No. 201400327

THE UNITED STATES OF AMERICA

TO ALL TO WHOM THESE PRESENTS SHALL COME:

Crop Development Center

Whereas, THERE HAS BEEN PRESENTED TO THE

Secretary of Agriculture

An application requesting a certificate of protection for an alleged distinct variety of sexually reproduced, or tuber propagated plant, the name and description of which are contained in the application and exhibits, a copy of which is hereunto annexed and made a part hereof, and the various requirements of LAW in such cases made and provided have been complied with, and the title thereto is, from the records of the PLANT VARIETY PROTECTION OFFICE, in the applicant(s) indicated in the said copy, and Whereas, upon due examination made, the said applicant(s) is (are) adjudged to be entitled to a certificate of plant variety protection under the LAW.

Now, therefore, this certificate of plant variety protection is to grant unto the said applicant(s) and the successors, heirs or assigns of the said applicant(s) for the term of TWENTY years from the date of this grant, subject to the payment of the required fees and periodic replenishment of viable basic seed of the variety in a public repository as provided by LAW, the right to exclude others from selling the variety, or offering it for sale, or reproducing it, or importing it, or exporting it, or conditioning it for propagation, or stocking it for any of the above purposes, or using it in producing a hybrid or different variety therefrom, to the extent provided by the PLANT VARIETY PROTECTION ACT. (84 STAT. 1542, AS AMENDED, 7 U.S.C. 2321 ET SEQ.)

CHICKPEA

'CDC Orion'

In Testimony Whereof, *I have hereunto set my hand and caused the seal of the* Plant Variety Protection Office *to be affixed at the* ***City of Washington, D.C.*** *this thirtieth day of March, in the year* ***two thousand and fifteen.***

Attest:

Commissioner
Plant Variety Protection Office
Agricultural Marketing Service

Secretary of Agriculture

201400327

REPRODUCE LOCALLY. *Include form number and date on all reproductions*

Form Approved - OMB No 0581-0055

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE

APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE
(Instructions and information collection burden statement on reverse)

The following statements are made in accordance with the Privacy Act of 1974 (5 U.S.C. 552a) and the Paperwork Reduction Act (PRA) of 1995

Application is required in order to determine if a plant variety protection certificate is to be issued (7 U.S.C. 2421) Information is held confidential until certificate is issued (7 U.S.C. 2426)

1 NAME OF OWNER
Crop Development Center

2 TEMPORARY DESIGNATION OR EXPERIMENTAL NAME
491-5

3 VARIETY NAME
CDC Orion

4. ADDRESS *(Street and No., or R.F.D. No., City, State, and ZIP Code, and Country)*
Crop Development Centre
University of Saskatchewan
College of Agriculture and Bioresources
51 Campus Drive
Room 4D36 Agriculture Building
Saskatoon SK S7N 5A8

5 TELEPHONE *(include area code)*
306 966-5855

6. FAX *(include area code)*
306 966-5015

FOR OFFICIAL USE ONLY

PVPO NUMBER
201400327

FILING DATE
5/6/2014

7 IF THE OWNER NAMED IS NOT A "PERSON", GIVE FORM OF ORGANIZATION *(corporation, partnership, association, etc.)*
University

8 IF INCORPORATED, GIVE STATE OF INCORPORATION

9 DATE OF INCORPORATION

10 NAME AND ADDRESS OF OWNER REPRESENTATIVE(S) TO SERVE IN THIS APPLICATION *(First person listed will receive all papers)*
Shaan Tsai
MERIDIAN SEEDS
PO BOX 224, 2 - 6TH AVE N
CASSELTON, ND 58012

11 TELEPHONE (Include area code)
701-347-9965

12 FAX (Include area code)
701-347-9890

FEES RECD

FILING AND EXAMINATION FEES:
$ 4,382
DATE 5/6/2014

CERTIFICATION FEE:
$
DATE

13 E-MAIL
s.tsai@canterra.com

14 CROP KIND *(Common Name)*
chickpea

15 GENUS AND SPECIES NAME OF CROP
Cicer arietinum

16 FAMILY NAME *(Botanical)*
Fabaceae

17 IS THE VARIETY A FIRST GENERATION HYBRID?
☐ YES ■ NO

18 DOES THE VARIETY CONTAIN ANY TRANSGENES? (OPTIONAL)
☐ YES ■ NO

IF YES, PLEASE GIVE THE ASSIGNED USDA-APHIS REFERENCE NUMBER FOR THE APPROVED PETITION TO DEREGULATE THE GENETICALLY MODIFIED PLANT FOR COMMERCIALIZATION

20 DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE SOLD ONLY AS A CLASS OF CERTIFIED SEED? *(See Section 83(a) of the Plant Variety Protection Act)*
☐ YES *(If "yes", answer items 21 and 22 below)*
■ NO *(If "no", go to item 23)*
☐ UNDECIDED

19 CHECK APPROPRIATE BOX FOR EACH ATTACHMENT SUBMITTED (Follow instructions on reverse)
a ■ Exhibit A Origin and Breeding History of the Variety
b ■ Exhibit B Statement of Distinctness
c ■ Exhibit C Objective Description of Variety
d ☒ Exhibit D Additional Description of the Variety *(Optional)*
e ■ Exhibit E Statement of the Basis of the Owner's Ownership
f. ■ Filing and Examination Fee ($4,382), make checks payable to "Treasurer of the United States" *(Mail to the Plant Variety Protection Office)* other methods of payment explained in the instructions

MAH
6-03-2014

21. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF CLASSES?
☐ YES ■ NO
IF YES, WHICH CLASSES? ☐ FOUNDATION ☐ REGISTERED ☐ CERTIFIED

22. DOES THE OWNER SPECIFY THAT SEED OF THIS VARIETY BE LIMITED AS TO NUMBER OF GENERATIONS?
☐ YES ■ NO
IF YES, SPECIFY THE NUMBER 1,2,3, etc FOR EACH CLASS
___ FOUNDATION ___ REGISTERED ___ CERTIFIED
(If additional explanation is necessary, please use the space indicated on the reverse.)

