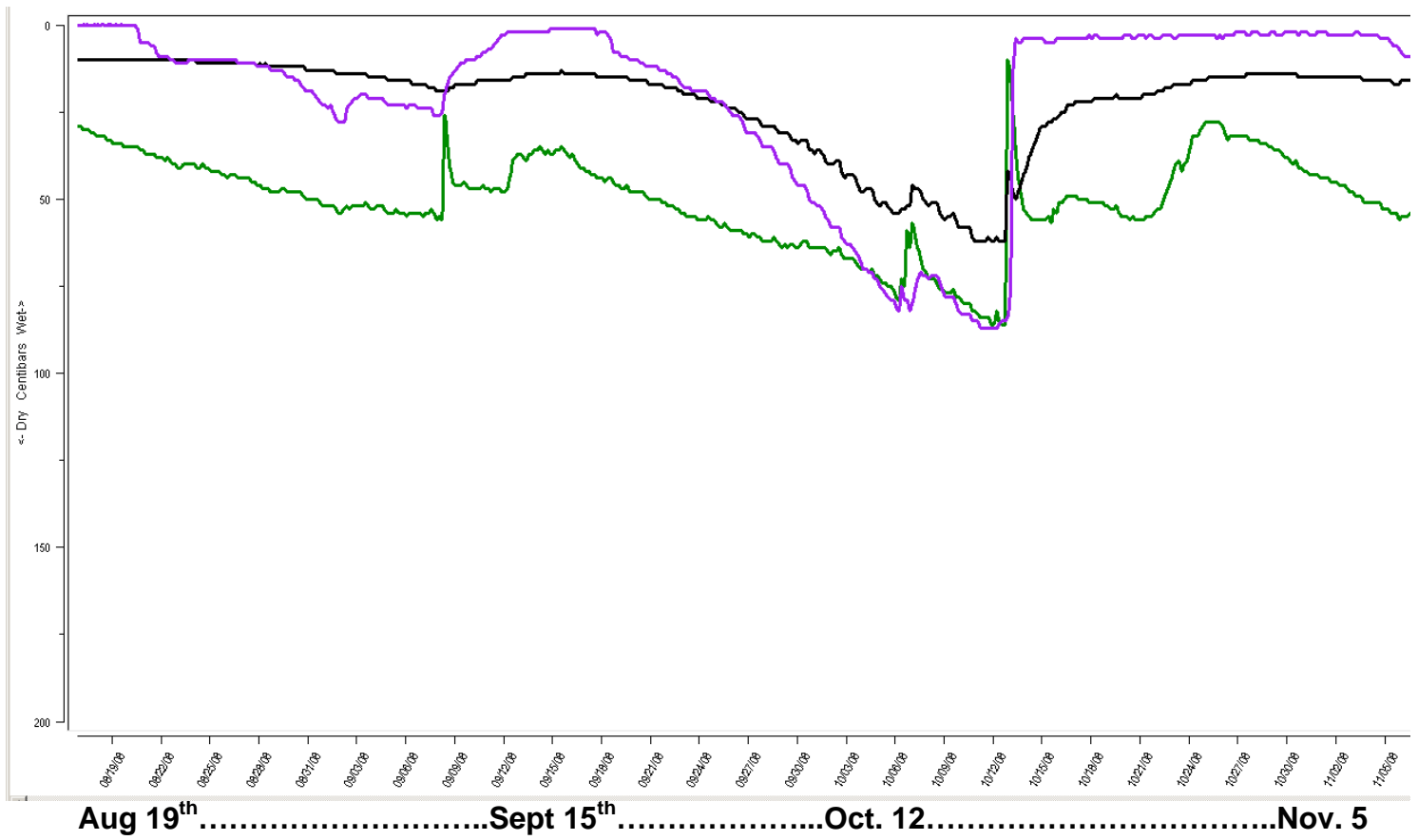
Oil Seed Radish

Relative Growth: 1 2 3 4 5 **6** 7 8 9 10

Seed Cost (acre): \$0 \$4 \$8 **\$12** \$16 \$20 \$24

Notes: Limited growth because of lack of N. Very frost tolerant – green well into November. Do not recommend brassicas by themselves. Seeding rate: 6#/acre.

