

FINAL RELEASE OUTLINE/CHECKLIST

Date: February 12 2013

Plant Breeder: George Vandemark

Breeding Team Members and Percentage of Contribution: George Vandemark (40%), Fred Muehlbauer (30%), Weidong Chen (15%), Kevin McPhee (15%).

(note: a breeding team is defined for potential distribution of royalty income; the extent of the team is up to the character of the breeder)

Identification:

1. Crop kind and market class
Large kabuli chickpea
2. Selection no.
CA04900843C
3. Proposed name
To be determined
4. Pedigree and experimental designation
CA0290B332 x HB-19/CA9783142

General Situation:

1. Unique cultivar characteristics / release justification
 - a. It is required the variety be an improvement over existing varieties in one or more important characteristics and has demonstrated potential for use in commercial agriculture.
 - b. It is required the variety be sufficiently distinguishable from existing varieties to allow for seed certification and intellectual property protection.

CA04900843C has consistently demonstrated exceptional yield and large seed size across trials in the Pacific Northwest.

2. Use-type
Canning and fresh market chickpea.
3. Description and general information

CA04900843C was evaluated by the USDA-ARS Grain Legume Genetics and Physiology Research Unit in advanced yield trials for 16 location-years (2008-2012). Over this time CA04900843C averaged 1703 kg/ha, which was 16.6% and 21.0% greater than the yields of Dwelley (1460 kg/ha) and Sierra (1408 kg/ha), respectively (see Table 1).

With respect to agronomic traits (see Table 2), CA04900843C is not significantly different than Dwelley or Sierra in days to 50% flower, days to mature, canopy height, or resistance to Ascochyta blight. CA04900843C has a significantly lower plant height index (PHI) than either Dwelley or Sierra. However, it has a mean PHI of 0.85, which suggests it has good tolerance to lodging. That it has acceptable levels of tolerance to lodging can be inferred from its superior yields relative to the check cultivars, which suggests that the crop produced by this line can be easily harvested. CA04900843C produces significantly larger seed than Dwelley or Sierra. In addition, based on data from 2012 yield trials, CA04900843C also produced a significantly higher percentage of seed that was equal or greater than 10mm (43.5%) than either Dwelley (17.4%) or Sierra (21.0%).

Data is presented in Table 3 for seed mineral concentrations of four minerals of particular concern for child nutrition based on a single year of data (2010) obtained from three environments. CA04900843C had significantly lower concentrations of Potassium and Magnesium than Dwelley or Sierra but did not have a

significantly different concentration of Iron than either Sierra or Dwelley. CA04900843C had significantly higher concentrations of seed calcium than either Dwelley or Sierra.

Data is presented in Table 4 for post-harvest quality traits important to cooking or canning. In general, CA04900843C had characteristics similar to Dwelley and Sierra, although it took approximately two minutes longer to cook CA04900843C than Sierra and four minutes longer to cook than Dwelley.

4. Variety it is intended to replace (if any)
Dwelley and Sierra

Performance Evaluations: See tables below.

(*must include independent narrative statement/evaluation from respective scientist(s))

1. Yield
 - a. Breeder trials (3 years)
 - b. Variety Testing Program
 - c. Regional performance testing data (legumes 2 years;)
2. Agronomic characteristics
3. *End-use quality assessment/data (legumes 3 years;) 2 years must have multiple locations
4. *Resistance to diseases, insects, other
5. Winterhardiness (if applicable)
6. Area of adaptation
7. Other important traits/unique characteristics
8. Weaknesses

(*must include independent narrative statement/evaluation from respective scientist(s))

Seed Source, Status and Availability:

Other Comments:

1. Variant clause (if applicable)

Provisions for Plant Variety Protection (PVP)—if applicable

Attachments:

1. Tables
2. Other supporting documentation
3. Draft variety release document
4. Draft PVP application (if applicable)

Table 1. Yield (kg/ha) of CA04900843C, Dwelley, Sierra, and Sawyer along with trial mean of 16 yield trials conducted by the USDA-ARS across four years (2008-2012).