23. HAS THE VARIETY (INCLUDING ANY HARVESTED MATERIAL) OR A HYBRID PRODUCED FROM THIS VARIETY BEEN SOLD, DISPOSED OF, TRANSFERRED, OR USED IN THE U.S. OR OTHER COUNTRIES?
■ YES ☐ NO
IF YES, YOU MUST PROVIDE THE DATE OF FIRST SALE, DISPOSITION, TRANSFER, OR USE FOR EACH COUNTRY AND THE CIRCUMSTANCES. *(Please use space indicated on reverse.)*

24. IS THE VARIETY OR ANY COMPONENT OF THE VARIETY PROTECTED BY INTELLECTUAL PROPERTY RIGHT *(PLANT BREEDER'S RIGHT OR PATENT)*?
☐ YES ■ NO
IF YES, PLEASE GIVE COUNTRY, DATE OF FILING OR ISSUANCE AND ASSIGNED REFERENCE NUMBER. *(Please use space indicated on reverse.)*

25. The owners declare that a viable sample of basic seed will be furnished directly to an acceptable depository in support of the variety within three months of filing. Seed will be replenished upon request in accordance with such regulations as may be applicable. For a tuber propagated variety or vegetative propagated parent of the variety, a tissue culture or vegetative sample will be deposited in a public repository within three months of the date of the certificate fee request letter. These will be maintained for the duration of the certificate.
The undersigned owner(s) is (are) the owner(s) of this sexually reproduced or tuber propagated plant variety, and believe(s) that the variety is new, distinct, uniform, and stable as required in Section 42, and is entitled to protection under the provisions of Section 42 of the Plant Variety Protection Act. Owner(s) is (are) informed that false representation herein can jeopardize protection and result in penalties.

SIGNATURE OF OWNER		SIGNATURE OF OWNER	
NAME *(Please print or type)*		NAME *(Please print or type)*	
KOFI AGBLOR			
CAPACITY OR TITLE	DATE	CAPACITY OR TITLE	DATE
MANAGING DIRECTOR	APRIL 23, 2014		

2014 MAY 6 AM 10:55

22. CONTINUED FROM FRONT *(Please provide a statement as to the limitation and sequence of generations that may be certified.)*

23. CONTINUED FROM FRONT *(Please provide the date of first sale, disposition, transfer, or use for each country and the circumstances, if the variety (including any harvested material) or a hybrid produced from this variety has been sold, disposed of, transferred, or used in the U.S. or other countries.)*

2014: Year of first sale of certified seed in Canada

24. CONTINUED FROM FRONT *(Please give the country, date of filing or issuance, and assigned reference number, if the variety or any component of the variety is protected by intellectual property right (Plant Breeder's Right or Patent).)*

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE
APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

EXHIBIT A – ORIGIN AND BREEDING HISTORY
** Use additional pages as needed

FOR OFFICIAL USE ONLY
PVPO NUMBER

1. Name of Owner	2. Temporary Designation or Experimental Name	3. Variety Name
Crop Development Center	491-5	CDC Orion

4. Describe the genealogy (back to and including public and commercial varieties, lines, or clones used) and the breeding method(s) **

- Please see attached

5. Give the details of subsequent stages of selection and multiplication **

Year	Detail of Stage	Selection Criteria
2003: F2 derived F3 families	were evaluated and selections made based on improved ascochyta blight resistance, early maturity and visual appearance of grain seed including suitable seed size and shape.	
2004: F2 derived F4 families	were evaluated for yield, days to flowering, days to maturity, seed size and seed shape in unreplicated preliminary yield tests.	
2005: F2 derived F5 generation	was evaluated for yield, days to flowering, days to maturity, seed size and seed shape, plant height at maturity, and ascochyta blight reaction in multi-location tests (3 locs in SK).	
2006: The F2 derived F6 generation	was further evaluated for yield, days to flowering, days to maturity, seed size and seed shape, plant height at maturity, and ascochyta blight reaction at an expanded set of locations across SK & AB (6 locs).	
2007-2009: F2 derived F6 enters	regional adaptability testing in Saskatchewan and Alberta at 10 locations	
2009: Breeder seed was produced	concurrently with final year of regional testing by bulking 18 F6 derived F8 pre-breeder lines.	
2010:Line 491-5 is officially named	CDC Orion.	

6. Is the variety uniform? ✓ Yes ____ No

How did you test for uniformity?

Uniformity (plant height, growth habit, leaf type, flower colour) assessment was done at least at two test locations each year for at least two years prior to release. The locations were chosen based on conditions that allowed normal growth and expression of all test characteristics. At each location and year, the trial had 3 replications. Plot size was 4.45 m2 with four rows per plot, inter-row spacing was 30 cm, row length was 3.65 m and seeding rate was54 seedsm2. All assessments were done on plot bases.

7. Is the variety stable? ✓ Yes ____ No

How did you test for stability? Over how many generations?

For the assessment of Uniformity of characteristics on the plot as a whole (visual assessment by a single observation of a group of plants or parts of plants), a population standard of 1% with an acceptance probability of at least 95% was applied.

8. Are genetic variants observed or expected during reproduction and multiplication? ✓ Yes ____ No

If yes, state how these variants may be identified, their type and frequency

Off-types: none

Plant variants: Purple flower or Unifoliate leaves
Acceptable levels:
2/10000 –Breeder
4/10000 –Select
6/10000-Foundation
8/10000- Registered
10/10000 – Certified

