Proc. Fla. State Hort. Soc. 125:137–138. 2012.

Field Performance of Lettuce Cultivars Used in Southern Florida

Huangjun Lu*[1] and David Sui[2]

[1]University of Florida/IFAS, Everglades Research and Education Center, 3200 E. Palm Beach Road, Belle Glade, FL 33430

[2]University of Florida/IFAS, Palm Beach County Cooperative Extension, 559 N. Military Trail, West Palm Beach, FL 33415

Additional index words. lettuce, cultivar, yield, resistance, insects

Yield and horticultural quality in lettuce production are dependent on management practices and cultivars used in the production. Selection of cultivars suitable for use in southern Florida is based on data from field variety trials. Lettuce variety trials by the University of Florida were discontinued for many years, which have resulted in a lack of data for selection of cultivars for use in Florida. Beginning in 2010, we resumed these trials at the UF/IFAS Everglades Research and Education Center in Belle Glade. A total of seven cultivars (three iceberg and four romaine) were tested in field trials. Results showed that the cultivars varied significantly for yield and other traits. In 2010, the cultivar Gator yielded more than the cultivars 8074 and Raleigh in iceberg variety trials, while all four romaine cultivars did not differ significantly for yield. In 2011, the three iceberg cultivars yielded similarly. 'Terrapin' and '70096' had higher yield than 'Manatee' in the romaine variety trials. The results indicate that there was a significant genotype by environment interaction for the iceberg lettuce 'Raleigh' and the romaine cultivar Manatee. 'Manatee' and '70096' are resistant to seed thermo-dormancy and generally germinated better than other cultivars. The variety 70096 was found to be resistant to banded cucumber beetles and tolerant to cold weather. All three iceberg cultivars and 'Manatee' were tolerant to aphids.

Lettuce is an economically important winter vegetable crop in Florida, with approximately 11,000 acres grown and a farm gate value of 30–35 million dollars generated annually (Lu, unpublished). Iceberg and romaine are the main types of lettuce grown in Florida. Because the University of Florida Lettuce Breeding Program was discontinued in the past decade and 'Tall Guzmaine', 'Short Guzmaine', and 'Floriglade' were among the last cultivars released by the program (Guzman, 1986), cultivars currently used in Florida lettuce production were exclusively developed by the private sector. Although each private program has its own variety trials, decisions on which varieties to be released for growers to use are generally based on visual observations in the field and no measurements and statistical analyses are carried out. As a result, there are no data on cultivars publicly available. The purpose of this experiment was to evaluate the cultivars that are being used in lettuce production for their performance in yield and other traits.

Materials and Methods

Cultivars used in the experiment include three iceberg ('Gator', '8074', and 'Raleigh') and four romaine ('Terrapin', 'Manatee', 'Okeechobee', and '70096') types. The trials were conducted for two years (2010 and 2011) at the University of Florida/IFAS Everglades Research and Education Center in Belle Glade. Iceberg cultivars and romaine cultivars were evaluated in separate variety trials with randomized complete-block design. Each trial was planted at two sites with four replications. The beds were 2 ft wide with 1 ft furrow to separate the adjacent beds. The seed of cultivars were sown in two rows per cultivar and the plots were 20 ft long. Seedlings were thinned to 1 ft between plants within the rows and the space between two rows on the same bed was 1.5 ft.

The soil at both sites was Dania muck (euic, hyperthermic shallow Lithic Haplosaprists). The plots received a preplant application of 50 lb/acre of N, 200 lb/acre P_2O_5, 200 lb/acre K_2O, and 15 lb/acre micronutrient mix in 2010 and 25 lb/acre of N, 250 lb/acre P_2O_5, 100 lb/acre K_2O, and 15 lb/acre micronutrient mix in 2011 as indicated by soil samples. The plots were scouted regularly for insects and diseases and sprays applied accordingly in all trials except for the ones at one site in 2010 in which plots were used for investigation on responses of cultivars to banded cucumber beetle, serpentine leafminer, and aphids. The planting and harvesting dates were 22 Oct. 2010 and 28 Jan. 2011 in the 2010 season, and 13 Oct. and 21 Dec. 2011 in the 2011 season, respectively. In this study, only marketable heads were harvested for determination of yield. Plants were considered as unmarketable if they had obvious defects such as loose heads and split inner leaves, or disease symptoms, or heads weighed less than 1.25 lb.

Data were subjected to analysis of variance (ANOVA) using the GLM procedure of SAS (SAS, 2010). The least significant difference (LSD) test (Freund and Wilson, 1997) was used for comparison of the differences of means at the 5% level of significance. Data from iceberg cultivars and romaine cultivars were separately analyzed.

Results and Discussion

In the 2010 growing season, the weather conditions were normal in Oct., Nov., and Jan. 2011, but the averaged daily minimum and maximum temperatures in Dec. 2010 were 11 and 9 °F lower

*Corresponding author; phone (561) 993-1500; email: hjlu@ufl.edu

than the recorded average between 1924 and 2001. There were 3 d with freezing temperatures in December. Lettuce plants grew well during the early season but the freezing temperatures caused damage to the lettuce and delayed growth of the cultivars in late season. In 2011, the weather was normal and growth of lettuce was also normal.

