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Capsicum annuum L. 'Purple Rain', a New Ornamental Pepper

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Ornamental pepper plants have become popular in garden centers and landscapes for their use as an annual bedding plant or a highlight in container plantings (Stommel and Bosland 2007). A proliferation of new cultivars offers a range of plant sizes, foliage colors, and fruit shapes and colors to fit a variety of garden applications and styles (Mitchell 2024; Stommel et al. 2018). Although there is variation in heat and cold tolerance among cultivars (Gajanayake et al. 2011), ornamental peppers are considered summer annuals that perform well in full sun across a range of hardiness zones (Gilman et al. 2023). While most cultivars are not bred specifically for flavor, the fruit are edible, so ornamental peppers can be used for culinary purposes as well.

The Agricultural Research Service (ARS) has a long history of breeding improved solanaceous crops, including tomatoes and peppers for culinary processing and fresh market. Novel collaboration between ARS vegetable breeders and floriculture geneticists led to the first ARS ornamental pepper releases in 1993 (Stommel and Griesbach 1993), followed by the first commercially successful black foliage ornamental pepper, 'Black Pearl' (Stommel and Griesbach 2005). Other unique cultivars developed through this collaboration combined the diversity in *Capsicum* for plant habit and foliage and fruit morphology and color leading to the release of 'Tangerine Dream' (Stommel and Griesbach 2004), 'Lil Pumpkin' and 'Pepper Jack' (Stommel and Griesbach 2008a), 'Midnight Creeper' and 'Solar Eclipse' (Stommel and Griesbach 2008b), and the 'Christmas Lights' series (Stommel et al. 2018) for ornamental or dual-purpose ornamental/culinary applications. Here, we describe a new ornamental pepper, 'Purple Rain', a true-breeding small-statured ornamental pepper with unique purple/black variegated foliage with green and white highlights.

Origin and Development

'Purple Rain' is a F_{14} generation selection with a complex pedigree originating from initial crosses between the US Department of Agriculture (USDA) germplasm release 90C44 and the heirloom cultivars Christmas Cheer and Royal Black (Fig. 1). It is derived from breeding lineages that gave rise to other USDA ornamental peppers, including 'Black Pearl' (Stommel and Griesbach 2005), 'Lil' Pumpkin' (Stommel and Griesbach 2008a), 'Midnight Creeper' (Stommel and Griesbach 2008b), and the 'Christmas Lights' series (Stommel et al. 2018).

The origin of the unique combination of traits in 'Purple Rain' is evident from the parental germplasm. 'Christmas Cheer' exhibits a compact, very prostrate growth habit, dark green foliage, and clusters of globe-shaped, upright-oriented light yellow fruit that ripen to orange and then red at maturity. Line 90C44 is similarly compact but has an upright growth habit, black foliage, and upright clusters of conical tabasco-type fruit that mature from black to red. 'Royal Black' exhibits a more vigorous upright growth habit with variegated green/violet/black foliage and segregates for variegation intensity. 'Royal Black' produces solitary upright tabasco-type fruit that mature from black to red.

'Purple Rain' exhibits compact habit derived from 'Christmas Cheer' and 90C44 and low-growing habit intermediate to that of 'Christmas Cheer' and 90C44. The conical fruit shape of 'Purple Rain' is inherited from 90C44 and 'Royal Black', and solitary fruit habit is derived from 'Royal Black'. The foliar variegation of 'Purple Rain' is derived from a variegated segregant of 'Royal Black', with black to violet foliage pigmentation intensity skewed toward that characteristic of 90C44. Early generation selections focused on compact, low-growing growth habit and intensity of black and violet anthocyanin-derived foliar variegation. In later generations, selection was intensified for uniformity of plant foliar variegation and reduction in intensity of pale yellow to white foliar variegation that reduced plant vigor.