Year	Location	CA04900843C	Dwelley	Sierra	Sawyer	Test Mean	LSD ¹
2008	Genesee, ID	1149	906	730	1192	960	615
2008	Waitsburg, WA	1344	1326	1522	1626	1420	440
2008	Pullman, WA	1820	1340	1530	1287	1491	316
2009	Genesee, ID	1544	1386	1132	1488	1258	533
2009	Kendrick, ID	1520	1420	1328	1527	1469	224
2009	Pullman, WA	1742	1487	1404	1509	1549	343
2010	Genesee, ID	896	559	631	930	763	171
2010	Kendrick, ID	1637	1370	1262	1416	1444	180
2010	Pullman, WA	1039	881	836	995	923	195
2011	Genesee, ID	2194	2365	1947	2232	2296	551
2011	Kendrick, ID	1905	1758	1789	1953	1906	199
2011	Pullman, WA	3116	2393	2397	2610	2770	441
2012	Dayton, WA	1424	798	627	1075	1028	385
2012	Genesee, ID	2251	2218	2094	2374	2547	494
2012	Kendrick, ID	1692	1333	1308	1199	1509	266
2012	Pullman, WA	1982	1821	1985	1901	1860	379
Grand Mean		1636	1404	1396	1528	1534	

¹LSD = Least significant difference between means based on the analysis of all entries tested ($\alpha = 0.1$).

Table 2. Means comparison¹ between CA04900843C, Dwelley, Sierra and Sawyer based on measurements obtained from advanced yield trial plots grown at the WSU Spillman Research Farm near Pullman, WA during 2008-2012.

Entry	Days to 50% Flower	Days to Maturity	Canopy Height (cm)	Plant Height Index	Weight 100 seeds (g)	Reaction to Ascochyta blight ²
CA04900843C	58.7 a	108.2 a	42.0 a	0.85 a	60.3 a	3.3 a
Dwelley	60.5 a	107.5 a	43.7 a	0.91 b	52.8 b	4.1 a
Sierra	59.2 a	107.5 a	40.4 a	0.91 b	52.1 b	3.4 a
Sawyer	57.9 a	104.9 a	40.8 a	0.87 ab	43.6 c	3.8 a

¹Means within a column followed by the same letter are not significantly different ($P \leq 0.1$).

²All plants with each plot were rated on a scale of 0-9 as follows: 1 = healthy plant; 2 = small and inconspicuous lesions present; 3 = lesions clearly present but plant remains mostly green; 4 = severe lesions visible; 5 = lesions girdle stems, most leaves show lesions; 6 = plant collapsing, leaf tips die back; 7 = plant dying but at least three green leaves present; 8 = dying plant with green stem but no green leaves, and 9 = dead plant. The disease score of the most severely affected plant within a plot was used for the plot score.

Table 3. Means¹ comparison between CA04900843C, Dwelley, Sierra and Sawyer for seed concentrations of nutrients of concern for child nutrition based on 2010 Advanced Yield Trials conducted at three locations (Pullman, WA; Genesee, ID and Kendrick, ID).

Entry	Calcium (mg/g DW)	Potassium (mg/g DW)	Magnesium (mg/g DW)	Iron (ug/g DW)
CA04900843C	1.13 a	11.29 c	1.34 c	51.51 a
Dwelley	0.99 b	12.01 a	1.45 a	52.65 a
Sierra	0.86 c	11.58 b	1.40 b	51.23 a
Sawyer	0.92 bc	11.77 ab	1.38 bc	48.42 b

¹Means within a column followed by the same letter are not significantly different ($P \leq 0.1$).

Table 4. Post harvest cooking and quality characteristics of CA4900843C, Dwelley, Sierra, and Sawyer (2012 harvest).

Entry	% water uptake	Conductivity (ms/cm)	Cooking time (min)	Post soak color	Post cook color	Seed coat retention
CA04900843C	111.86	1.03	21.33	good/light	good/light	Good
Dwelley	108.25	1.65	16.67	good/light	good/light	Good
Sierra	102.67	1.22	19.33	good/light	good/light	Good
Sawyer	103.88	0.64	16.67	good/light	good/light	good