Capsicum annuum L. Lil' Pumpkin™ and Pepper Jack™

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Many vegetables have ornamental as well as food value. Widely grown vegetable crops such as pepper (*Capsicum annuum* L.) were prized more as ornamentals than as a food source when introduced to Europe in the 15th century (Stommel and Bosland, 2006). The tomato (*S. lycopersicum* L.), once believed to be poisonous when first introduced to Europe and North America, was long used as an ornamental plant before widespread adoption for culinary use (Rick, 1976). Popular garden ornamentals have been developed from kales (*Brassica oleracea* L. 'Nagoya'), lettuces (*Lactuca sativa* L. 'Merlot'), sweetpotatoes [*Ipomoea batatas* (L.) Lam. 'Blackie'], eggplants (*Solanum melongena* L. 'Bambino Baby Eggplant'), and peppers (*C. annuum* 'Black Pearl'). Novel-colored vegetables developed primarily for culinary use can be grown for their vibrant color and form as well as taste. 'Bright Lights' swiss chard (*Beta vulgaris* var. *cicla* L.), for example, displays stems colored yellow, orange, red, purple, green, and white. Others include orange watermelons [*Citrullus lanatus* (Thunb.) Matsum. & Nakai 'New Queen'], purple snap beans (*Phaseolus vulgaris* L. 'Royal Burgundy'), purple asparagus (*Asparagus officinalis* L. 'Purple Passion'), and sweet as well as showy peppers (*C. annuum* 'Tangerine Dream').

The use of vegetables in the ornamental garden is not a new idea. Potagers, or decorative kitchen gardens, were an important element of the elaborate gardens in Versailles

during the 1600s (Pennington, 2002). The use of vegetables as focal elements in the garden all but disappeared between the 17th and 19th centuries. Today, aided by the availability of new and novel cultivars, vegetable gardening is again popular, and traditional vegetable gardeners and landscape architects are drawing on the examples set by their 17th century predecessors to beautify the vegetable garden. Curators of botanic gardens and landscape contractors have adopted ornamental vegetables as specimen plants, border plants, and in mass plantings. Greenhouse growers have added ornamental vegetables to their annual production cycle because they are easy to produce and are extremely profitable in comparison with their culinary counterparts (Gibson et al., 1999).

There is a wealth of genetic diversity in *C. annuum* for fruit and foliar attributes and plant habit (Stommel and Bosland, 2006). Variation for fruit and leaf shape, size and color, and varying hues of green to purple and variegated foliar pigmentation has stimulated the popularity of this species in the ornamental garden. The colorful fruit and varied foliage color that typify ornamental peppers provide a vibrant summer garden display that rivals chrysanthemum (*Dendranthema grandiflora* Tzvelev.) for brilliant fall color.

The Agricultural Research Service of the U.S. Department of Agriculture announces the release of two new pepper cultivars, '05C37-3' (trademarked as Lil' Pumpkin™) and '05C69-12' (trademarked as Pepper Jack™). These new pepper cultivars are intended for ornamental applications. Their unique foliage and fruit color afford summer as well as fall interest. Lil' Pumpkin's™ black foliage and orange pumpkin-like fruit and Pepper Jack's™ greenish black foliage and mix of small orange and black conical fruit provide rich color contrasts to the summer garden and are particularly well-suited for the fall Halloween season. These new cultivars are suitable for bedding plant as well as container plant production.

Lil' Pumpkin™. Lil' Pumpkin™ is a clonally propagated F₄ selection derived from initial crosses between the USDA pepper germplasm line 90C44 (Stommel and Griesbach, 1993) and a unique purple foliage selection, 94C27, identified from a segregating population of the variegated heirloom pepper 'Royal Black' (Fig. 1A). Line 90C44 is a true-breeding genotype with compact upright growth habit, black foliage, and erect clusters of tabasco-type fruit that mature from black to red. Line 94C27 produced solitary pendant tabasco-type pods that matured from purple to red. Pumpkin-shaped fruit were derived from an initial cross between the sweet squash-type pepper 'Tennessee Cheese' and the sweet bell pepper 'Summer Sweet 860'.

Early generation selection focused on development of parental lines with small fasciated fruit and purple to black foliage, respectively, followed by integration of these fruit and foliage characteristics into a single genotype in succeeding generations. Recurrent selection for high intensity of foliar anthocyanin pigmentation resulted in black foliage. Selection was also practiced for compact yet vigorous growth habit that would be suitable for pot culture as well as bedding plant conditions. Routine virus indexing is practiced to maintain virus-free plant stocks.

