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‘Bellevue’ Sweetpotato

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‘Bellevue’ sweetpotato [*Ipomoea batatas* (L.) Lam.] was developed by the Louisiana Agricultural Experiment Station to provide an orange-fleshed, copper-skinned cultivar with superior storage root shape, skin smoothness, disease resistance, and southern root-knot nematode resistance. ‘Bellevue’ is weak in production beds, although adequate plant numbers can be achieved with proper presprouting. ‘Bellevue’ can be harvested up to 10 days earlier than the ‘Covington’ (Yencho et al., 2008) in the California production region. ‘Bellevue’ and ‘Beauregard’ (Rolston et al., 1987) are similar in harvest days in the Gulf South production region. The roots are elliptical and consistent in shape in varied soil types. It has a superior shape without lobing, and yields are equal and superior to ‘Beauregard’ for the U.S. no. 1 grade (5.1–8.9 cm diameter, 7.6–22.9 cm long) in California and in the Gulf South production region. The skin of ‘Bellevue’ is very smooth and remarkably free of lenticels, eyes, or fine root hairs. ‘Bellevue’ is highly resistant to southern root-knot nematode and well suited to sandy soils typical for the production area in California.

Initially identified and evaluated as ‘LA06-52’, the cultivar is named for a thoroughfare in Atwater, CA.

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Origin

‘Bellevue’ was first grown in 2006 and originated from an open-pollinated polycross nursery consisting of 15 lines in 2005 and tested under the line designation ‘LA06-52’. The female lineage is ‘LA82-529’ from the Louisiana State University AgCenter Sweetpotato Breeding Program. The male parent is unknown.

Description

One of the unique characteristics of ‘Bellevue’ is its predominantly purple foliage, which contrasts sharply to most commercial cultivars grown in the United States. ‘Bellevue’ has green-stemmed vines corresponding to color charts as [2.5 G (green) Y (yellow) (5/6)] (Munsell® Color, New Windsor, NY) at the apex. The numerical and letter designation for color represents the hue and the fraction represents value or chroma. Vines gradually turn purple [2.5 R (red) P (purple) (2/8)] over 30–40 cm from the apex to the crown. The ‘Bellevue’ canopy biomass is greater than ‘Beauregard’. Unfolded immature leaves are dark purple [10 P (purple) (2/64)] on the upper and lower surface and change gradually over seven nodes from the apex to dark green upper [7.5 G (green) Y (yellow) (3/4)] and lower [7.5 G (green) Y (yellow) (4/2)] surfaces. Mature leaves at five nodes from the apex have an acute apex and mostly a cordate base and three-lobed lamina. This contrasts with ‘Beauregard’ which has no lobes and mostly green unfolded immature leaves five nodes from the apex. Mature leaves are similar in size to that of ‘Beauregard’. The petioles are green [7.5 G (green) Y (yellow) (3/4)] with a purple [7.5 R (red) P (purple) (4/4)] marking at the base of the leaf junction with the petiole.

A typical inflorescence of ‘Bellevue’ has two clusters of six flowers per peduncle. Individual flowers are about 3.6 cm long from the base of the calyx, and the corolla is 3.5 cm wide at the opening. The inner and outer limbs of the corolla (corollas’ outermost area, distal from the calyx) are light purple [10 P (purple) (7/4)]. The darker inner throat of the corolla appears purple [7.5 R (red) P (purple) (4/6)]. Stigmata appear purple [7.5 R (red) P (purple) (8/6)]. The five stamens are inferior to stigmata and attached to the ovary.

Storage roots are round-elliptical without lobing and consistent in shape. The skin is copper [5 Y (yellow) R (red) (7/4)]. The ‘Bellevue’ cortex is 4–5 mm in depth and similar to ‘Beauregard’. The flesh of ‘Bellevue’ is uniformly orange [5 Y (yellow) R (red) (7/4)] and equal to or slightly more intense than ‘Beauregard’ [2.5 Y (yellow) R (red) (7/8)]. Dry matter content is ≈20.5% and slightly less than ‘Beauregard’ (21.3%), using methodology of La Bonte et al. (2000).

