Vegetable

Variety Trials
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Tips to Interpret Results on Vegetable Variety Performance

Edgar Vinson and Joe Kemble

Introduction: The information provided by this report must be studied carefully in order to make the best selections possible. Although yield is a good indicator of varietal performance, other information must be studied. The following information provides a few tips to interpret results in this report.

Open-Pollinated or Hybrid Varieties

In general, hybrid varieties (also referred to as F_1 varieties) are earlier and produce a more uniform crop. They have improved disease and pest or virus tolerance/resistance. F_1 varieties are often more expensive than open-pollinated varieties (also referred to as OP varieties), and seeds cannot be collected from one crop in order to plant the next. Despite the advantages hybrids offer, OP varieties are still often planted in Alabama. Selecting a hybrid variety is the first step toward earliness and quality.

Yield Potential

Yields reported in variety trial results are extrapolated from small plots. Depending on the vegetable crop, plot sizes range between 100 to 500 square feet. Yields per acre are estimated by multiplying plot yields by corrective factors ranging from 100 to 1,000. Small errors are thus amplified, and estimated yields per acre may not be realistic. Therefore, locations cannot be compared simply by looking at the range of yields actually reported. However, the relative differences in performance among varieties are realistic, and can be used to identify best-performing varieties.

Statistical Interpretation

The coefficient of determination (R^2), coefficient of variation (CV) and least significant difference (LSD, 5 percent) are reported for each test. These numbers are helpful in separating the differences due to small plots (sampling error) and true, but unknown, differences among entries.

R^2 ranges are between 0 and 1. Values close to 1 suggest that the test was conducted under good conditions and that most of the variability observed was mainly due to the effect of variety and replication. Random, uncontrolled errors were of lesser importance. CV is an expression of yield variability relative to yield mean. Low CVs are desirable (under 20 percent) but are not always achieved.

TIPS

There must be a minimum yield difference between two varieties before one can statistically conclude that one variety actually performs better than another. This is known as the least significant difference (LSD). When the difference in yield is less than the LSD value, one cannot conclude that there is any real difference between two varieties. For example, in the okra trial presented in this issue conducted at the North Alabama Horticulture Research Center in Cullman, Ala., 'Clemson Spineless' yielded 10,520 pounds per acre, while 'Jambalaya' and 'Clemson Spineless 99' yielded 9,431 and 8,991 pounds per acre, respectively. Since there was less than a 1,249 difference between 'Clemson Spineless' and 'Jambalaya', there is no statistical difference between these two varieties. However, the yield difference between 'Clemson Spineless' and 'Clemson Spineless 99' was 1,529, indicating that there is a real difference between these two varieties. From a practical point of view, producers should place the most importance on LSD values when interpreting results.

Testing Condition

AU vegetable variety trials are conducted under standard, recommended commercial production practices. If the cropping system to be used is different from that used in the trials, the results of the trials may not apply. Information on soil type (Table 1), planting dates, fertilizer rates and spray schedule are provided to help producers compare their own practices to the standard one used in the trials, and make relevant adjustments.

Ratings of Trials

At each location, variety trials were rated on a 1 to 5 scale, based on weather conditions, fertilization, irrigation, pest pressure and overall performance (Table 2). Results from trials with ratings of 2 and under are not reported. These numbers may be used to interpret differences in performance from location to location. The overall rating may be used to give more importance to the results of variety performance under good growing conditions.

Where to Get Seeds

Because seeds are alive, their performance and germination rates depend on how old they are, where and how they were collected, and how they have been handled and stored. It is always preferable to get certified seeds from a reputable source, such as the ones listed in the Appendix.

Several factors other than yield have to be considered when choosing a variety from a variety trial report. The main factors to consider are type, resistance and tolerance to diseases, earliness and of course availability and cost of seeds. It is always better to try two to three varieties on a small scale before making a large planting of a single variety.

Vegetable Trials on the Web – For more vegetable variety information be sure to visit our web page at:

www.aaes.auburn.edu/comm/pubs/pubs-by-type/rebulllist.php

Our website will provide such useful information as description of variety types, a ratings system and information about participating seed companies.