Lil' Pumpkin™ was trialed under field conditions as both a bedding and container plant in Dearing, GA (heat zone 9) (American Horticultural Society, 1997) and Beltsville, MD (heat zone 7). Growers noted Lil' Pumpkin's™ unique combination of small pumpkin-like orange fruit and contrasting black foliage (Fig. 2A–B). Lil' Pumpkin™ is a release made available from a cooperative research and development agreement with McCorkle Nurseries (Dearing, GA) to develop new pepper germplasm with novel fruit, foliage, and plant growth habit.

Pepper Jack™. Pepper Jack™ is a clonally propagated F₃ selection originating from intercrosses of the sweet bell peppers 'Summer Sweet 860' and 'Ariane' and the squash-type pepper 'Tennessee Cheese'. The pedigree is complex (Fig. 1B). Similar to Lil' Pumpkin™, anthocyanin-pigmented foliage is derived from initial crosses between the purple foliage 90C44 USDA release and the 94C27 purple foliage segregant identified in a population of the open-pollinated heirloom 'Royal Black'. Small tabasco-type fruit and black immature fruit color were derived from 90C44 and 94C27. Orange mature fruit color was introgressed from the sweet bell pepper 'Ariane'. Prostrate growth habit was introduced by intercrossing with the heirloom 'Christmas Cheer'.

The F₃ selection is descended from an intercross of parental lines exhibiting: 1) prostrate growth habit with green foliage and orange tabasco-type fruit, and 2) upright growth habit, black foliage, and immature black tabasco-type fruit. Later generations

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Fig. 1. Pedigree for (A) Lil' Pumpkin^{TM} and (B) Pepper Jack^{TM}.

focused on selection of plants with prostrate and indeterminate growth habit suitable for bedding plant production as well as pot culture. Routine virus indexing is practiced to maintain virus-free plant stocks.

Pepper Jack^{TM} was trialed under field conditions as both a bedding and container plant in Dearing, GA, and Beltsville, MD. In these trials, growers noted the plant's striking display of upright-oriented immature black and contrasting mature orange-pigmented fruit and complimentary greenish black foliage (Fig. 2C–D). Pepper Jack^{TM} is made available from a cooperative research and development agreement with McCorkle Nurseries (Dearing, GA).

Description

Lil' Pumpkin^{TM} and Pepper Jack^{TM} are diploid ($2n = 2x = 24$) herbaceous annuals. These cultivars are stable and are reproduced true to type when vegetatively propagated. Lil' Pumpkin^{TM} and Pepper Jack^{TM} have been asexually propagated over successive generations since 2005 by vegetative shoot cuttings at Beltsville, MD, and Dearing, GA. Off-types of Lil' Pumpkin^{TM} and Pepper Jack^{TM} have not been observed. Lil' Pumpkin^{TM} and Pepper Jack^{TM} have performed uniformly in multiple trials during later stages of cultivar development. Data reported here were collected from 2006 field trials in

Beltsville, MD, and describe relevant ornamental attributes. Field plots were established in late May 2006 from greenhouse-grown transplants and data were collected in Sept. 2006. Comparative data on the recent ornamental pepper releases 'Black Pearl' (Stommel and Griesbach, 2005) and 'Ember' (Syngenta Seeds, Downers Grove, IL) are provided for Lil' Pumpkin^{TM} and Pepper Jack^{TM}, respectively (Table 1).

Lil' Pumpkin^{TM}. Lil' Pumpkin^{TM} plants display a compact upright and indeterminate habit. Plants produce greater than three basal shoots that grow upright forming a compact growth habit. Plants average 88 cm in diameter (range, 87 to 91 cm) and 50 cm in height (range, 47 to 52 cm) resulting in a height to diameter ratio of 0.57. 'Black Pearl' plants average 45 cm in diameter (range, 44 to 47 cm) and 31 cm in height (range, 29 to 34 cm; height/diameter, 0.70).

Leaves and stems of Lil' Pumpkin^{TM} are glabrous and glossy. Roots are fibrous. Leaves are simple, entire, symmetrical, and lanceolate with an apiculate tip. Mature leaves average 5.5 cm in length (range, 5.0 to 6.0 cm) and 2.5 cm in width (range, 2.5 to 2.6 cm). Petiole length averages 4.3 cm (range, 3.8 to 5.0 cm). Adaxial leaf surface is black (202A) (Royal Horticultural Society, 1966). 'Black Pearl' has larger but similar shaped and colored leaves. 'Black Pearl' leaves average 8.2 cm in length (range, 7.4 to 11.0 cm) and 3.5 cm in width (range, 2.9 to 4.5 cm).