4. Exhibit A – Origin and Breeding History for CDC Orion (491-5)

CDC Orion kabuli chickpea was developed from the cross FLIP95-48C/93-120-63K made in the spring of 2000. The kabuli germplasm FLIP95-48C was developed by the International Center for Agricultural Research in the Dry Areas (ICARDA) in Aleppo, Syria. FLIP95-48C is medium-seeded kabuli with good resistance to ascochyta blight. Line 93-120-63K was developed by the Crop Development Centre, University of Saskatchewan. It was derived from a cross between Sultano and C188-620. Both Sultano and C188-620 are large kabuli with desirable seed characteristics and susceptible to ascochyta blight. Line 93-120-63K is a large-seeded kabuli well adapted to western Canadian environments. The F2-derived family breeding method was used in the development of CDC Orion. F2-derived F3 families were evaluated in 2003 at Goodale Research Farm near Saskatoon in three-row, 1.5-m2 microplots with selection based on improved ascochyta blight resistance, early maturity and visual appearance of grain seed including suitable seed size and shape. Unreplicated preliminary yield test of selected F2-derived F4 families was conducted at Goodale Research Farm near Saskatoon, SK, in 2004. Multi-location tests for the F2-derived F5 generation were done at Goodale Research Farm near Saskatoon and Kyle in SK and at Brooks in AB in 2005. The F2-derived F6 generation were evaluated at Goodale Research Farm near Saskatoon, Davidson, Elrose and Kyle in SK and at Brooks and Bow Island in AB in 2006. At the F2-derived F5 generation the entries were arranged in a 99 simple lattice with two replications; whereas at the F2-derived F6 generation the lines were arranged in a randomized complete block design with three replications. From the F2-derived F4 to the F2-derived F6, each entry was seeded in a three-row plot of 14 m. The line 4915 was selected from these trials and tested in the Saskatchewan Regional Kabuli Chickpea Trials in 20072009, coordinated by the Saskatchewan Advisory Council on Grain Crops. The Regional Kabuli Chickpea Trials were conducted at ten locations (eight in Saskatchewan andtwo in Alberta) per year. The Alberta sites (Brooks and Bow Island) and three (Hodgeville, Kyle and Swift Current) of the Saskatchewan sites are on the Brown soil zone. The rest of the Saskatchewan sites [Goodale Research Farm, SPG Research Farm (both near Saskatoon), Davidson, Elrose and Pasqua] are on the Dark Brown soil zone. The Regional Trials were arranged in a randomized complete block design with three replications per location. Plot size was 4.45 m2 with four rows per plot and 30 cm between rows. The seeding rate was 54 seeds per m2. At each generation data were collected on grain yield, days to flowering, days to maturity, ascochyta blight reaction, plant height at maturity, seed size and shape. Each measurement was on a plot basis. Line 491-5 was named CDC Orion in 2010. Breeder seed was produced in 2009 at Pasqua, SK, concurrent with the final year of regional testing, by bulking 18 F6-derived F8 pre-breeder lines.

5. Give the details of subsequent stages of selection and multiplication.

2003: F2 derived F3 families were evaluated and selections made based on improved ascochyta blight resistance, early maturity and visual appearance of grain seed including suitable seed size and shape.

2004: F2 derived F4 families were evaluated for yield, days to flowering, days to maturity, seed size and seed shape in unreplicated preliminary yield tests.

2005: F2 derived F5 generation was evaluated for yield, days to flowering, days to maturity, seed size and seed shape, plant height at maturity, and ascochyta blight reaction in multi-location tests (3 locs in SK).

2006: The F2 derived F6 generation was further evaluated for yield, days to flowering, days to maturity, seed size and seed shape, plant height at maturity, and ascochyta blight reaction at an expanded set of locations across SK & AB (6 locs).

2007-2009: F2 derived F6 enters regional adaptability testing in Saskatchewan and Alberta at 10 locations

2009: Breeder seed was produced concurrently with final year of regional testing by bulking 18 F6 derived F8 pre-breeder lines.

2010:Line 491-5 is officially named CDC Orion.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE
APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

EXHIBIT B – STATEMENT OF DISTINCTNESS

**** Use additional tables to present clear differences for additional comparison varieties. Use additional pages to present supporting evidence.***

FOR OFFICIAL USE ONLY
PVPO NUMBER

1 Name of Owner	2 Temporary Designation or Experimental Name	3 Variety Name
Crop Development Center	491-5	CDC Orion

Based on overall morphology, CDC Orion (*Applicant's new variety*) is most similar to CDC Frontier (*Most similar comparison variety(ies)*) CDC Orion (*Applicant's new variety*) most clearly differs from CDC Frontier (*Most similar comparison variety(ies)*) in the following traits Name the specific trait Then list the value of that trait for each variety in the comparison Submit appropriate supporting evidence (see the Guidelines for Presenting Evidence in Support of Variety Distinctness in the instructions):

	Eg. Leaf Pubescence *Eg. Leaf Color* *Eg. Plant Height*	*heavy pubescence* *Dark Green (5GY 3/4)* *200 cm +/- 10 cm (N=25)*	*glabrous* *Light Green (2.5GY 8/10)* *250 cm +/- 15 cm (N=25)*	*photograph attached* *Munsell Color Chart* *statistics attached*
	1. Qualitative traits:	**2. Color traits:**	**3. Quantitative traits:**	**4. Other traits:**
Application Variety	CDC Orion please see attached		please see attached	
Comparison Variety 1	CDC Frontier please see attached		please see attached	
Comparison Variety 2	Amit please see attached		please see attached	
Comparison Variety 3				

***** Use additional tables to present clear differences for additional comparison varieties. Use additional pages to present supporting evidence.***

Exhibit B – Statement of Distinctness

	Qualitative traits	Quantative traits
CDC Orion	**Seed Shape:** Ram-head seed shape (See figure 1)	**Seed Size**: larger than Frontier and Amit (see Table 1&2, figure 1) **Maturity:** 2 days later than Amit (Table 1), 2-3 days earlier than Frontier (See Table 3)
CDC Frontier	**Seed Shape:** Ram-head seed shape	**Seed Size**: smaller than Orion, bigger than Amit. (see table 2) **Maturity:** 2-4 days later than Orion and Amit (see table 3)
Amit	**Seed Shape:** Round (See figure 1)	**Seed Size:** Smaller than Orion and Frontier (see table1, 2 & figure 1) **Maturity:** 2 days earlier than Orion (see Table 1), 3-4 days earlier than Frontier (See Table 3)

Table 1. Summary of agronomic and disease data for CDC Orion Kabuli chickpea and the check cultivar Amit (B-90) from Saskatchewan and Alberta regional chickpea trials, 2007-2009

	Yield (kg ha^{-1})					Ascochyta blight	
Cultivar	Brown soil zone	Dark Brown soil zone	Days to Flower	Height (cm)	Days to maturity	(0-9)[1]	1000 seedweight (g)
CDC Orion	3242	2953	52	43	114	4.1	434
Amit (B-90)	2955	2728	54	47	112	3.7	258
LSD (0.05)	286	266	1.2	1.7	4	0.5	7
Site-yr (n)	9	14	14	14	16	6	13