- 1 ft
- 2 ft
- 3 ft



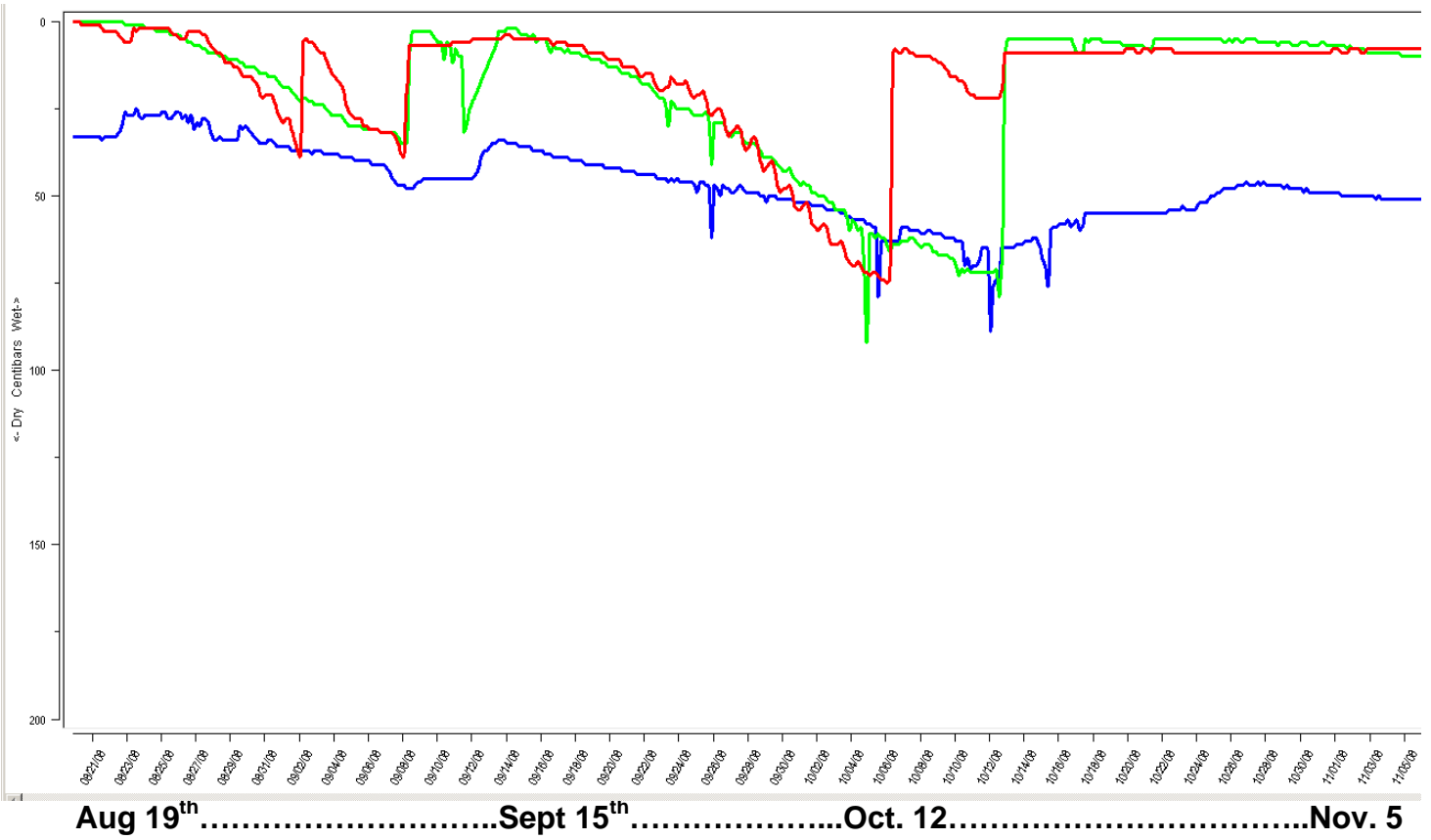
Winter Barley

Relative Growth: 1 2 3 **4** 5 6 7 8 9 10

Seed Cost (acre): \$0 \$4 **\$8** \$12 \$16 \$20 \$24

Notes: Not a lot of fall growth. Fairly shallow rooted and limited water use.
Seeding rate was approximately 1.5 bu/acre.

