'DoubleGreen Delight', a Cream-type Southernpea with an Enhanced Persistent Green Seed Phenotype

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'DoubleGreen Delight' is a new southernpea [*Vigna unguiculata* (L.) Walp.] released 1 Aug. 2001 by the U.S. Dept. of Agriculture, Agricultural Research Service. 'DoubleGreen Delight', a cream-type cultivar, is the first southernpea to be released that has a persistent green seed phenotype conditioned by both the *green cotyledon* gene and the *green testa* (seedcoat) gene. Dry 'DoubleGreen Delight' seeds have a richer and more uniform green color than dry seeds of green cotyledon phenotype cultivars, and the seeds are much less susceptible to color loss due to sun blanching when harvest is delayed. 'DoubleGreen Delight' was developed for use by the frozen food and dry-pack bean industries and home gardeners.

Origin

'DoubleGreen Delight' was developed over an 11-year period using a pedigree breeding procedure that included a single cross and repeated single-plant selections (Fig. 1). The original cross involved 'Bettergreen', a cream-type pea with green-colored cotyledons, and 'Freezeegreen', a cream-type pea with green-colored testa (Chambliss, 1979; Fery et al., 1993). Intense selection pressure was applied in the F_2 through F_9 generations for combined green cotyledon and green testa phenotypes and superior horticultural characteristics. 'DoubleGreen Delight' originated as a bulk of an F_9 line grown in 1995.

Description

'DoubleGreen Delight' has a high, bushy plant habit (Table 1). 'DoubleGreen Delight' produces dry pods at Charleston, S.C., in 65 to 77 d, usually about 2 to 3 d later than 'Bettergreen' (Table 2). Flower color is white. There is no purple pigmentation on the stems, branches, petioles, or peduncles. 'DoubleGreen Delight' has a dull, dark green foliage color. Pod set is concentrated, and the pods are borne at foliage level in a scattered fashion. Fresh pods are attached to the peduncles at about a

90° angle; dry pods are attached in a pendant fashion. Each peduncle typically produces two pods.

A typical 'DoubleGreen Delight' pod is slightly curved, 16 cm long, and contains 16 peas (Fig. 2). Pod color is light green when immature, green with a heavy purple shading and a purple top vein when ready for mature-green harvest, and a dark straw color when dry. The ovate to reniform shape of dry 'DoubleGreen Delight' peas is similar to the shape of dry 'Bettergreen' peas. 'DoubleGreen Delight' peas have a smooth seed coat and are somewhat smaller than 'Bettergreen' peas (weight per 100 dry peas: 'DoubleGreen Delight', 9.1 g; 'Bettergreen', 9.7 g).

The results of 5 years (1996–2000) of replicated field testing at Charleston, S.C., indicate that the yield potential of 'DoubleGreen Delight' is similar to that of 'Bettergreen' (the 'DoubleGreen Delight' yield of dry peas over the entire period of replicated testing was 103% of the yield of 'Bettergreen') (Table 2). 'DoubleGreen Delight' was tested as US-880 throughout the southern United States as an observational entry in the 1997 Regional Southernpea Cooperative Trials and as a replicated entry in the 1998 and 1999 trials. Dur-

ing the three years of testing in these trials, 'DoubleGreen Delight' out-yielded the cream-type control ('Early Acre') in 14 of 27 tests.

'DoubleGreen Delight' is homozygous for the *gc* gene that conditions the green cotyledon trait and the *gt* gene that conditions the green testa trait (Chambliss, 1974; Fery and Dukes, 1994). The primary color of field-grown 'DoubleGreen Delight' peas harvested at the dry-stage of maturity is a rich olive green [Munsell (1990) color rating: 2.5 GY 6/4]. Dry 'DoubleGreen Delight' peas imbibed to restore fresh-harvest seed size and blanched in boiling water for 3 min exhibit a uniform green color [Munsell (1990) color rating: 2.5 GY 7/8]. A major attribute of the new cultivar is the persistence of the green color of unharvested dry peas long after optimal harvest time. Unlike the green cotyledon phenotype parent 'Bettergreen', which growers must harvest soon after pod drying to ensure a high percentage of green-colored peas, growers of 'DoubleGreen Delight' have a considerably greater harvest window.