[1] 0 = no disease, 9 = whole plant severely blighted

Table 2. 1000 Seed weight: 2011-2013 Canadian Regional Trials

Year	NAME	Bow Island (AB)	Brooks (AB)	Moose Jaw (SK)	Elrose (SK)	MEAN
2011	Amit	282	254	229	284	262
	CDC Frontier	401	362	303	385	363
	CDC Orion (491-5)	481	436	381	474	443
	REPS	3	3	3	3	
	P value	<0.001	<0.001	<0.001	<0.001	
	LSD (0.05)	12.75	14.09	19.44	10.62	
	CV (%)	2.56	3.14	4.93	2.14	
2012	NAME	Bow Island (AB)	Brooks (AB)	Moose Jaw (SK)	Elrose (SK)	MEAN
	Amit	276	279	242	268	266
	CDC Frontier	376	384	347	350	364
	CDC Orion (491-5)	457	468	413	449	447
	REPS	3	3	3	3	
	P value	<0.001	<0.001	<0.001	<0.001	
	LSD (0.05)	12.03	19.50	29.27	15.62	
	CV (%)	2.54	4.00	6.45	3.36	
2013	NAME	Bow Island (AB)	Brooks (AB)	Moose Jaw (SK)	Elrose (SK)	MEAN
	Amit	259	246	237	243	246
	CDC Frontier	326	350	331	334	335
	CDC Orion (491-5)	467	470	422	427	446
	REPS	3	3	3	3	
	P value	<0.001	<0.001	<0.001	<0.001	
	LSD (0.05)	62.58	19.60	18.11	17.87	
	CV (%)	8.53	2.82	2.80	2.75	

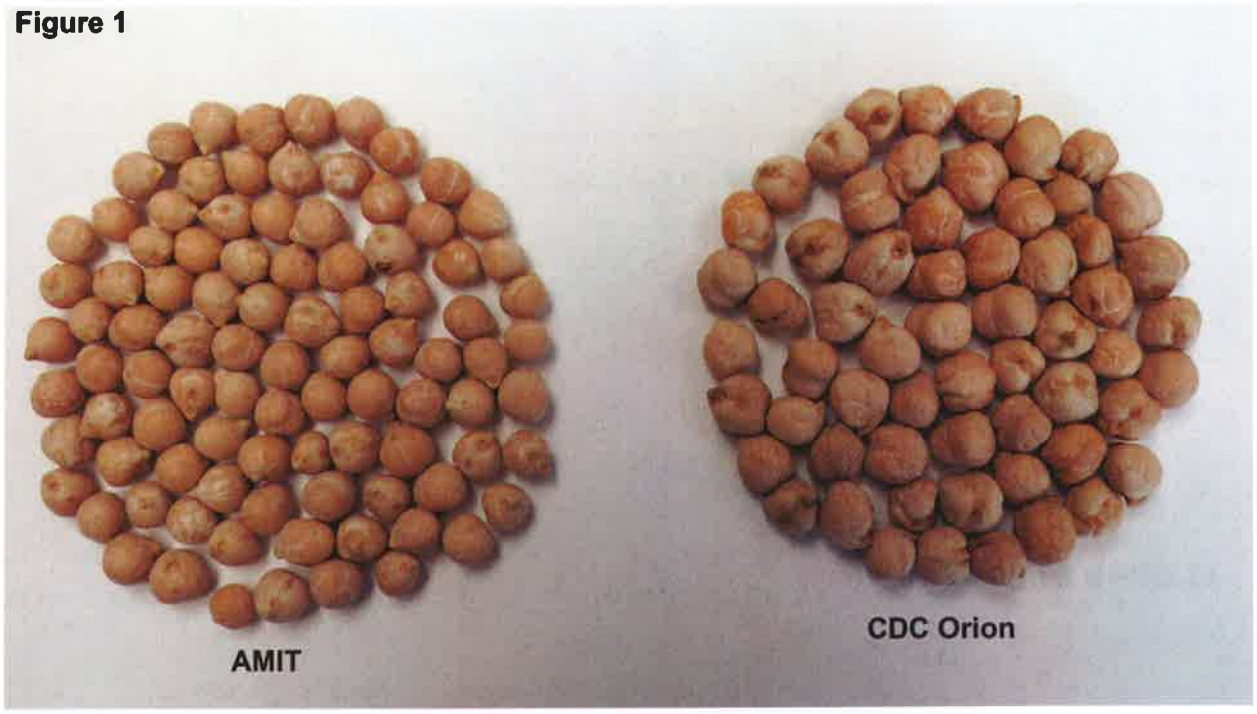
Year **Table 3. Days to Maturity (days): 2011-2013 Canadian Regional Trials**

2011 NAME	Elrose (SK)	Moose Jaw (SK)	Brooks (AB)	Bow Island (AB)	Mean
Amit	118.3	120.3	109.0	111.0	114.7
CDC Frontier	123.3	124.7	109.0	115.7	118.2
CDC Orion (491-5)	122.0	120.0	107.7	113.0	115.7
REPS	3.0	3.0	3.0	3.0	
P value	<0.01	<0.01	<0.01	<0.01	
LSD (0.05)	2.29	2.39	3.00	4.00	
CV (%)	1.4	1.4	2.0	2.6	

2012 NAME	Elrose (SK)	Milden (SK)	Brooks (AB)	Bow Island (AB)	Mean
Amit	136	150	124	100	128
CDC Frontier	141	153	130	98	131
CDC Orion (491-5)	137	154	123	99	128
REPS	3	3	3	3	
P value	<0.01	<0.01	<0.01	<0.01	
LSD (0.05)	1.59	2.48	7.00	2.71	
CV (%)	0.8	1.2	4.3	2.0	

2013 NAME	Elrose (SK)	Moose Jaw (SK)	Brooks (AB)	Bow Island (AB)	Mean
Amit	119	129	116	118	120
CDC Frontier	125	133	111	123	123
CDC Orion (491-5)	121	130	113	113	119
REPS	3	3	3	3	
P value	<0.01	<0.01	<0.01	<0.01	
LSD (0.05)	2.3	3.1	10	7.1	
CV (%)	1.0	1.2	4.5	3.1	

Figure 1



2014 MAY 6 AM 10:55

EXHIBIT C

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY
PLANT VARIETY PROTECTION OFFICE
BELTSVILLE, MD 20705

OBJECTIVE DESCRIPTION OF VARIETY
GENERAL FORM FOR ANY SPECIES

NAME OF APPLICANT (S)	TEMPORARY OR EXPERIMENTAL DESIGNATION	VARIETY NAME
Meridian Seeds	491-5	CDC Orion.