	1 ft
	2 ft
	3 ft



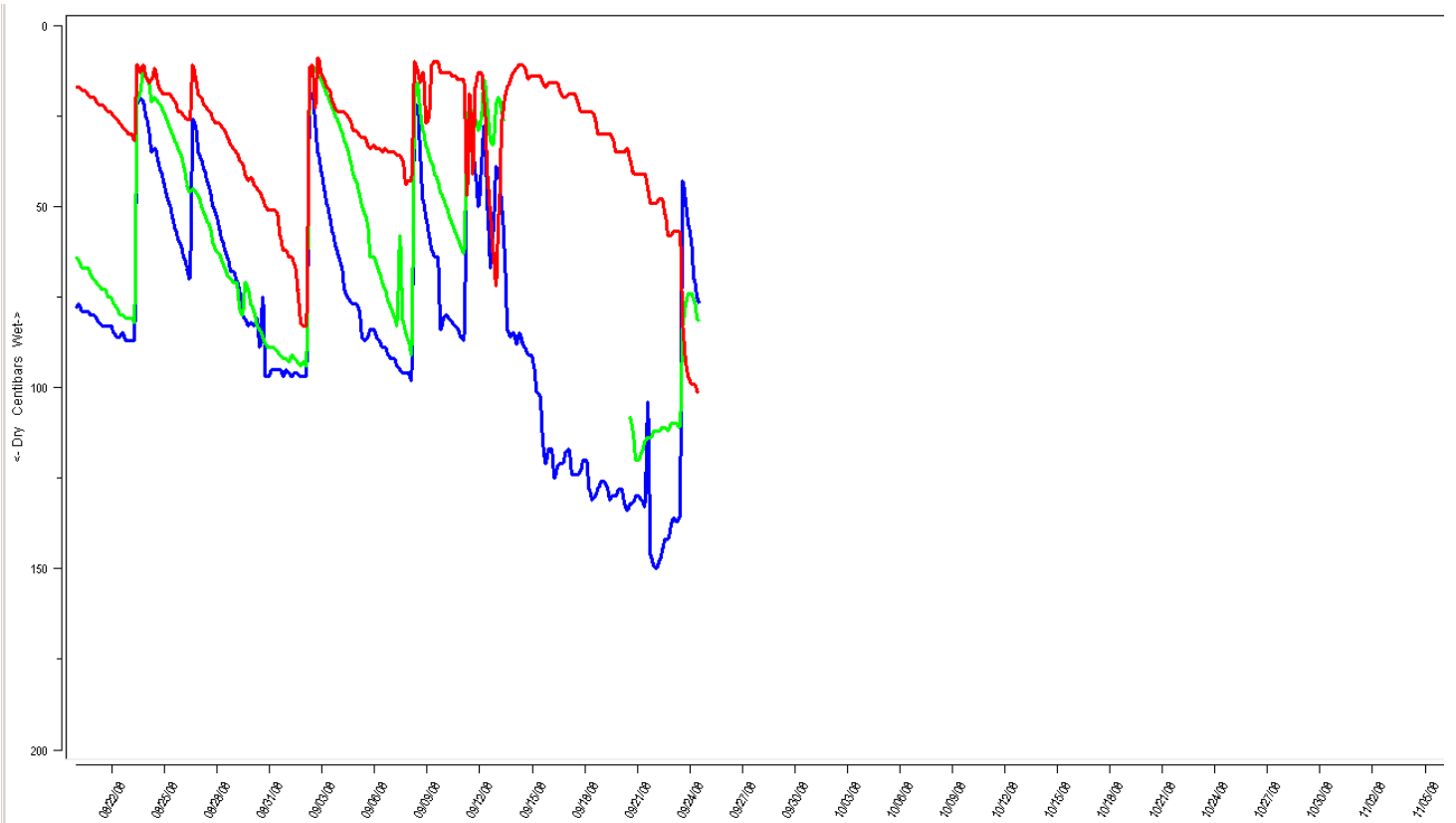
Ethiopian Cabbage

Relative Growth: 1 2 3 4 5 **6** 7 8 9 10

Seed Cost (acre): \$0 \$4 \$8 \$12 **\$16** \$20 \$24

Notes: Limited growth because of lack of N. Great root system. Very frost tolerant – green well into November. Stalks still standing when harvesting corn in Nov. Seeding rate: 5#/acre.

	1 ft
	2 ft
	3 ft



Aug 19th.....Sept 15th.....Oct. 12.....Nov. 5

Brassica Mix

Relative Growth: 1 2 3 4 **5** 6 7 8 9 10

Seed Cost (acre): \$0 \$4 \$8 \$12 \$16 **\$20** \$24

Notes: Sensors stopped working in Sept. Limited growth because of lack of N. Very frost tolerant – green well into November. Do not recommend brassicas by themselves. Seeding rate: 6#/acre.

█ 1 ft
█ 2 ft
█ 3 ft