

PROJECT TITLE: 2008 India, Australia and Western Regional Chickpea Line Evaluations

EXPERIMENT NOS.: #8908

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OBJECTIVES: To evaluate chickpea selections from the India, Australia and the USDA-ARS Grain Legume Genetics and Physiology program in Pullman, Washington, for grain production potential in Central Montana.

METHODS: The 2008 chickpea trial was conducted on-station at the Central Agricultural Research Center, near Moccasin, Montana. The trial consisted of 33 selections, of which, 20 were from India, three were from Australia seven lines from the USDA-ARS program and three “check” varieties (Dwellely, Dylan and Sierra; **Table 1**). The trial was seeded under no-till conditions into chem-fallowed spring wheat stubble on April 23, 2008 (**Table 2**). Seed quality, such as seed size, were evaluated for the trial. A 1,000-kernel weight was measured using standard counting methods. Sieve-sizing was accomplished by shaking (by hand) seed through a series of hand sieves (5, 6, 7, 8, 9, and 10-mm). The Additional trial production methods can be found in **Table 2**.

RESULTS:

Chickpea Grain Yields were exceptional at Moccasin, with the trial averaging 1,248 lbs per acre (at 13% grain moisture; **Table 3**). As a whole, the India and Australia Lines were superior to the USDA line and three check varieties. These lines are in the Small Kabuli and Desi-type chickpeas versus the traditional Large Kabuli-type, as are the check varieties and USDA-ARS lines. Historically, small Kabuli and Desi-type chickpeas perform better at CARC. The Australian Desi-type Line AC48111 had the greatest grain production (at 13% moisture) with 1,478 lbs acre⁻¹, but was only significantly greater (based on LSD_{0.05}) than six other India and Australia lines and all but one of the USDA-ARS lines. **Plant Heights** averaged 33.3 cm, with the USDA-ARS line CA9990B1579C being the tallest (40.3 cm; not significant; **Table 3**). **Flowering**: The India and Australia lines flowered 6-days to 1-week earlier than the checks and USDA-ARS lines (**Table 3**) and this trend was also seen at grain ripeness, as the India and Australia lines were harvested 10-days earlier than the USDA-ARS lines. No single India or Australia line reached flowering first (neither replicated nor analyzed). **Disease**: The trial was monitored for *Ascochytae* sp. blight through the growing season (**Table 3**). The presence of the disease was low, however, four lines did exhibit leaf and stem lesions (AC48105, IS-13, Dylan, and Sierra), and the trial was sprayed with fungicide (Boscalid and Prothioconazole) on July 1, and July 18, 2008. No lesions were evident on the pods at grain harvest. The Australian line AC48105 exhibited the most symptoms of the disease (neither replicated nor analyzed). **Kernel Size and Weights**: Due to differences in size classes (Desi, small Kabuli and large Kabuli), the kernel size varied among varieties (**Table 4**). Dd had the greatest kernel size. The trial’s test weight averaged 57.1 lbs per bushel (**Table 3**). India line IS-12 had the heaviest test weight, but was not significantly heavier. Seed sized (**Table 4**)...

FUTURE PLANS: Chickpea line evaluations will continue, especially with the India and Australia lines, in order to release suitable cultivars for the Central Montana climate.

Table 1. 2008 India, Australia and USDA-ARS Chickpea Line Evaluations - Line Characteristics.
 - Exp: 890708. Central Agricultural Research Center, Moccasin, Montana.

Selection	Type	Seed Size ^{1/}	Seed Coat		Cotyledon	Leaf-Type	Flower
			Color	Texture			
IS-02	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-04	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-05	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-06	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-07	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-08	Kabuli	Large	Tan	Smooth	Yellow	Compound	White
IS-09	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-12	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-13	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-14	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-15	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-16	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-17	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-18	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-19	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-20	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
IS-21	Desi	Small	Drk Brown	Rough	Yellow	Compound	Purple
IS-22	Desi	Small	Lt Brown	Rough	Yellow	Compound	Purple
IS-28	Desi	Very Small	Green	Rough	Green	Compound	Purple
IS-29	Kabuli	Small	Tan	Smooth	Yellow	Compound	White
AC45226	Desi	Very Small	Drk Brown	Rough	Yellow	Compound	Purple
AC48105	Kabuli	Small	Lt Brown	Smooth	Yellow	Compound	White
AC48111	Desi	Very Small	Drk Brown	Rough	Yellow	Compound	Purple
Dwelly	Kabuli	Large	Tan	Smooth	Yellow	Unifoliate	White
Dylan	Kabuli	Large	Tan	Smooth	Yellow	Compound	White
Sierra	Kabuli	Large	Tan	Smooth	Yellow	Unifoliate	White
CA9783163C	Kabuli	Large	Tan	Smooth	Yellow	Compound	White
CA9990B1579C	Kabuli	Large	Tan	Smooth	Yellow	Unifoliate	White
CA0090B347C	Kabuli	Large	Tan	Smooth	Yellow	Unifoliate	White
CA0190B839C	Kabuli	Large	Tan	Smooth	Yellow	Unifoliate	White
CA0290B730C	Kabuli	Large	Tan	Smooth	Yellow	Mixed	White
CA9890233W	Kabuli	Large	White	Smooth	Yellow	Compound	White
CA9990I875W	Kabuli	Large	White	Smooth	Yellow	Compound	White