ADDRESS (Street and No. or RD No., City, State, Zip Code, and Country)
PO Box 224, 2-6th Ave N
Casselton, ND 58012

FOR OFFICIAL USE ONLY

PVPO NUMBER

This is a general form for use when a form for a specific genus and species is not available. Applications of this type are made in species in which few varieties, if any, are commonly known. For that reason, a form cannot be drafted because the span of the variation of most characteristics is not known. In this case, the varieties are described according to the classical Linnaean way. **Using a dictionary of botanical terms and this form**, describe the characteristics of the application variety on the left side of the form **and** describe the most similar comparison variety on the right side of the form. Be as specific as possible. Include photographic prints of the varieties.

1. QUALITATIVE TRAITS

Crop Kind (Common Name): Chickpea.
Genus and Species: Cicer arietinum
Location Where Developed: Saskatoon, Saskatchewan.

Name of Comparison: Amit
Source of Comparison:

Preferred Growing Conditions (light, moisture, soil type, pot/bedding/ground cover, etc.):
Semi-arid growing conditions in brown, dark brown soils w/ adequate heat moisture.

Growing Conditions:
Same.

Propagation Method (seed/tuber/cuttings/etc.; inbred/hybrid/open pollinated/etc.; annual/perennial/etc.):
Annual growth habit, self pollinating

Propagation Method:
Same.

Whole Plant Habit (herbaceous/woody; upright/prostrate; thorns; tendrils; etc.):
Herbaceous plant w/ upright growth.

Plant Habit:
Same.

Leaf Shape (simple/compound; arrangement on stem; whole leaf shape; leaf margin; leaf base; leaf apex; leaf attachment; leaf venation; pubescence; waxiness; glands; fragrance; etc.):
pinnate 'fern type' leaf ~~with~~ (S)

Leaf Shape:
Same.

Application Variety Data	Comparison Variety Data

201400327

1. QUALITATIVE TRAITS (continued)

Application Variety Data	Comparison Variety Data
Flowers (inflorescence type; floret shape; bud; sepals; petals; stigma; stamen; pollen; etc.) white flowers	Flowers: Same
Fruits (type; surface features; attachment; seeds; etc.) ram-head seed shape	Fruits and Seeds: round seed shape.

2. QUANTITATIVE TRAITS

		Trait	Average (Mean)	Standard Deviation	Sample Size	Trait	Average (Mean)	Standard Deviation	Sample Size
		Number of Chromosomes (1N)				Number of Chromosomes (1N)			
MATURITY	From Direct Seeding	Days from emergence to first flower				Days from emergence to first flower			
		Days from emergence to 50% of plants in flower				Days from emergence to 50% of plants in flower			
		Days from first flower to last flower				Days from first flower to last flower			
	From Trans-Planting	Days from transplant to first flower				Days from transplant to first flower			
		Days from transplant to 50% of plants in flower				Days from transplant to 50% of plants in flower			
		Days from first flower to last flower				Days from first flower to last flower			
	From Pack Trials	Days from emergence to first flower				Days from emergence to first flower			
		Days from emergence to 50% of plants in flower				Days from emergence to 50% of plants in flower			
		Days from first flower to last flower				Days from first flower to last flower			
PLANT		mm Plant Height at Maturity				mm Plant Height at Maturity			
		mm Plant Width (Spread) at Maturity				mm Plant Width (Spread) at Maturity			
		Number of Stems Arising from Base of Plant				Number of Stems Arising from Base of Plant			
		mm Main Stem Length				mm Main Stem Length			
		mm Main Stem Diameter at Mid-point				mm Main Stem Diameter at Mid-point			
		Number of Branches (arising from lower half of main stem)				Number of Branches (arising from lower half of main stem)			
		Branch Angle from Main Stem				Branch Angle from Main Stem			
		Application Variety Data				Comparison Variety Data			

2014 MAY 6 AM 10:55

2. QUANTITATIVE TRAITS (continued)

	Application Variety Data				Comparison Variety Data			
	Trait	Average (Mean)	Standard Deviation	Sample Size	Trait	Average (Mean)	Standard Deviation	Sample Size
LEAVES	Leaf Angle from Main Stem	___			Leaf Angle from Main Stem	___		
	mm Width of Leaf	___.__			mm Width of Leaf	___.__		
	mm Length of Leaf Including Petiole	___.__			mm Length of Leaf Including Petiole	___.__		
	mm Thickness of Leaf	___.__			mm Thickness of Leaf	___.__		
	mm Length of Petiole	___.__			mm Length of Petiole	___.__		
	mm Width of Leaflet	___.__			mm Width of Leaflet	___.__		
	mm Length of Leaflet	___.__			mm Length of Leaflet	___.__		
INFLORESCENCE	mm Inflorescence Height from Ground	___.__			mm Inflorescence Height from Ground	___.__		
	mm Inflorescence Width (Diameter)	___.__			mm Inflorescence Width (Diameter)	___.__		
	mm Depth of Head or Inflorescence	___.__			mm Depth of Head or Inflorescence	___.__		
	Number of Florets Per Inflorescence	___			Number of Florets Per Inflorescence	___		
	mm Length of Peduncle	___.__			mm Length of Peduncle	___.__		
INDIVIDUAL FLORET	Number of Sepals per Floret	__			Number of Sepals per Floret	__		
	Number of Petals per Floret	__			Number of Petals per Floret	__		
	Number of Anthers per Floret	__			Number of Anthers per Floret	__		
	Number of Stigmas per Floret	__			Number of Stigmas per Floret	__		
	mm Floret Diameter	__.__			mm Floret Diameter	__.__		
	mm Eye Diameter	__.__			mm Eye Diameter	__.__		
	mm Petal Length (ray flower if Compositae)	__.__			mm Petal Length (ray flower if Compositae)	__.__		
	mm Petal Width (ray flower if Compositae)	__.__			mm Petal Width (ray flower if Compositae)	__.__		
	mm Disk Flower Length (Compositae only)	__.__			mm Disk Flower Length (Compositae only)	__.__		
	mm Disk Flower Width (Compositae only)	__.__			mm Disk Flower Width (Compositae only)	__.__		
	mm Sepal Length	__.__			mm Sepal Length	__.__		
	mm Sepal Width	__.__			mm Sepal Width	__.__		
	Application Variety Data				Comparison Variety Data			