Flowers are self-compatible, hermaphroditic, pentamerous, and hypogynous. The purple flowers (81A) average 2.1 cm in diameter (range, 2.0 to 2.2 cm) and have purple filaments, anthers, and styles. Flowers of 'Black Pearl' are similar. Fruit shape of Lil' Pumpkin^{TM} is unique. Lil' Pumpkin^{TM} has pumpkin-shaped or fasciated (ridged) fruit that are black (202A) when immature and mature to orange (25A). Lil' Pumpkin^{TM} fruit are solitary and are borne upright. Pedicels average 1.6 cm (range, 1.4 to 1.8 cm). Fruit average 2.4 cm in diameter (range, 2.4 to 2.5 cm) at the midpoint, 1.7 cm in diameter (range, 1.6 to 1.7 cm) at the calyx, and 1.7 cm in length (range, 1.5 to 2.0 cm). Fruit contain three locules. Average fruit pericarp thickness is 1.7 mm (range, 1.0 to 2.0 mm). Fruit of 'Black Pearl' are very different in shape and mature fruit color and are borne in clusters of five to seven fruit per cluster. 'Black Pearl' fruit are round and average 1.6 cm in diameter (range, 1.3 to 1.7 cm). Immature fruit of 'Black Pearl' are black (202A) and mature to red (46A).

Lil' Pumpkin^{TM} produces a flush of full-sized black fruit in ≈ 60 d from transplanting that mature to orange in ≈ 75 d under good growing conditions (see "Culture" section). Additional fruit will continue to develop and ripen until frost in nonprotected conditions, providing season-long interest. Taste evaluations indicated that fruit are very hot (i.e., pungent). Because Lil' Pumpkin^{TM}

Fig. 2. Whole plant and closeup images of Lil' Pumpkin™ and Pepper Jack™: (A) single plant of Lil' Pumpkin™; (B) closeup of Lil' Pumpkin™ highlighting immature black fruit, mature orange fruit, and black foliage; (C) single plant of Pepper Jack™; and (D) closeup of Pepper Jack™ highlighting immature black fruit, mature orange fruit, and greenish black foliage.

Table 1. Comparative data for Lil' Pumpkin™, Pepper Jack™, 'Black Pearl', and 'Ember' ornamental pepper plant habit and foliar and fruit morphology.^z

Attribute		Cultivar			
		Lil' Pumpkin™	Pepper Jack™	Black Pearl	Ember
Plant	Height (cm)	50 ± 2 ^y	47 ± 1	31 ± 1	22 ± 2
	Diameter (cm)	88 ± 1	84 ± 2	45 ± 1	36 ± 1
	Height/diameter	0.57 ± 0.02	0.55 ± 0.01	0.70 ± 0.02	0.60 ± 0.02
Leaf	Length (cm)	5.5 ± 0.3	4.3 ± 0.2	8.2 ± 1.3	4.5 ± 0.2
	Width (cm)	2.5 ± 0.1	2.1 ± 0.1	3.5 ± 0.5	2.2 ± 0.1
	Length/width	2.2 ± 0.1	2.1 ± 0.1	2.4 ± 0.1	2.01 ± 0.06
	Color, RHS #	Black, 202A	Green, 132C	Black, 202A	Green, 132C
Fruit	Length	1.7 ± 0.2	3.4 ± 0.1	1.6 ± 0.1	3.0 ± 0.02
	Diameter at calyx (cm)	1.7 ± 0.1	1.3 ± 0.1	0.9 ± 0.1	0.8 ± 0.1
	Diameter at midpoint (cm)	2.4 ± 0.1	1.2 ± 0.1	1.6 ± 0.1	0.77 ± 0.03
	Fruit/cluster	1	1	5.8 ± 0.4	3.6 ± 0.4
	Color, RHS # immature	Black, 202A	Black, 202A	Black, 202A	Purple, 79A
	Mature	Red, 25A	Red, 25A	Red, 46A	Red, 34A

^zData represent up to eight observations collected from 2006 trials in Beltsville, MD.

^yMean ± SE.

RHS = Royal Horticultural Society.

is intended for ornamental applications, Scoville pungency units were not determined. Although edible, ornamental peppers are typically pungent and are grown for their unusual pod shapes or for their dense foliage and colorful fruits (Bosland and Votava, 2000; Stommel and Bosland, 2006).

Lil' Pumpkin™ was trouble-free for disease and insect pests under field conditions in Maryland and Georgia. Controlled testing was not conducted. Under greenhouse conditions, green peach aphid, *Myzus persicae* (Sulzer), and western flower thrips, *Frankliniella occidentalis* (Pergande), colonization necessitated control measures.