^{1/} - Seed size (in g/1,000-kernels) range: Very Small: 175 - 250 Small: 250 - 350
 Large: 375 - 475 Very Large: 475+

Table 2. 2008 India, Australia and USDA-ARS Line Evaluations - Management summary.
 -Exp. 890708. Central Agricultural Research Center, Moccasin, Montana

Field Summary	
Environment:	Dryland
Tillage History:	No-Till
Previous Crop:	Fallow
Soil Type:	Judith Clay-loam; Fine-loamy; carbonatic Typic Calciboroll
Elevation:	4300'
Trial Management	
Seeding Date:	4/23/2008
Fertilizer:	None
Plot Dimensions:	5-rows x 11" spacing x 20'
Land Rolling:	5/15/2008 10' water-filled (1/4 full)
Pesticides: (rates)	Quizalofop (10oz/acre) - grass herbicide - post emergence (05/29/07) Boscalid (6oz/acre) - fungicide - <i>Ascochytae</i> Control (07/01/08) Prothioconazole (4.5oz/acre) - fungicide - <i>Ascochytae</i> Control (07/18/08)
Harvest Date:	8/18 & 29/08 - Using a 5' plot harvester - At grain maturity
Precipitation:	Chickpea 8.61" 8.93" (99-Yr Ave) - April 23 - Aug 18, 2008

Table 3. 2008 India, Australia and USDA-ARS Chickpea Line Evaluations - Agronomic Summary.
 - Exp: 890708. Central Agricultural Research Center, Moccasin, Montana.

Selection	Canopy Ht.	Test Wt.	Field	Moisture	13% Moist	Disease ^{1/}	Flower
IS-02	32.8	58.3 ^a	892 ^a	9.3	1250 ^a	--	28-Jun
IS-04	33.0	58.1 ^a	969 ^a	9.0	1399 ^a	--	1-Jul
IS-05	32.3	58.4 ^a	959 ^a	9.0	1392 ^a	--	1-Jul
IS-06	33.3	57.9	927 ^a	9.1	1333 ^a	--	1-Jul
IS-07	31.3	58.7 ^a	1007 ^a	9.2	1431 ^a	--	28-Jun
IS-08	29.5	58.4 ^a	918 ^a	9.1	1316 ^a	--	29-Jun
IS-09	34.5	56.9	1014 ^a	9.0	1469 ^a	--	28-Jun
IS-12	33.8	58.8 ^a	873 ^a	9.0	1258 ^a	--	28-Jun
IS-13	32.3	58.1 ^a	1006 ^a	9.1	1433 ^a	+	27-Jun
IS-14	30.0	58.0	981 ^a	9.0	1413 ^a	--	30-Jun
IS-15	38.3 ^a	58.3 ^a	821	9.2	1160	--	29-Jun
IS-16	33.0	58.0	902 ^a	9.1	1298 ^a	--	30-Jun
IS-17	31.3	58.5 ^a	897 ^a	9.1	1277 ^a	--	27-Jun
IS-18	31.5	57.8	946 ^a	9.3	1331 ^a	--	27-Jun
IS-19	30.3	58.1 ^a	816	9.3	1148	--	27-Jun
IS-20	33.0	57.5	827	9.3	1157	--	29-Jun
IS-21	28.8	57.6	918 ^a	9.3	1288 ^a	--	2-Jul
IS-22	28.5	58.0	940 ^a	9.2	1327 ^a	--	29-Jun
IS-28	32.8	57.2	821	9.8 ^a	1089	--	2-Jul
IS-29	32.0	58.1	908 ^a	9.2	1279 ^a	--	27-Jun
AC45226	37.5 ^a	55.8	991 ^a	9.4	1377 ^a	--	27-Jun
AC48105	27.8	58.4 ^a	828	8.7	1237	++	1-Jul
AC48111	30.0	56.3	1027 ^a	9.0	1478 ^a	--	27-Jun
Dwellely	37.3 ^a	55.8	502	8.2	798	--	6-Jul
Dylan	37.3 ^a	53.8	692	7.9	1140	+	2-Jul
Sierra	35.8 ^a	56.7	693	8.3	1093	+	4-Jul
CA9783163C	31.5	55.0	725	8.2	1148	--	7-Jul
CA9990B1579C	40.3 ^a	56.4	748	8.2	1194	--	8-Jul
CA0090B347C	37.0 ^a	57.0	876 ^a	8.9	1285 ^a	--	2-Jul
CA0190B839C	39.8 ^a	55.9	586	8.1	938	--	4-Jul
CA0290B730C	34.0	55.1	746	8.0	1212	--	5-Jul
CA9890233W	30.3	54.5	702	7.7	1187	--	7-Jul
CA9990I875W	37.5 ^a	54.5	642	8.0	1040	--	5-Jul
Means (<i>n</i> = 132)	33.3	57.1	851	8.8	1248		30-Jun
LSD _{0.05} (by t)	5.7	0.7	155	0.2	230		
CV% (s/means)	12.2	0.9	12.9	1.9	13.1		
F-Value (32,96 df)	2.7	28.1	5.8	40.5	3.4		