UF IFAS Extension UNIVERSITY of FLORIDA

HS1225

Evaluation of Lettuce Cultivars for Production on Muck Soils in Southern Florida[1]

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Introduction

Lettuce (*Lactuca sativa* L.) is an economically important winter vegetable crop in Florida, with approximately 11,000 acres in production and a farm gate value of $70–$80 million annually. Florida lettuce production occurs mainly in the Everglades Agricultural Area (EAA) (Figure 1), located just south of Lake Okeechobee in Palm Beach County, in a rich organic soil called "muck" (Figure 2). Iceberg and romaine are the predominant types of lettuce grown in Florida. Lettuce production typically begins in late September and finishes in early May.

Historically, the University of Florida lettuce breeding program released valuable cultivars to the lettuce breeding industry, including 'Tall Guzmaine', 'Short Guzmaine', and 'Floriglade', which were the last cultivars released by the UF/IFAS lettuce breeding program (Guzman 1986). The importance of 'Tall Guzmaine' is outstanding; it has been incorporated as parental breeding material in modern romaine cultivars planted in the United States and abroad.

Table 1 presents a summary of lettuce cultivars released by the University of Florida lettuce breeding program by Dr. Victor Guzman (*in memoriam*), with information on diseases and a physiological disorder commonly affecting lettuce growers in south Florida.

Figure 1. The Everglades Agricultural Area (EAA) located just south of Lake Okeechobee in Palm Beach County, Florida.
Credits: Gustavo F. Kreutz, UF/IFAS

Cultivars currently used in Florida lettuce production were exclusively developed by the private sector. These cultivars are planted in three distinct production seasons in south Florida—early planting in the fall, intermediate planting in the winter, and late planting in the spring. Some of the iceberg, romaine, leaf, and Bibb lettuce cultivars used are listed in Table 2.

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Figure 2. Lettuce.
Credits: Germán V. Sandoya, UF/IFAS

Although each private lettuce-breeding program has its own variety trials, decisions and recommendations for released cultivars are based on visual observations in the field. Data on effects of current cultivars, production locations, and their interactions on lettuce yields are limited.

In 2010 and 2011, variety trials at the UF/IFAS EAA included commercial cultivars and UF/IFAS breeding lines, including romaine and iceberg types (Lu et al. 2011; Lu and Sui 2012). These trials were conducted on muck soils following UF/IFAS-recommended practices. In 2010, experiments were planted in early fall planting season on October 22 and in mid-winter planting season on January 23. In 2011, experiments were carried out in early season in fall with a planting date of October 13 and in mid-season (transition between fall and winter planting seasons) with a planting date of November 26. Overall, yield was lower in 2010 than in 2011 because three freezes in December 2010 caused plant damage to early-season trials.

Several romaine, iceberg, and Bibb lettuce lines were assessed for yield and marketability in 2017.

Cultivar and UF Breeding Lines Characteristics

Cultivars

'**Manatee**': 'Manatee' is historically important in Florida's lettuce production and was the major cultivar before 2011. However, it did not have good yield overall in variety trials, particularly in 2011 (Table 1), because it had low yield in the mid-season trials. 'Manatee' has resistance to early bolting and grows better in the early growing season (from late September to early October) and late growing season (from middle of April to early May) when temperatures are high. This cultivar can be used in lettuce production in both the early and late growing seasons when other cultivars are not suitable for production due to hot weather. 'Manatee' also has medium resistance to aphids.

'**Terrapin**': This romaine cultivar had the highest yield and the highest percent of marketable heads in variety trials (Table 1). It can be planted from November to January and harvested in January through March to maximize profits.

'**Okeechobee**': This cultivar yielded well in the variety trials, and its yield was stable across years (Table 1). 'Okeechobee' is suitable for production in the months from November through April.

'**Gator**': 'Gator' is an iceberg cultivar used for lettuce production for many years. In the variety trials, it had the highest yield among the iceberg cultivars in 2010 but the lowest yield in 2011 (Table 2). However, the yields of all three iceberg cultivars were not significantly different in 2011. 'Gator' can continue to be used as a major cultivar in lettuce production in south Florida.

'**Raleigh**': 'Raleigh' is an old variety released in 1984 (Guzman 1984). This variety had low yield in 2010 but high yield in 2011. Because 'Raleigh' is an east-coast type of lettuce and farmers in the EAA area no longer grow this kind of lettuce, this variety is not recommended for production.

UF Breeding lines

'**70096**': This romaine breeding line yielded poorly in 2010 because it had early bolting in the late-season trials that year, but it had good yield in 2011 (Table 1). This variety showed strong resistance to banded cucumber beetle and was found to be cold-tolerant and seed-thermodormancy-resistant in the variety trials (Lu et al. 2011; Lu and Sui 2012). However, '70096' is tipburn sensitive and is aphid-susceptible.