2. QUANTITATIVE TRAITS (continued)

	Application Variety Data				Comparison Variety Data			
	Trait	Average (Mean)	Standard Deviation	Sample Size	Trait	Average (Mean)	Standard Deviation	Sample Size
INDIVIDUAL FRUIT	mm Fruit Length	___.__			mm Fruit Length	___.__		
	mm Fruit Width	___.__			mm Fruit Width	___.__		
	mm Fruit Thickness	___.__			mm Fruit Thickness	___.__		
	gm Fruit Weight	____.__			gm Fruit Weight	____.__		
	mm Fruit Rind or Skin Thickness	__.__			mm Fruit Rind or Skin Thickness	__.__		
	mm Fruit Flesh Thickness	___.__			mm Fruit Flesh Thickness	___.__		
	Number of Locules (Cavities) per Fruit	__			Number of Locules (Cavities) per Fruit	__		
	mm Cavity Width	___.__			mm Cavity Width	___.__		
	mm Cavity Length	___.__			mm Cavity Length	___.__		
	Number of Seeds per Fruit	___			Number of Seeds per Fruit	___		
SEEDS	mg Weight per 1000 Seeds	___.__			mg Weight per 1000 Seeds	___.__		
	mm Seed Length	__.__			mm Seed Length	__.__		
	mm Seed Width	__.__			mm Seed Width	__.__		
	mm Seed Thickness	__.__			mm Seed Thickness	__.__		
OTHER								

3. PLANT COLORS

	Color Verbal Name	Color Chart Code	Name of Color Chart		Color Verbal Name	Color Chart Code	Name of Color Chart
Example	Light Blue	106C	RHS				
Hypocotyl Color				Hypocotyl Color			
Cotyledon Color				Cotyledon Color			
Brace Root Color				Brace Root Color			
Main Stem Color, Mature				Main Stem Color, Mature			
Leaf or Leaflet Color, Dorsal				Leaf or Leaflet Color, Dorsal			
Leaf or Leaflet Color, Ventral				Leaf or Leaflet Color, Ventral			
Leaf or Leaflet Venation Color				Leaf or Leaflet Venation Color			
Leaf Color, Other (describe location or placement)				Leaf Color, Other (describe location or placement)			
	Application Variety Data				Comparison Variety Data		

3. PLANT COLORS (continued)

Application Variety Data				Comparison Variety Data			
	Color Verbal Name	Color Chart Code	Name of Color Chart		Color Verbal Name	Color Chart Code	Name of Color Chart
Petiole Color				Petiole Color			
Tendril Color				Tendril Color			
Thorn Color				Thorn Color			
Bud (Unopened Flower) Color				Bud (Unopened Flower) Color			
Stigma Color				Stigma Color			
Style Color				Style Color			
Ovary (Immature Flower) Color				Ovary (Immature Flower) Color			
Pollen Color				Pollen Color			
Anther Color				Anther Color			
Filament Color				Filament Color			
Petal Color, Main				Petal Color, Main			
Petal Color, Edges (Picotee)				Petal Color, Edges (Picotee)			
Petal Color, Blotches				Petal Color, Blotches			
Petal Color, Streaks				Petal Color, Streaks			
Petal Color, Spots				Petal Color, Spots			
Petal Color, Veins				Petal Color, Veins			
Petal Color, Eye				Petal Color, Eye			
Petal Color, Throat				Petal Color, Throat			
Petal Color, Disk Flowers (Compositae only)				Petal Color, Disk Flowers (Compositae only)			
Floral Color, Other (describe location or placement)				Floral Color, Other (describe location or placement)			
Sepal Color				Sepal Color			
Mature Fruit Color, Skin				Mature Fruit Color, Skin			
Mature Fruit Color, Flesh				Mature Fruit Color, Flesh			
Fruit Color, Other (describe location or placement)				Fruit Color, Other (describe location or placement)			
Seed Coat Color				Seed Coat Color			
Seed Embryo Color				Seed Embryo Color			
Seed Structure Color, Other (describe location or placement)				Seed Structure Color, Other (describe location or placement)			
Application Variety Data				Comparison Variety Data			

Note: Common Color Charts: RHS = Royal Horticultural Society Colour Chart
Munsell = Munsell Book of Color
HCC = Horticultural Colour Chart
BCC = British Colour Council Dictionary of Colour Standards

4. DISEASE, INSECT AND ENVIRONMENT RESISTANCE
(Rate from 1 (most susceptible) to 9 (most resistant))

Application Variety Data	Comparison Variety Data
___ Powdery Mildew	___ Powdery Mildew
___ Other (Specify) _____	___ Other (Specify) _____
___ Aphids	___ Aphids
___ Other (Specify) _____	___ Other (Specify) _____
___ Heat	___ Heat
___ Cold	___ Cold
___ Lodging	___ Lodging
___ Wind	___ Wind
___ Other (Specify) _____	___ Other (Specify) _____

REFERENCES:

Bailey, L.H. 1971. *Manual of Cultivated Plants.* MacMillan. New York, N.Y.
Hay, R., P.M. Synge. 1991. *The Colour Dictionary of Garden Plants with House and Greenhouse Plants.* Bloomsbury Books, London.
Munsell Color Chart for Plant Tissues. Macbeth. P.O. Box 230 Newburgh, N.Y. 12551-0230
The Wise Garden Encyclopedia. 1990. HarperCollins Publishers. New York, N.Y.

COMMENTS (Attach photographic prints; Continue in Exhibit D)

INSTRUCTIONS

Please read instructions carefully before completing the attached form. The Objective Description Form is a necessary part of an application for Plant Variety Protection (Breeder's Rights) in the United States of America. It is designed to guide the applicant in describing a plant variety in detail so that comparisons with other varieties may be done in a meaningful way. It is in the applicant's best interest to describe the application variety as completely as possible to establish an adequate variety description.

The applicant's name and complete address should be at the top of the form. The country should be included since it is needed when mailing to some areas. The name of the variety is also entered at the top of the form. The Plant Variety Protection Office will assign a unique PVPO Number to each application and enter it below the variety name.