Pepper Jack™. Plants produce greater than three basal shoots that grow upright forming a compact growth habit. Growth is

indeterminate. Plants average 84 cm in diameter (range, 82 to 88 cm) and 47 cm in height (range, 45 to 49 cm) with a height to diameter ratio of 0.70. 'Ember' plants have a smaller height to diameter ratio (0.60) and average 36 cm in diameter (range, 34 to 39 cm) and 22 cm in height (range, 19 to 24 cm).

Leaves and stems of Pepper Jack™ are glabrous and glossy. Roots are fibrous. Leaves are simple, entire, symmetrical, and lanceolate with an apiculate tip. Mature leaves average 4.3 cm in length (range, 4.0 to 4.5 cm) and 2.1 cm in width (range, 2.0 to 2.2 cm). Petiole length averages 2.5 cm (range, 2.5 to 2.6 cm). Adaxial leaf surface is green (132C) mottled with black (202A) highlights. 'Ember' has similar shaped and colored leaves. 'Ember' leaves average 4.5

cm in length (range, 4.1 to 4.7 cm) and 2.2 cm in width (range, 2.1 to 2.4 cm).

Pepper Jack™ flowers are self-compatible, hermaphroditic, pentamerous, and hypogynous. The purple flowers (81A) average 2.7 cm in diameter (range, 2.5 to 2.9 cm) and have purple filaments, anthers, and styles. Flowers of 'Ember' are similar. Pepper Jack™ has a unique contrasting mixed display on the same aged plant of immature black (202A) and mature orange (25A) fruit. Fruit mature to orange in ≈75 d. A mixed fruit set ensures an attractive display into the fall season. Fruit are tabasco-shaped, solitary, and are borne upright on 1.5-cm pedicels. Fruit average 3.4 cm in length (range, 3.2 to 3.7 cm), 1.3 cm in width at the calyx (range, 1.2 to 1.4 cm), and 1.2 cm in width at the midpoint (range, 1.2 to 1.3 cm). Pepper Jack™ fruit contain two to three locules. Average pericarp thickness is 1.0 mm. Fruit of 'Ember' are similar in shape to Pepper Jack™ fruit but have different immature and mature fruit color. 'Ember' fruit are tabasco-shaped and are borne in clusters of three to five fruit per cluster. 'Ember' fruit average 3.0 cm in length (range, 2.8 to 3.4 cm), 0.8 cm in width at the calyx (range, 0.7 to 0.9 cm), and 0.8 cm in width at the midpoint (range, 0.7 to 0.8 cm). Immature 'Ember' fruit color is purple (79A) and mature fruit color is red (34A). Fruit of Pepper Jack™ were described as very hot (i.e., pungent) in routine taste evaluations. Scoville pungency units were not determined because Pepper Jack™ is intended for ornamental applications.

Similar to Lil' Pumpkin™, disease and insect problems were not evident during field trials of Pepper Jack™ in Maryland and Georgia. Green peach aphid and western flower thrips colonization in the greenhouse necessitated routine control measures.

Culture

Lil' Pumpkin™ and Pepper Jack™ may be used as bedding plants where their compact (Lil' Pumpkin™) or spreading (Pepper Jack™) growth habit, greenish black to black foliage, and brightly colored erect fruit provide an attractive ornamental display. Outdoor container trial evaluations suggest that these cultivars are equally well suited for container culture under high light conditions. Previous tests with related black foliage pepper genotypes in controlled environments indicate that intensity of black foliar pigmentation is reduced under short-day, low-light conditions (Lightbourn et al., 2007; Stommel and Griesbach, 2005). Lil' Pumpkin™ and Pepper Jack™ do not require pinching or application of growth regulators to maintain their growth habit.

Similar to peppers grown for culinary use, these cultivars are warm-season crops requiring minimum daytime temperatures of 18 to 21 °C (Love, 1987). The base growing degree day temperature for pepper is 18 °C. Optimal growth is achieved at higher temperatures up to 32 °C. Plants grow poorly in the 5 to 15 °C

range and are frost-susceptible (Bosland, 1999). Plants are best established from transplants produced in a warm greenhouse. Plants prefer a well-drained loam or sandy loam soil with some organic matter and a pH range of 6.2 to 6.8. Satisfactory drainage reduces the incidence of infection by soilborne diseases such as phytophthora root rot.

Availability

Lil' Pumpkin^{TM} and Pepper Jack^{TM} are available from McCorkle Nurseries, 4904 Luckey's Bridge Road, Dearing, GA 30808. Plant patent applications have been submitted for '05C37-3' (Lil' Pumpkin^{TM}) and '05C69-12' (Pepper Jack^{TM}). It is requested that appropriate recognition be made if this germplasm contributes to the development of a new breeding line or cultivar.

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