PROJECT TITLE: Statewide/Western Regional evaluation of chickpea (Garbonzo bean) variety performance

EXPERIMENT NO.: #8907

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OBJECTIVES:
To evaluate grain yield potential of chickpea varieties under dryland conditions across Montana.

METHODS:
The 2003 Montana Uniform Chickpea Performance Trial (UCPT) consisted of two desi-type, one small kabuli-type and three large kabuli-type chickpea entries and was combined with eight large kabuli-types from the USDA-ARS, Pullman, Washington, chickpea breeding program (four Castilian and four White lines; **Table 1**). The trial was established on no-till fallow on May 7, 2003 (**Table 2**). Grain harvest occurred from August 4th through the 11th, depending on grain maturity conditions. Other important production methods are summarized in **Table 2**.

RESULTS:
Despite well above average moisture in April, drought-like conditions returned in June and July. Grasshopper damage, which consisted of cutting of peduncles and the loss of pods (fell to the ground) resulted in significant grain yield losses in the late maturing kabuli-type chickpeas.

Chickpea Grain Yields: Due to hot and dry weather conditions and increased grasshopper pressures between pod fill and grain maturity stages of growth, grain yields ranged dramatically among the selections (**Table 3**). Myles desi-type chickpea, the earliest maturing cultivar, was the highest grain producer, averaging 1,028 pounds per acre, while Dwelley, a large kabuli-type chickpea, averaged only 17 pounds per acre. The “white” lines of chickpeas (designated with a “W” at the end of their line numbers) seemed to have lower yield potentials compared with the “Castilian” lines. The trial average grain yield was 251 pounds per acre.
Flowering: The desi-type chickpeas were much earlier than the kabuli-type chickpeas to reach flowering, with Myles and CDC Anna being the earliest varieties to flower (**Table 3**). Line CA99901614C appeared to flower at least two day prior to the other experimental lines evaluated.
Plant Heights: CDC Yuma, a kabuli-type chickpea, was the tallest (significant at 5% level) cultivar tested, averaging 14.5 inches in canopy height, two inches taller than the trial average (12.5”; **Table 3**).
Kernel Sizes: The 1,000 kernel weight of the trial averaged 316 grams, with the line CA99901614C being the largest (**Table 3**). Grain samples were sized by passing them through 10, 9, 8, and 7 millimeter round sieves. In the larger kabuli-types, the USDA-ARS line CA99901614C had the largest percentage of beans that remained when passed through an 8 mm sieve (81.0%), and had significantly more beans remaining on the 9 mm sieve (based on $LSD_{0.05}$; **Table 4**).

FUTURE RESEARCH:
Evaluating chickpea varieties for yield performance across Montana climates will continue.

Table 1. 2003 Uniform/Western Regional Chickpea Trial - Chickpea variety characteristics summary. - Exp. 890703. Central Ag. Research Center, Moccasin, MT. **{File: 890703-Character}**

Variety	Type	Sub-Type	Seed Size[1/]	Leaf Structure[2/]	*Ascochyta* Tolerance	Maturity
Myles	Desi		Very Small	Fern-like	Fair	Early
CDC Anna	Desi		Very Small	Fern-like	Fair	Early
B-90	Small Kabuli		Small	Fern-like	Poor	Early
CDC Yuma	Kabuli	Castilean	Large	Fern-like	Poor	Late
CA99B1895C	Kabuli	Castilean	Large	Unifoliate	Unknown	Late
Dwelley	Kabuli	Castilean	Very Large	Unifoliate	Very Poor	Very Late
Sierra	Kabuli	Castilean	Very Large	Unifoliate	Very Poor?	Medium
CA99901614C	Kabuli	Castilean	Very Large	Unifoliate	Uknown	Early
CA9990B1514C	Kabuli	Castilean	Very Large	Unifoliate	Uknown	Late
CA9990B1579C	Kabuli	Castilean	Very Large	Unifoliate	Uknown	Medium
CA99901861W	Kabuli	White	Very Large	Unifoliate	Uknown	Late
CA9890169W	Kabuli	White	Very Large	Unifoliate	Uknown	Medium
CA9890233W	Kabuli	White	Very Large	Unifoliate	Uknown	Late
CA9890239W	Kabuli	White	Very Large	Unifoliate	Uknown	Very Late

[1/] - Seed Size class ranges (g/1,000 seeds): Very Small: 175 - 250 Small: 250 - 350 Large: 375 - 475 Very Large: 475+

[2/] - "Fern-like" indicates a pinnately compound leaf structure

Table 2. 2003 Statewide/Western Regional Chickpea Trial - Moccasin trial management summary. - Exp. 890703. Central Agricultural Research Center, Moccasin, MT. **{File: 890703:Manage}**