'**8074**': This breeding line had stable yield across years (Table 2). Although its head looks relatively small, leaves of the head are tightly compacted, making the head relatively heavy.

Management

All cultivars except for '70096' and 'Raleigh' are recommended for lettuce production in Florida. The following management practices for lettuce production in Florida have been designed by UF/IFAS Extension specialists based on research results and are available online.

Fertilization: See Hochmuth et al. (2009; 2012) for recommendation of fertilization (https://edis.ifas.ufl.edu/wq114 and https://edis.ifas.ufl.edu/cv008).

Insect management: Information is available in UF/IFAS fact sheets CIR1460 (Mossler and Dunn 2005, https://journals.flvc.org/edis/article/view/114335/109652) and Vegetable Handbook https://edis.ifas.ufl.edu/publication/CV293.

Disease management: The major diseases of lettuce in Florida and their management are described in Raid (2004).

Weed control: Control of weeds in lettuce is described in Dittmar and Stall (2013, https://edis.ifas.ufl.edu/wg031).

References

Dittmar, P., and W. Stall. 2013. *Weed Management in Leafy Greens* (*Lettuce, Endive, Escarole, and Spinach*). HS203. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/wg031

Guzman, V. L. 1984. '*South Bay*' *and* '*Raleigh*'*, Two Crisphead Lettuce Cultivars Resistant to Corky Root Rot for Organic Soils*. Circ. S-310. Gainesville: University of Florida Institute of Food and Agricultural Sciences.

Guzman, V. L. 1986. '*Short Guzmaine*'*,* '*Tall Guzmaine*'*, and* '*Floriglade*'*, Three Cos Lettuce Cultivars Resistant to Lettuce Mosaic Virus*. Circ. S-326. Gainesville: University of Florida Institute of Food and Agricultural Sciences.

Hochmuth, G., Ed. Hanlon, R. Nagata, G. Snyder, and T. Schueneman. 2009. *Fertilization Recommendations for Crisphead Lettuce Grown on Organic Soils in Florida*. SP153. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/wq114

Hochmuth, G., E. Hanlon, G. Snyder, R. Nagata, and T. Schueneman. 2012. *Fertilization of Sweet Corn, Celery, Romaine, Escarole, Endive, and Radish on Organic Soils in Florida*. BUL313. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/cv008

Lu, H., A. Wright, and D. Sui. 2011. "Responses of Lettuce Cultivars to Insect Pests in Southern Florida." *HortTechnology* 21(6): 773–778.

Lu, H., and D. Sui. 2012. "Field Performance of Lettuce Cultivars Used in Southern Florida." *2012 FSHS Proceedings* 125: 137–138.

Mossler, M. A., and E. Dunn. 2005. *Florida Crop/Pest Management Profile: Lettuce*. CIR1460. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://journals.flvc.org/edis/article/view/114335/109652

Nuessly, G. S., and S. E. Webb. 2010. *Insect Management for Leafy Vegetables*. ENY-475. Gainesville: University of Florida Institute of Food and Agricultural Sciences. https://edis.ifas.ufl.edu/ig161

Raid, R. N. 2004. "Lettuce Diseases and their Management." *Diseases of Fruits and Vegetables*. 121–147.

SAS Institute. 2010. Cary, NC. http://www.sas.com

Table 1. University of Florida historical lettuce cultivar releases of iceberg, romaine, and Bibb types.

Type	Cultivar	Characteristics					
		BLS[1]	CRR[2]	LDM[3]	FWL[4]	LMV[5]	TB[6]
Iceberg	Floricrisp 1265	S	S	U	T	S	U
	Floricrisp 1366	S	S	U	U	S	U
	Gator	S	R	U	U	U	U
	Raleigh	S	T	U	U	S	U
	South Bay	U	T	U	U	S	U
Romaine	Florida 1974	U	U	U	U	R	U
	Floricos 83	S	T	SR	S	R	U
	Floriglade	U	T	U	U	R	U
	Short Guzmaine	S	U	U	U	R	U
	Tall Guzmaine	S	T	U	S	R	U
	Terrapin	S	U	U	S	U	U
Bibb	Everglades	U	S	SR	U	R	R
	Floribibb	S	S	SR	T	R	U
	Florida Buttercrisp	U	R	S	U	T	T
	Florida 202	U	R	S	U	R	R

[1] BLS, Bacterial leaf spot, caused by the bacterium *Xanthomonas campestris* p.v. *vitians*
[2] CRR, Corky root rot, caused by the bacterium *Rizoraphis suberifaciens*
[3] LDM, Lettuce downy mildew, caused by the oomycete *Bremia lactucae*
[4] FWL, Fusarium wilt of lettuce, caused by the fungus *Fusarium oxysporum* f.sp. *lactucae*
[5] LMV, Lettuce mosaic virus, caused by the *lettuce mosaic virus*
[6] TB, Tipburn, a disorder related to calcium deficiency or excessive heat
R= Resistant, SR=Some resistance, T=Tolerant, S=Susceptible, U= Unknown

Table 2. Partial list of lettuce cultivars of iceberg, romaine, leaf, and Bibb types currently planted in the EAA in south Florida.