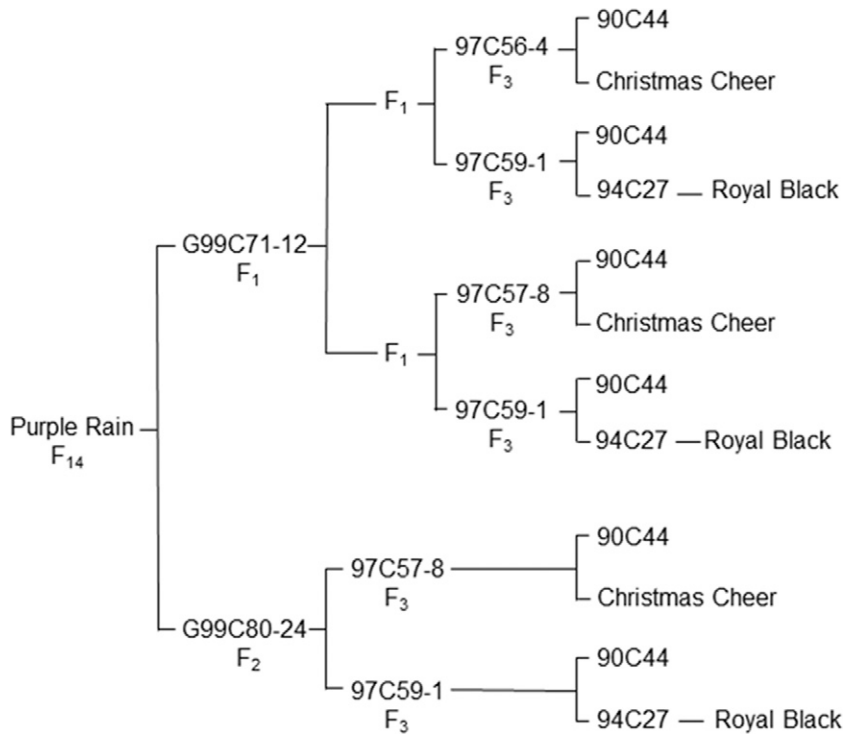

Fig. 1. Pedigree for the ornamental pepper (*Capsicum annuum* L.) cultivar Purple Rain.

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Fig. 2. Whole plants (**A**), foliage (**B**), and fruit (**C**) showing characteristic variegated leaf pigmentation and fruit attributes for the ornamental pepper (*Capsicum annuum* L.) cultivar Purple Rain.

Description and Performance

'Purple Rain' is a true-breeding diploid ($2n = 2x = 24$) herbaceous annual with a compact, low-growing, somewhat spreading habit. It was selected for its distinctive variegated foliage, fruit color, and growth habit (Fig. 2). 'Purple Rain' has performed uniformly in advanced generation trials during cultivar development. The data reported here (Table 1 and Fig. 3) were collected from 2022 and 2023 field trials conducted in Beltsville, MD, USA, using standard horticultural practices for pepper production in the Mid-Atlantic region (Rutgers University 2022). Standard errors of the mean are reported to facilitate relative comparison of the means for plant and fruit attributes in respective trials. Plants were established in the field in late May from greenhouse-grown transplants, and the data were collected in August during the respective trials. The plants reached an average size of 20 to 22 cm in height and 40 to 53 cm in width after 3 months of summer growth in 2022 and 2023 trials (Fig. 3). The leaves and stems of 'Purple Rain' are glabrous and glossy. The leaves are lanceolate. Adaxial leaf color is violet and black with yellow-green and yellow-white highlights (RHS 86A, 202A, 147B, and 158A, respectively) (Royal Horticultural Society and Flower Council of Holland 1986). The flowers of 'Purple Rain' are purple (81A) and have purple filaments, anthers, and styles. The conical, upright, solitary fruit are glossy black (202A), transitioning to orange-red (32A) during ripening and are red (45A) at maturity in ~75 d. Fruit contain two to three locules and average 2.2 to 2.6 cm in height and 1.2 cm in diameter at the base. Fruit are pungent and edible but were not selected for flavor quality because 'Purple Rain' is intended for ornamental applications.