'DoubleGreen Delight' is recommended for use by the frozen food and dry-pack bean industries and home gardeners. The frozen food industry can imbibe the dry peas in water and use the resulting raw product to produce a pack that closely approximates the color and appearance of fresh peas. The dry-pack bean industry can use the dry peas to produce colorful dry-packs of field peas and mixed beans. Home gardeners can harvest the peas fresh for immediate consumption or storage in home freezers.

Availability

Breeder's seed of 'DoubleGreen Delight' has been released to seed producers. Small samples of 'DoubleGreen Delight' breeder's seed are available from the author for distribution to interested research personnel. Genetic

Fig. 1. Pedigree of 'DoubleGreen Delight' southernpea.

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Table 1. Plant height, plant width, peduncle length, pod length, and number of peas per pod for 'DoubleGreen Delight' and 'Bettergreen' southernpeas, Charleston, S.C., 2000.^z

Cultivar	Plant		Peduncle	Pod	Peas/
	Height (cm)	Width (cm)	length (cm)	length (cm)	pod (no.)
DoubleGreen Delight	43 a ^y	84 a	29 a	16.4 a	16.1 a
Bettergreen	43 a	83 a	29 a	16.3 a	15.2 a

^zTrial planted on 14 June 2000. The experimental design was a randomized complete block with 10 replications. Each plot was space-planted, 18 hills per plot, three seeds per hill, 30 cm between hills, and 102 cm between rows.

^yMean separation within columns by Student–Newman–Keuls multiple range test, $P \leq 0.05$.

Table 2. Number of days to harvest, weight per 100 dry peas, and dry pea yield for 'DoubleGreen Delight' and 'Bettergreen' cream-type southernpeas grown in spring trials, Charleston, S.C., 1996–2000.^z

Cultivar	Days to harvest (no.)	Wt/100 dry peas (g)	Dry pea yield (kg·ha ⁻¹)
<i>Trial I – 1996</i>			
DoubleGreen Delight	71.2 a ^y	8.0 a	1211 a
Bettergreen	69.4 a	8.9 a	1051 b
<i>Trial II – 1997</i>			
DoubleGreen Delight	77.2 a	---	882 a
Bettergreen	74.1 a	---	740 a
<i>Trial III – 1998</i>			
DoubleGreen Delight	70.4 a	9.6 b	636 a
Bettergreen	68.2 b	10.7 a	537 a
<i>Trial IV – 1999</i>			
DoubleGreen Delight	65.0 a	8.0 a	772 b
Bettergreen	62.6 b	8.0 a	952 a
<i>Trial V – 2000</i>			
DoubleGreen Delight	71.1 a	10.2 b	901 a
Bettergreen	67.8 b	10.8 a	927 a
<i>Combined analysis of all trials^c</i>			
DoubleGreen Delight	71.0 a ^{ns}	9.1 b ^{**}	842 a [*]
Bettergreen	68.3 b	9.7 a	815 a

^zSpring 1996, 1997, 1998, 1999, and 2000 trials planted on 23 May, 2 June, 27 May, 2 June, and 14 June, respectively. The experimental design of each trial was a randomized complete block with 5 (1996) or 10 (1997–2000) replications. Results of combined analyses of all trials indicated significant cultivar × trial interactions for weight per 100 dry peas and dry pea yield. Consequently, results are presented for both single trial and combined analyses to aid interpretation.

^yMean separation within columns and trials by Student–Newman–Keuls multiple range test, $P \leq 0.05$.

^{*}The combined analysis for weight per 100 dry peas does not include the 1997 data set (Trial II).

^{ns, *, **}Nonsignificant or significant interaction between cultivar and trial at $P \leq 0.05$ or $P \leq 0.01$, respectively.

material of this release will be deposited in the National Plant Germplasm System, where it will be available for research purposes, including the development and commercialization of new cultivars. It is requested that appropriate recognition of source be given when this germplasm contributes to research or development of a new breeding line or cultivar.

Literature Cited

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Fig. 2. Fresh pods and peas of 'DoubleGreen Delight' southernpea.