Type	Cultivar	Planting slot	Vendor
Iceberg	Belle Glade	Intermediate	3 Star Lettuce
	Chosen	Early	3 Star Lettuce
	Flagler	Throughout	3 Star Lettuce
	Lantana	Early	3 Star Lettuce
	Cooper	Intermediate/Late	3 Star Lettuce
Romaine	Hialeah	Throughout	3 Star Lettuce
	Homestead	Intermediate	3 Star Lettuce
	Okeechobee	Intermediate	3 Star Lettuce
	Manatee	Throughout	3 Star Lettuce
	Sawgrass	Intermediate/Late	3 Star Lettuce
	Tammy	Intermediate	3 Star Lettuce
	1505	Intermediate/Late	3 Star Lettuce
	Desert Gold	Intermediate	3 Star Lettuce
	Solid King	Intermediate	Central Valley Seeds
Leaf	RSX743	Throughout	3 Star Lettuce
	Big Star	Intermediate	Central Valley Seeds
	3SX739	Intermediate	3 Star Lettuce
Bibb	Palmetto	Throughout	3 Star Lettuce

Table 3. Yield (lb/ac) and marketable heads (MH) (%) of romaine lettuce grown in Belle Glade, FL, in 2010 and 2011 seasons.

Cultivar/Line	2010		2011	
	Yield (lb/ac)	% MH	Yield (lb/ac)	% MH
Terrapin	18,600 a	88 a	26,100 a	93 a
Manatee	17,700 a	86 a	15,500 b	77 b
Okeechobee	16,800 a	84 a	21,400 ab	89 a
70096	15,300 a	86 a	22,600 a	89 a

*Means in a column followed by the same letter are not significantly different ($P > 0.05$) according to the least significant difference (LSD) test (SAS Institute 2010).

Table 4. Yield (lb/ac) and marketable heads (MH) (%) of iceberg lettuce grown in Belle Glade, FL, in 2010 and 2011 seasons.

Cultivar/Line	2010		2011	
	Yield (lb/ac)	% MH	Yield (lb/ac)	% MH
Gator	14,700 a	86 a	15,600 a	77 b
8074	12,400 b	83 ab	18,200 a	89 a
Raleigh	11,200 b	79 b	20,500 a	89 a

*Means in a column followed by the same letter are not significantly different ($P > 0.05$) according to the least significant difference (LSD) test (SAS Institute 2010).

Table 5. Yield (lb/ac), and percentage of marketable heads (MH), of iceberg, romaine, and Bibb lettuce grown in Belle Glade, FL, in a 2017 experiment.

Cultivar/Line	Yield (lb/ac)	% MH	Cultivar/Line	Yield (lb/ac)	% MH
Iceberg			**Romaine**		
Chosen*	13,398	74	Manatee*	17,457	87
Flagler*	15,015	86	Okeechobee*	17,886	91
Cooper*	15,873	85	Sawgrass*	15,939	90
Belle Glade*	16,071	68	Homestead*	20,361	95
Lantana*	14,091	75	Hialeah*	15,180	95
Floricrisp 1265	18,942	91	Floricos 83	11,451	90
Minetta	21,186	97	43007	14,421	90
Shawnee	16,236	95	45060	5,115	97
1265	13,035	89	46087	4,686	98
1443	13,992	72	50098	15,048	86
1502	11,847	78	50100	15,147	100
1508	10,428	92	60183	13,134	96
47079	17,226	86	60184	24,024	90
47083	16,929	97	60185	22,770	86
47098	13,266	89	70096	8,778	85
48060	16,500	96	C1139	12,738	95
49017	14,058	85	C1142	14,718	87
49019	12,342	87	C1145	17,688	100
49085	11,055	84	C1146	5,709	100
49758	14,157	86	**Bibb**		
49889	10,857	78	Floribibb	5,775	96
50011	15,180	15	60173	8,679	67
50114	23,166	100	60176	8,679	92
50664	23,859	90	18076	8,052	81
60154	20,130	86	60174	9,438	79
60155	16,797	85	60178	9,603	95
60157	18,876	87	70202	8,382	89
60158	20,064	97			
60159	23,001	94			
60160	19,800	97			
60161	13,200	16			
60162	25,212	98			
60163	21,747	97			
60166	17,556	90			
60167	19,635	93			
60168	21,450	91			
60169	14,355	62			
60171	20,856	91			
60172	16,665	80			
60180	20,790	94			

*Starred germplasms are commercial cultivars planted in Florida; others listed are advanced breeding lines or old cultivar releases from the UF/IFAS lettuce breeding program.