Disease and insect pests did not affect 'Purple Rain' production during summer field trials in Beltsville, MD. When grown in the greenhouse, green peach aphid, *Myzus persicae* (Sulzer), and western flower thrips, *Frankliniella occidentalis* (Pergande), required routine control measures.

Comparative data were collected from the ornamental peppers 'Midnight Creeper' (Stommel and Griesbach 2008b), 'Christmas Lights Blue/Red' (Stommel et al. 2018), and 'Black Pearl' (Stommel and Griesbach 2005). Compared with other ARS ornamental pepper releases, 'Purple Rain' is most similar in stature to 'Midnight Creeper' but is less upright and more compact (Fig. 3). The leaves of 'Purple Rain' have comparable length but are narrower than the leaves of 'Midnight Creeper' and 'Christmas Lights Blue/Red' (Table 1). In contrast, the 'Black Pearl' plants are characteristically tall and have large leaves. 'Purple Rain' bears narrow, conical-shaped fruit in contrast to the shorter, larger-diameter conical fruit

Table 1. Comparative data describing foliar and fruit traits for the ornamental pepper (*Capsicum annuum* L.) cultivar Purple Rain compared to other ARS black foliage ornamental pepper cultivars Midnight Creeper, Christmas Lights Blue/Red, and Black Pearl. Data represent ten and 12 observations collected from 2022 and 2023 trials, respectively, in Beltsville, MD, USA.

Foliage and fruit attribute		Purple Rain	Midnight Creeper	Christmas Lights Blue/Red	Black Pearl
Leaf	Length (cm)	4.8 ± 0.2[i,ii]	5.6 ± 0.2	5.8 ± 0.2	9.2 ± 0.4
		4.8 ± 0.1[iii]	5.1 ± 0.1	4.8 ± 0.2	11.8 ± 0.4
	Width (cm)	1.8 ± 0.1	2.5 ± 0.1	2.8 ± 0.1	4.2 ± 0.2
		1.9 ± 0.04	2.5 ± 0.1	2.5 ± 0.1	5.0 ± 0.2
	RHS color[iv]	Black 202A, Violet 86A Yellow-green 147B, Yellow-white 158A	Black 202A	Green 147A	Black 202A
Fruit	Length (cm)	2.6 ± 0.1	1.1 ± 0.02	2.3 ± 0.1	1.7 ± 0.03
		2.2 ± 0.1	1.1 ± 0.04	2.1 ± 0.05	1.6 ± 0.1
	Midpoint width (cm)	1.2 ± 0.07	1.3 ± 0.02	1.3 ± 0.02	1.5 ± 0.02
		1.0 ± 0.03	1.2 ± 0.02	1.4 ± 0.03	1.4 ± 0.06
	RHS color (immature)	Black 202A	Black 202A	Violet 79A	Black 202A
	RHS color (mature)	Red 45A	Red 46A	Red 45A	Red 46A

[i] Mean ± standard error of the mean.
[ii] 2022 trials.
[iii] 2023 trials.
[iv] RHS = Royal Horticultural Society and Flower Council of Holland (1986). Colors were consistent in both years.