Disease Reactions

‘Bellevue’ was compared with ‘Beauregard’ in controlled tests for resistance to common pathogens affecting sweetpotatoes. It was slightly more resistant than ‘Beauregard’ (resistant) for soil rot, caused by *Streptomyces ipomoeae* (Person & W.J. Martin, Waksman & Henrici). ‘Bellevue’ and ‘Beauregard’ were resistant to *Fusarium* wilt or stem rot caused by *Fusarium oxysporum* Schlect. f. sp. *batatas* race 0 (Wollenw.) Snyd. & Hans. but were not tested with race 1 that occurs in California. ‘Bellevue’ was highly resistant to race 3 of southern root-knot nematode, *Meloidogyne incognit*a (Kofoid & White, 1919); ‘Beauregard’ is susceptible. Similar to susceptible ‘Beauregard’, storage roots of ‘Bellevue’ were found to be very susceptible to bacterial soft rot, caused by *Dickeya dadantii* Samson et al. (=*Erwinia chrysanthemi* Burkholder, McFadden & Dimock). ‘Bellevue’ and ‘Beauregard’ were intermediate in reaction to *Rhizopus* soft rot caused by *Rhizopus stolonifer* (Ehr. ex. Fr.) Lind. Russet Crack symptoms have not been observed in California.

Insect Resistance

‘Bellevue’ is currently under trial for relative insect resistance. It ranked similar in percent uninjured roots in comparison with ‘Beauregard’ and ‘Covington’ in the 2013 National Sweetpotato Collaborators Group Entomology trials conducted by D.M. Jackson (USDA Vegetable Laboratory, USDA, ARS Charleston, SC). However, sweetpotato flea beetle (*Chaetocnema confinis* Crotch) damage was significantly greater than ‘Beauregard’ in this same trial. It has not demonstrated any unusual propensity for insect damage in numerous on-farm trials in the Gulf South; however, insect damage has been noted in California in replicated trial plots as well as commercial fields as compared with ‘Covington’.

Production

‘Bellevue’ plant production from propagation beds is weak unless presprouted and

still 20% to 30% less numerically than 'Beauregard'. In California, plant production is similar to slightly less than 'Covington'. Because it is very susceptible to bacterial root rot, presprouting should be conducted at 24 °C for extended period rather than higher temperatures for short duration to increase plant production.

'Bellevue' was compared with 'Beauregard', (midsouth and California) in randomized complete block trials with three or four replications at various locations in Louisiana, California, Arkansas, and Missouri. Trials covered a range of planting dates and growing days (mostly 110–120 d). 'Bellevue' had U.S. no. 1 yields comparable to 'Beauregard' in six trials and exceeded 'Beauregard' in three trials (Table 1). Gulf and midsouth trials in 2013 demonstrated similar or greater yield in five out of seven trials for U.S. no.1 grade (data not shown); similar results were found in 2014. In California, 'Bellevue' has demonstrated a total marketable yield greater than 'Beauregard' and 'Covington' and similar yield for U.S. no.1 in 10 trials over 3 years. The increase in total marketable yield is a function of greater numbers of jumbo grade. Jumbo root number was reduced by decreasing spacing from 30 cm to 23–25 cm. Replicated plots have shown 'Bellevue' to have consistent yields for middle and late-season plantings. Yield declines appeared within norms in poor environments. 'Bellevue' has harvestable roots ≈115–120 d after planting in most production areas, which is typical development time for sweetpotatoes and comparable to 'Beauregard'. Late-season air cracking has been noted in California. Performance is best in sandy loam soils; however, shape is well maintained in heavier clay soils. Storage quality is excellent; roots are sound and marketable after 6–8 months of storage.