Field Summary				
	Environment:	Dryland		
	Tillage History:	No-Till	Previous Crop:	Fallow
Trial Management				
	Seeding Date:	5/7	Plot Dimensions:	5-rows x 11" spacing x 16'
	Fertilizer: (lbs/ac)	None		
	Pesticides:(rates)	Pre-plant Glyphosate (RounupUltra) application - 8oz/acre Hand weeding		
	Harvest Dates:	8/4(Myles); 8/8(B-90, Anna, CA99901604C) 8/11 (Remaining Lines)	Timing:	At grain maturity -Using a 5' plot harvestor
	Precipitation:	4.49"	- Crop-year (5/1 - 7/31)	
	Elevation:	4300'		

Table 3. 2003 Uniform/Western Regional Chickpea Performance Trial - Agronomic summary.
- Exp. 890703. Central Ag. Research Center, Moccasin, MT. **{File: 890703:Summary}**

Selection	Flower	Grain Harvest		
		Plant Height	Yield	Kernel Weight
	(date)	(inches)	(lbs/acre)	(g/1,000)
Myles	**6/29** [u]	12.5	**1028** [a]	187
Amit(B-90)	7/2	12.9	662	231
CDC Anna	6/30	12.4	585	159
CA99901614C	7/1	11.2	244	**402** [a]
CA9990B1514C	7/4	12.9	180	341
CA9990B1579C	7/3	13.1	167	360 [a]
Sierra	7/3	13.2	164	343
CDC Yuma	7/2	**14.5** [a]	140	295
CA9890169W	7/3	11.3	129	356
CA9990B1895C	7/5	13.0	67	279
CA99901861W	7/7	12.0	63	358 [a]
CA9890233W	7/5	11.2	38	371 [a]
CA9890239W	7/9	11.7	25	368 [a]
Dwelley	7/5	12.8	17	374 [a]
Mean(56)	7/3	12.5	251	316
LSD(0.05byt)		0.9	158	45
CV%(s/mean)		5.0	44.1	9.9
F-Value		8.51	29	22.87

[a] - Denotes values equal highest value (in **bold**) based on $LSD_{(0.05)}$.

[n] - Denotes not statistically significant at 0.05 level.

Table 4. 2003 Uniform/Western Regional Chickpea Performance Trial - Sieve size summary. - Exp. 890703. Central Ag. Research Center, Moccasin, MT. **{File: 890703-SieveSize}**

	Sample remaining on each sieve				
Kabuli Selections	10 mm	9 mm	8 mm	7 mm	<7mm
	---------- % ----------				
CA99901614C	**7.1** [a]	**34.7** [a]	39.2 [a]	11.9	5.3
CA9890169W	1.3 [a]	20.7	41.8 [a]	25.9 [a]	10.2 [a]
CA99901861W	1.9 [a]	17.7	43.1 [a]	28.0 [a]	9.2 [a]
CA9990B1579C	0.1	9.8	**50.0** [a]	31.7 [a]	7.3
CA9890233W	4.3 [a]	17.5	36.4 [a]	19.8 [a]	9.4 [a]
Sierra	0.4 [a]	7.2	46.2 [a]	29.9 [a]	15.9 [a]
CA9990B1514C	0.1	6.7	46.9 [a]	26.7 [a]	19.1 [a]
CA9890239W	4.5 [a]	16.9	31.0	21.1 [a]	25.0 [a]
CDC Yuma	0.0	4.4	45.4 [a]	25.4 [a]	22.1 [a]
Dwelley	0.0	17.5	31.7 [a]	13.2	**30.1** [a]
CA9990B1895C	0.0	2.0	35.0 [a]	**35.1** [a]	27.5 [a]
Means (*n* = 44)	2.5	14.1	40.6	24.4	16.5
LSD (0.05 by t)	6.9	11.6	18.5	17.4	21.6
CV% (s/means)	190.0	54.2	31.6	49.3	90.8
F-Value	1.19 [n]	5.38	1.00 [n]	1.47 [n]	1.38 [n]
Desi Selections					
Amit(B-90)	0.0	0.0	**1.2** [a]	**46.1** [a]	52.3
Myles	0.0	0.0	0.0	37.9	62.3
CDC Anna	0.0	0.2 [n]	0.8	17.0	**82.3** [a]
Means (*n* = 12)	0.0	0.1	0.7	33.7	65.6
LSD (0.05 by t)		0.1	0.4	5.8	5.6
CV% (s/means)		346.4	113.3	34.47	17.1
F-Value		1.00 [n]	2.66 [n]	6.68	7.38

[a] - Denotes values equal highest value (in **bold**) based on $LSD_{(0.05)}$.

[n] - Denotes not statistically significant at 0.05 level.