ANOVA results revealed significant variation for yield among iceberg cultivars (Table 1). Year effect was significant and cultivar × year interaction was also significant. No significant location effect and location × cultivar effect were detected. Significant cultivar × year interaction indicated that cultivars performed differently in different years; therefore, comparisons of cultivars for yield were conducted within each year. In 2010, 'Gator' was the best cultivar and produced 14,000 lb lettuce per acre (Table 2). 'Raleigh' and '8074' yielded significantly lower than 'Gator'. In 2011, yield of 'Raleigh' was the highest (20,500 lb/acre) but yield of all three iceberg cultivars were not significantly different.

Marketable heads of each cultivar were recorded. In 2010, 'Gator' had 86% of heads marketable, while percentage of marketable heads in 'Raleigh' was 79, which was significantly lower than that of 'Gator' (Table 2). In 2011, 'Raleigh' had the highest percentage (90) of heads that were marketable and 'Gator'had the lowest (77).

Romaine cultivars differed highly significantly for yield as indicated by the ANOVA results (Table 3). Romaine variety trials also showed significant year effect and year × cultivar interaction, indicating that varieties varied for yield during different years. In 2010, there appeared to be a large difference in yield, but all four cultivars were not statistically different on yield (Table 4). In 2011, 'Terrapin' was still the highest yielding cultivar, producing 25,000 lb lettuce per acre. 'Manatee' had the lowest yield (15,100 lb/acre), which was significantly lower than those of 'Terrapin' and '70096'. Percentages of marketable heads produced by cultivars were not significantly different in 2010, but in 2011 (Table 4). 'Terrapin' had the highest percent (92) of marketable heads, while 'Manatee' had the lowest (75) in 2011.

In addition to yield, cultivars were recorded for their responses to biotic and/or abiotic stresses. Among cultivars, '70096' showed strong resistance to banded cucumber beetle and 'Manatee' and three iceberg cultivars had less aphids (Lu et al., 2011). Cultivar 70096 was also found to be cold tolerant and seed thermo-dormancy resistant. 'Manatee' also showed resistance to seed thermo-dormancy. All these useful traits can help growers reduce lettuce damage when the stresses are present in the growing season.

Table 1. Analysis of variance (ANOVA) for marketable yield for iceberg variety trials in 2010 and 2011.

Source of variance	df	MS	*F*	*P*
Year (Y)	1	680962	4.13	0.050
Location (L)	1	78536	0.48	0.493
Rep (Location)	6	103506	0.63	0.705
Cultivar (C)	2	756533	4.59	0.017
C × Y	2	679305	4.11	0.025
C × L	2	98413	0.59	0.560
Error	33	164882		

Table 2. Marketable yield (lb/acre) and marketable heads (%) of iceberg varieties grown at Belle Glade, FL in 2010 and 2011.

	2010		2011	
Variety	Yield	Marketable head	Yield	Marketable head
Gator	14700 a[z]	86 a	15600 a	77 b
8074	12400 b	83 ab	18200 a	89 a
Raleigh	11200 b	79 b	20500 a	90 a

[z]Means in a column within each variety followed by the same letter are not significantly different ($P = 0.05$) using a least significant difference test (SAS Institute, 2010).

Table 3. Analysis of variance (ANOVA) for marketable yield for romaine variety trials in 2010 and 2011.

Source of variance	df	MS	*F*	*P*
Year (Y)	1	890472	4.15	0.047
Location (L)	1	344684	1.60	0.212
Rep (Location)	6	93506	0.43	0.855
Cultivar (c)	3	1086215	5.06	0.004
C × Y	3	632758	2.94	0.043
C × L	3	269003	1.25	0.303
Error	45	214571		

Table 4. Marketable yield (lb/acre) and marketable heads (%) of romaine varieties grown at Belle Glade, FL in 2010 and 2011.

	2010		2011	
Variety	Yield	Marketable head	Yield	Marketable head
Terrapin	17400 a[z]	89 a	25200 a	92 a
Manatee	16900 a	87 a	15100 b	75 b
Okeechobee	16500 a	86 a	20700 ab	88 a
70096	14700 a	89 a	21400 a	90 a

[z]Means in a column within each variety followed by the same letter are not significantly different ($P = 0.05$) using a least significant difference test (SAS Institute, 2010).

Literature Cited

Freund, R.J. and W.J. Wilson. 1997. Inferences for two or more means, p. 247–249. In: R.J. Freund and W.J. Wilson (eds.). Statistical methods. Revised editon. Academic Press, San Diego, CA.

Guzman, V.L. 1986. Short Guzmaine, Tall Guzmaine, and Floriglade, three cos lettuce cultivars resistant to lettuce mosaic virus. Inst. Food Agr. Sci., Univ. of Florida, Agr. Expt. Sta. Circ. S-326.

Lu, H., A. Wright, and D. Sui. 2011. Responses of lettuce cultivars to insect pests in southern Florida. HortTechnology 21(6):773–778.

SAS. 2010. SAS Institute, Cary, NC.