Table 1. Yield by grade of 'Bellevue' and 'Beauregard' in replicated trials.

Cultivar	Avg yield (t·ha^{-1})[z]			
	U.S. no. 1	Canner	Jumbo	Total marketable
		2007		
		Chase, LA midseason[y]		
Bellevue	23.1 a[x]	9.1 a	6.3 a	38.6 a
Beauregard	24.4 a	10.1 a	3.0 a	37.5 a
		2011		
		Livingston, CA midseason		
Bellevue	8.4 b	12.1 a	4.8 b	25.4 b
Beauregard	14.1 a	12.3 a	13.0 a	39.4 a
		2012		
		Montrose, AR late season		
Bellevue	20.1 a	14.8 a	1.0 a	35.9 a
Beauregard	17.1 a	25.0 a	3.8 a	45.9 b
		2012		
		Grand Prairie, LA midseason		
Bellevue	14.9 a	10.1 a	0.5 a	25.4 a
Beauregard	21.3 a	8.9 a	1.2 a	31.4 a
		2012		
		Sikeston, MO late season		
Bellevue	41.8 a	8.1 a	25.4 a	75.4 a
Beauregard	22.4 b	9.1 a	30.5 a	62.0 a
		2013		
		Grand Prairie, LA late season		
Bellevue	25.6 a	7.1 a	11.3 a	44.0 a
Beauregard	9.6 a	9.1 a	12.2 b	30.9 a
		2013		
		Sikeston, MO late season		
Bellevue	34.4 a	7.2 a	5.2 a	46.8 a
Beauregard	21.6 a	4.8 a	4.4 a	30.8 a
		2013		
		Livingston, CA midseason		
Bellevue	27.2 a	10.3 a	9.9 a	47.4 a
Beauregard	27.7 a	7.6 a	6.6 a	42.0 a
		2013		
		Wisner, LA late season		
Bellevue	20.8 a	7.8 a	7.1 a	35.8 a
Beauregard	12.9 b	7.6 a	4.9 a	25.4 a
		2014		
		Wynn, AR late season		
Bellevue	45.4 a	7.0 a	13.9 a	66.3 a
Beauregard	27.2 b	4.8 a	26.7 a	58.7 a

[z]Sizes of roots: U.S. no. 1: 5.1–8.9 cm diameter, 7.6–22.9 cm long; canner: 2.5–5.1 cm diameter, 5.1–17.8 cm long; jumbo: larger than U.S. no. 1 in diameter or length or both, and without objectionable defects.
[y]Midseason plantings (16 May to 30 May), late-season plantings (1 June to July).
[x]Values within the same column followed by the same letter are not significantly different at a level of significance, $P = 0.05$. Means separation by Duncan's multiple range test.

Quality Attributes

Roots stored for 3 months in 2012 were baked at 190 °C for ≈2 h. Sucrose content of baked 'Bellevue' (2.4 mg·g^{-1}) on a fresh weight basis (fwb) was similar to that of 'Beauregard' (2.3 mg·g^{-1} fwb). In contrast, 'Beauregard' had nearly twice as much maltose (4.9 mg·g^{-1} fwb) as 'Bellevue'. However, maltose is perceived as 67% less sweet than sucrose (Joesten et al., 2007). Fructose (1.8 mg·g^{-1} fwb) and glucose (2.4 mg·g^{-1} fwb) were nearly twice that of 'Beauregard'. Total sugar content was slightly less than in 'Beauregard' using methodology of La Bonte et al. (2000). 'Bellevue' is not sweet when freshly harvested. 'Bellevue' requires similar baking time to major orange flesh type cultivars.

Availability

Limited quantities of foundation seed (root) stock will be commercially available for the 2015 crop season. Requests for roots should be made to the Sweet Potato Research Station: P.O. Box 120, Chase, LA 71324, or through a licensed certified seed grower. Intellectual property protection will be sought.

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