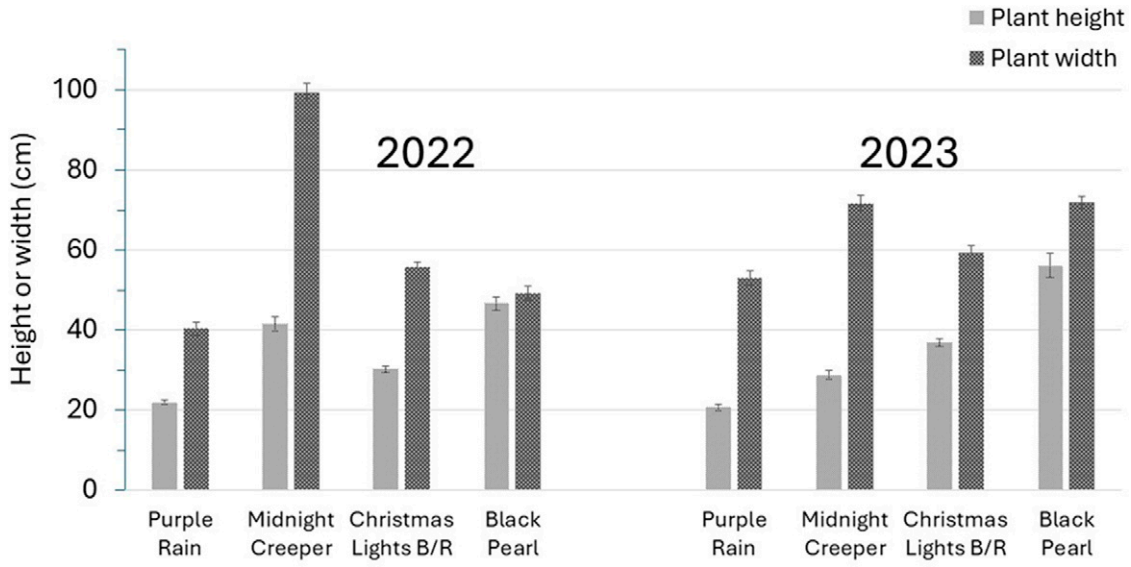

Fig. 3. Comparison of plant habit (mean height and width) among four Agricultural Research Service ornamental pepper releases grown in 2022 (10 replications) and 2023 (12 replications) in Beltsville, MD, USA. Bars represent standard error of the mean.

characteristic of 'Christmas Lights Blue/Red' and the relatively round fruit of 'Midnight Creeper' and 'Black Pearl' (Table 1). All bear upright solitary fruit, except for the clustered fruit habit of 'Black Pearl'. The time to fruit maturity of 'Purple Rain' is similar to that of the 'Christmas Lights' series (70 to 75 d) and approximately 10 d earlier than 'Midnight Creeper' and 'Black Pearl'.

Culture, Propagation, and Use

'Purple Rain' is considered a summer annual and as such will perform across a wide range of USDA hardiness zones (4 to 10) (US Department of Agriculture 2023). 'Purple Rain' is true-breeding, so it can be propagated by seed. The seeds can be directly sown in the ground in warmer climates or started indoors 6 to 8 weeks before the last frost date. Pepper is a warm season crop best planted outdoors when temperatures reach 21 to 24 °C. Plants grow best in full sun in well-drained soil with weekly to biweekly application of a balanced calcium/potassium nitrate-based, water-soluble fertilizer, depending on soil conditions. Pinching or growth regulators are not required to maintain plant growth habit. 'Purple Rain' can be used wherever sunny annuals are planted—patio plantings, in the foreground of a sunny mixed border, or massed in commercial, park, or public garden settings. 'Purple Rain' is especially well suited as an accent or filler in a container, a hanging basket, or window box plantings, and it holds its fruit and foliage through the fall until the first frost. Mature fruit can also be harvested on the stems for use in dried arrangements.

Availability

The genetic material of this release has been deposited in the National Plant Germplasm System (US Department of Agriculture 2024), where it will be available for research purposes, including development and commercialization. ARS requests that appropriate recognition be made if this germplasm contributes to the development of a new breeding line or cultivar. Herbarium vouchers have been deposited in the US National Arboretum Herbarium. A limited quantity of seed is available for distribution to research personnel or commercial growers upon written request to: John R. Stommel, USDA, ARS, GIFVL, BARC-West, B-010A, 10300 Baltimore Ave., Beltsville, MD 20705.

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