Selecting for and Improving Chickpea Disease Resistance and Adaptation to Western Nebraska

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Chickpea production and consumption has been increasing rapidly over the past several years (1,500 acres in 2000 to almost 10,000 acres in 2006). Unfortunately, less than 300 acres were planted in 2007 and 2008, zero in 2009, and about 100 acres in 2010 and very few in 2011 and 2012 in western Nebrsaka.

Ascochyta blight ,caused by *Ascochyta rabiei*, a seed-borne disease, is the most limiting production problem found in the Nebraska Panhandle. The pathogen attacks leaves, stem, and pods severely affecting seed quality. Although genetic resistance is the most cost effective strategy for control of blight there are other disease management strategies such as crop rotation, removal of volunteer plants, deep plowing, and fungicide treatment that can augment the use of resistant genes. Identifying varieties with Ascochyta blight resistance will bring great value to regional production by helping us become a competitive production area by reducing pesticide use and lowering production costs.

The main goal of this project funded by the Nebraska Department of Agriculture through the Specialty Crop Block Grant is to identify chickpea cultivars with Ascochyta and root rot resistance for western Nebraska.

An experiment was carried out to access yield losses due to Ascochyta blight. The Western Regional Chickpea Trial provided by the USDA-ARS, Pullman, WA and 8 bulks selected from 2011 were evaluated at the PHREC under irrigated conditions. Ascochyta blight was controlled with one fungicide treatment (LEM 17 EC) at flowering stage. The treatments were arranged in a split plot design, where the fungicide treatment (protected vs. non-protected) was the main plot, and the chickpea lines were assigned as sub-plots. Each treatment was replicated 3 times. PHREC-Ca-Comp. #1 and PI 17256 were the tolerant checks. Additionally, four experimental lines (PHREC-*Ca*-Comp. #1, PI 17256, CA0469C020C, and CA0469C025C) were planted in strips on March 2, 2012 at Gurley, NE in Bob Kurz's farm.

Some chickpea lines are showing yield potential and Ascochyta blight resistance. Ascochyta blight incidence was low in 2012 due to the high temperatures. Under non-chemical control, Ascochyta blight incidence was 11% compared to 5% under chemical protection. Yield and 100-seed weight was reduced by 29.1% and 7.3% comparing protected vs. non-protected. From the 2012 chickpea trial, CDC Frontier, CA0469C020C, NE21-11-18, and CA0469C025C had the highest yields under the non-protected trials (2747, 2603, 2515, and 2368 lbs/acre, respectively). The commercial checks Dylan and Sarah had the lowest yields under the non-protected environment (911 and 1266 lbs/acre, respectively). Under the protected trial, CDC Frontier, PHREC-*Ca*-Comp. #1, NE21-11-18, CA0469C025C, and CA0469C020C had the highest yield (4235, 3457, 3455, 3420, and 3169 lbs/acre, respectively) (Table 1). Dylan had similar low under both non-protected and protected trial (911 and 1045 lbs/acre, respectively). CDC Frontier,

PHREC-*Ca*-Comp. #1, NE21-11-15, NE21-11-21, NE21-11-22, and NE21-11-23 responded positively to the fungicide treatment.

The experiment at Gurley, NE was lost due to very severe drought weather. There was a total of 3.5 inches of precipitation from flowering up to physiological maturity.

Table 1. Chickpea trial grown at Mitchell, NE during 2012.

			Yield	Ascochyta Blight	Maturity Days	100-Seed weight
Treatment	**ENTRY**	**Pedigree**	**lb/a**	**%**	**days**	**g**
Non-Protected	1	SIERRA	1734	16.7	114	51.0
Non-Protected	2	DYLAN	911	46.7	114	48.5
Non-Protected	3	MYLES	2115	1.2	90	18.4
Non-Protected	4	SARAH	1266	28.3	114	14.9
Non-Protected	5	SAWYER	2211	3.8	114	44.9
Non-Protected	10	PHREC-Ca-Comp.#1	1701	1.0	114	32.2
Non-Protected	11	CDC ALMA	2113	33.3	113	42.5
Non-Protected	12	CDC ORION	2135	13.3	114	44.3
Non-Protected	13	CDC FRONTIER	2747	1.7	114	36.8
Non-Protected	22	HB 14	1895	40.0	114	49.9
		Non-Protected Mean	**1945**	**11**	**111**	**38**
Protected	1	SIERRA	2087	5.0	114	52.3
Protected	2	DYLAN	1045	35.0	114	52.6
Protected	3	MYLES	2395	0.0	77	19.6
Protected	4	SARAH	2264	5.0	113	15.3
Protected	5	SAWYER	3070	1.0	113	45.5
Protected	10	PHREC-Ca-Comp.#1	3457	1.0	113	32.5
Protected	11	CDC ALMA	2234	5.0	111	43.6
Protected	12	CDC ORION	2633	1.0	113	47.4
Protected	13	CDC FRONTIER	4235	1.0	113	38.7
Protected	22	HB 14	2422	40.0	113	51.0
		Protected Mean	**2744**	**5**	**110**	**41**