The "General Form for Any Species" was designed to allow the applicant the most freedom in describing the variety in a way that is most appropriate to the crop and the needs of the Plant Variety Protection Office. A good botanical dictionary or key should be used to provide the most specific terms to describe qualitative plant characteristics (SECTION 1) in the classical Linnaean (botanical) way. For example, when describing leaf margins, the applicant should use terms such as entire, crenate, dentate, incised, serrate, sinuate, spinose, or undulate. Similarly, flowers should be described as actinomorphic, zygomorphic, monoecious, dioecious, etc.

Choose one variety to use as a comparison variety throughout the Objective Description Form. **Describe the comparison variety in the right-hand column for all traits.** The variety that you choose should be the most similar one in terms of background and morphology. It should be the same one used in Exhibit B to describe the novelty of the application variety. The comparison variety should be grown in trials **with** the application variety for 2 – 3 location/years (environments) **in the region of best adaptability**. The varietal and environmental data collection should remain available for an additional 3 years to resolve any questions concerning comparisons or descriptions of varieties.

In general, measurements of quantitative traits (SECTION 2) should be taken **in one trial on 15-25 randomly selected plants** or plant parts to obtain averages and statistics that describe a typical planting of the variety. For each of the measurable traits, **report the mean, the number of plants measured, and the standard deviation**.

$$\textit{Standard Deviation} = \sqrt{\frac{\sum (X - \bar{X})^2}{(N-1)}}$$

The color descriptions (SECTION 3) must include the verbal color name and color codes from the "Munsell Color Chart" or other published color chart. An example of this is given on the top of the section. The color chart code is a more objective method for describing colors, however, verbal descriptions are used in seed catalogs and other literature references from which the databases are created. The verbal color continues to be necessary in distinguishing new varieties from all varieties of prior existence.

Test as many disease and insect reactions (SECTION 4) as possible before applying for protection, especially the most common diseases or insect pests for the crop.

CULTIVAR DESCRIPTION

CDC Orion kabuli chickpea

Bunyamin Taran[1], Manjula Bandara[2], Tom Warkentin[1], Sabine Banniza[1], and Albert Vandenberg[1]

[1]Crop Development Centre, College of Agriculture and Bioresources, University of Saskatchewan, 51 Campus Drive, Saskatoon, Saskatchewan, Canada S7N 5A8 (e-mail: bunyamin.taran@usask.ca); and [2]Crop Diversification Centre South, 301 Horticultural Station Rd East, Brooks, Alberta, Canada T1R 1E6.
Received 23 August 2010, accepted 28 October 2010.

Taran, B., Bandara, M., Warkentin, T., Banniza, S. and Vandenberg, A. 2011. **CDC Orion kabuli chickpea**. Can. J. Plant Sci. **91**: 355–356. CDC Orion, a kabuli chickpea (*Cicer arietinum* L.) cultivar, was released in 2010 by the Crop Development Centre, University of Saskatchewan for distribution to Select seed growers in western Canada through the Variety Release Program of the Saskatchewan Pulse Growers. CDC Orion has a pinnate leaf type, fair resistance to ascochyta blight (*Ascochyta rabiei* Pass. Lab.), late maturity, large seed size and high yield potential in the Brown and Dark Brown soil zones of the Canadian prairies.

Key words: Chickpea, *Cicer arietinum* L., cultivar description

Taran, B., Bandara, M., Warkentin, T., Banniza, S. et Vandenberg, A. 2011. **Le pois chiche kabuli CDC Orion**. Can. J. Plant Sci. **91**: 355–356. CDC Orion est un cultivar de pois chiche kabuli (*Cicer arietinum* L.) homologué en 2010 par le Crop Development Centre de l'Université de la Saskatchewan en vue de sa distribution aux producteurs de semences Select de l'Ouest canadien dans le cadre du Variety Release Program des Saskatchewan Pulse Growers. CDC Orion se caractérise par des feuilles pennées, une assez bonne résistance à la brûlure ascochytique (*Ascochyta rabiei* Pass. Lab.), une maturité tardive, de grosses graines et un rendement potentiel élevé pour la zone des sols bruns et brun foncé des Prairies canadiennes.

Mots clés: Pois chiche, *Cicer arietinum* L., description de cultivar

CDC Orion is a large-seeded kabuli chickpea (*Cicer arietinum* L.) cultivar developed by the Crop Development Centre, University of Saskatchewan, for production in the Brown and Dark Brown soil zones of western Canada. CDC Orion was issued a Certificate of Eligibility for Certification, Number 1252-2009, on 2010 Apr. 27 under the authority of the Canada Seeds Act by the Canadian Seed Growers' Association.

Pedigree and Breeding Method

CDC Orion kabuli chickpea was developed from the cross FLIP95-48C/93-120-63K made in the spring of 2000. The kabuli germplasm FLIP95-48C was developed by the International Center for Agricultural Research in the Dry Areas (ICARDA) in Aleppo, Syria. FLIP95-48C is medium-seeded kabuli with good resistance to ascochyta blight. Line 93-120-63K was developed by the Crop Development Centre, University of Saskatchewan. It was derived from a cross between Sultano and C188-620. Both Sultano and C188-620 are large kabuli with desirable seed characteristics and susceptible to ascochyta blight. Line 93-120-63K is a large-seeded kabuli well adapted to western Canadian environments. The F_2-derived family breeding method was used in the development of CDC Orion. F_2-derived F_3 families were evaluated in 2003 at Goodale Research Farm near Saskatoon in three-row, 1.5-m^2 microplots with selection based on improved ascochyta blight resistance, early maturity and visual appearance of grain seed including suitable seed size and shape. Unreplicated preliminary yield test of selected F_2-derived F_4 families was conducted at Goodale Research Farm near Saskatoon, SK, in 2004. Multi-location tests for the F_2-derived F_5 generation were done at Goodale Research Farm near Saskatoon and Kyle in SK and at Brooks in AB in 2005. The F_2-derived F_6 generation were evaluated at Goodale Research Farm near Saskatoon, Davidson, Elrose and Kyle in SK and at Brooks and Bow Island in AB in 2006. At the F_2-derived F_5 generation the entries were arranged in a 9×9 simple lattice with two replications; whereas at the F_2-derived F_6 generation the lines were arranged in a randomized complete block design with three replications. From the F_2-derived F_4 to the F_2-derived F_6, each entry was seeded in a three-row plot of 1×4 m. The line 491–5 was selected from these trials and tested in the Saskatchewan Regional Kabuli Chickpea Trials in 2007–2009, coordinated by the Saskatchewan Advisory Council on Grain Crops. The Regional Kabuli Chickpea Trials were conducted at ten locations (eight in Saskatchewan and

Table 1. Summary of agronomic and disease data for CDC Orion kabuli chickpea and the check cultivar Amit (B-90) from Saskatchewan and Alberta regional chickpea trials, 2007–2009

Cultivar	Yield (kg ha^{-1})		Days to flower	Height (cm)	Days to maturity	Ascochyta blight (0–9)[z]	1000-seedweight (g)
	Brown soil zone	Dark Brown soil zone					
CDC Orion	3242	2953	52	43	114	4.1	434
Amit (B-90)	2955	2728	54	47	112	3.7	258
LSD (0.05)	286	266	1.2	1.7	4	0.5	7
Site-yr (*n*)	9	14	14	14	16	6	13

[z]0 = no disease, 9 = whole plant severely blighted.

two in Alberta) per year. The Alberta sites (Brooks and Bow Island) and three (Hodgeville, Kyle and Swift Current) of the Saskatchewan sites are on the Brown soil zone. The rest of the Saskatchewan sites [Goodale Research Farm, SPG Research Farm (both near Saskatoon), Davidson, Elrose and Pasqua] are on the Dark Brown soil zone. The Regional Trials were arranged in a randomized complete block design with three replications per location. Plot size was 4.45 m^2 with four rows per plot and 30 cm between rows. The seeding rate was 54 seeds per m^2. At each generation data were collected on grain yield, days to flowering, days to maturity, ascochyta blight reaction, plant height at maturity, seed size and shape. Each measurement was on a plot basis. Line 491-5 was named CDC Orion in 2010. Breeder seed was produced in 2009 at Pasqua, SK, concurrent with the final year of regional testing, by bulking 18 F_6-derived F_8 pre-breeder lines.

Performance and Adaptation

CDC Orion had higher yield ($P < 0.05$) than Amit (formerly known as B-90) in the Brown soil zone (Table 1). In the Dark Brown soil zone, however, CDC Orion yielded similar to Amit. CDC Orion flowered two days earlier ($P < 0.05$) than Amit, but required the same number of days to maturity. Plants of CDC Orion were 4 cm shorter ($P < 0.05$) than plants of Amit. CDC Orion had much higher seed weight ($P < 0.05$) compared to Amit. CDC Orion had similar ascochyta disease rating as Amit on a 0 – scale 9 (Singh and Reddy 1993) under field conditions.

Other Characteristics

CDC Orion has pinnate leaves, white flowers, yellow cotyledons, and beige seed colour similar to Amit. CDC Orion has ram-head seed shape typical for kabuli type as opposed to round shape in Amit. The seed type of CDC Orion is considered visually acceptable in kabuli chickpea markets.

Maintenance and Distribution of Pedigreed Seed

Breeder seed of CDC Orion is maintained by the Crop Development Centre, University of Saskatchewan, 51 Campus Drive, Saskatoon, Saskatchewan, Canada, S7N 5A8. Distribution rights for CDC Orion are held by the Saskatchewan Pulse Growers, 104-411 Downey Road, Saskatoon, Saskatchewan, Canada S7N 4L8. Breeder seed of CDC Orion was first distributed in 2010 to Saskatchewan and Alberta seed growers qualified as Select growers by the Canadian Seed Growers' Association.

Appreciation is expressed to the Pulse Crop Breeding Staff of the Crop Development Centre, University of Saskatchewan, for their technical assistance in the development of CDC Orion, to staff at the Kernen Crop Research Farm of the Crop Development Centre for breeder seed maintenance, and to all cooperating growers. Financial support of the Alberta Agricultural Research Institute, the Saskatchewan Pulse Growers, Alberta Pulse Growers' Commission and Saskatchewan Ministry of Agriculture is gratefully acknowledged.

Singh, K. B. and Reddy, M. V. 1993. Resistance to six races of *Ascochyta rabiei* in the world germplasm collection of chickpea. Crop Sci. **33**: 186–189.

U.S. DEPARTMENT OF AGRICULTURE
AGRICULTURAL MARKETING SERVICE
SCIENCE AND TECHNOLOGY - PLANT VARIETY PROTECTION OFFICE
APPLICATION FOR PLANT VARIETY PROTECTION CERTIFICATE

EXHIBIT E - STATEMENT OF THE BASIS OF OWNERSHIP

FOR OFFICIAL USE ONLY
PVPO NUMBER

1 Name of Owner	2. Temporary Designation or Experimental Name	3. Variety Name
Crop Development Center	491-5	CDC Orion

4. Does the applicant own all rights to the variety? Mark an "X" in the appropriate block. **If no, please explain.** ☐ **YES** ☑ **NO**

As the US licensee, Meridian Seeds is applying for PVP on the owner's behalf (i.e. Crop Development Center).

5. Is the applicant a U.S. national or a U.S. based entity? **If no, give name of country.** ☑ **YES** ☐ **NO**

6. Is the applicant the original owner? ☐ **YES** ☑ **NO** **If no, please answer one of the following:**

a. If the original rights to variety were owned by individual(s), is (are) the original owner(s) a U.S. National(s)?
☐ **YES** ☐ **NO** **If no, give name of country**

b. If the original rights to variety were owned by a company(ies), is (are) the original owner(s) a U.S. based company?
☐ **YES** ☑ **NO** **If no, give name of country** CANADA

7. Additional explanation on ownership *(Trace ownership from original breeder to current owner. Use the reverse for extra space if needed)*:

PLEASE NOTE:

Plant variety protection can only be afforded to the owners (not licensees) who meet the following criteria:

1. If the rights to the variety are owned by the original breeder, that person must be a U.S. national, national of a UPOV member country, or national of a country which affords similar protection to nationals of the U.S. for the same genus and species.
2. If the rights to the variety are owned by the company which employed the original breeder(s), the company must be U.S. based, owned by nationals of a UPOV member country, or owned by nationals of a country which affords similar protection to nationals of the U.S. for the same genus and species.
3. If the applicant is an owner who is not the original owner, both the original owner and the applicant must meet one of the above criteria.

The original breeder/owner may be the individual or company who directed the final breeding. See Section 41(a)(2) of the Plant Variety Protection Act for definitions.