Table 1

Soil Types at the Location of the Trial

Location	Water holding capacity (In.)	Soil type
Gulf Coast Research and Extension Center (Fairhope)	0.09-0.19	Malbis fine sandy loam
Brewton Experiment Field (Brewton)	0.12-0.14	Benndale fine sandy loam
Wiregrass Research and Extension Center (Headland)	0.14-0.15	Dothan sandy loam
Lower Coastal Plain Research and Extension (Camden)	0.13-0.15	Forkland fine sandy loam
EV Smith Research Center, Horticultural Unit (Shorter)	0.15-0.17	Norfolk-orangeburg loamy sand
Chilton Area Horticultural Substation (Clanton)	0.13-0.15	Luvernue sandy loam
Upper Coastal Plain Research and Extension Center (Winfield)	0.13-0.20	Savannah loam
North Alabama Horticultural Substation (Cullman)	0.16-0.20	Hartsells-Albertville fine sandy loam
Sand Mountain Research and Extension Center (Crossville)	0.16-0.18	Wynnville fine sandy loam

Table 2

Description of Ratings

Rating	Weather	Fertilizer	Irrigation	Pests	Overall
5	Very Good	Very Good	Very Good	None	Excellent
4	Favorable	Good	Good	Light	Good
3	Acceptable	Acceptable	Acceptable	Tolerable	Acceptable
2	Adverse	Low	Low	Adverse	Questionable
1	Destructive	Very Low	Insufficient	Destructive	Useless

Okra Trials Resume in North Alabama

Joe Kemble, Edgar Vinson and Arnold Caylor

An okra variety trial was conducted at the North Alabama Horticulture Research Center (NAHRC) in Cullman, Ala. (Tables 3, 4 and 5).

On June 6, 2013, okra was direct-seeded onto 20-foot-long experimental plots. Okra was spaced 18 inches apart within a row and rows were spaced on 8 foot centers. White plastic mulch and drip irrigation were used. Okra varieties were replicated four times and arranged in a randomized complete block experimental design.

Soils were fertilized according to the recommendations of the Auburn University Soil Testing Laboratory. Current commercial okra production information for Alabama — including insect, disease, and weed management, as well as recommended fertigation and spray schedules — is available in the Southeastern U.S. Vegetable Crop Handbook. Copies are available from your county Extension office or online at www.thegrower.com/south-east-vegetable-guide.

Pods were harvested when they reached a length of approximately 4-6 inches. Okra was harvested twice per week between Aug. 7 and Sept. 20. A total of 17 harvests were conducted.

The market standard 'Clemson Spineless' produced a total marketable yield that was significantly higher than all varieties with the exception of 'Jambalaya.' A variation of 'Clemson Spineless' — 'Clemson Spineless 99'— performed as well as 'Jambalaya' but not as well as 'Clemson Spineless.' 'Clemson Spineless 99' produced significantly higher yields than both 'Cowhorn 22' and its variant 'Cowhorn 44.'

Okra remains a popular vegetable in the southeast. Since the last okra trials, there has been an increase in the selection of varieties. More okra trials that include some of these newer varieties should be conducted.

See Pages 10-11 for pictures of the okra grown for this study.

Table 3

Ratings of 2013 Okra Variety Trial

Location	NAHRC
Weather	5
Fertility	5
Irrigation	5
Pests	5
Overall	5

Note: See introduction for description of ratings scales

Table 4

Seed Source, Earliness, and Descriptions of Selected Okra Varieties

Variety	Type	Seed Source	Days to Harvest	Pod Color	Plant Height (ft.)
Clemson Spineless	OP	Willhite	55	Green	4
Clemson Spineless 99	OP	Wax Seeds	--	Green	4
Cowhorn 22	OP	Wax Seeds	60	Green	4-6
Cowhorn 44	OP	Wax Seeds	--	Green	7-8
Jambalaya	F1	Johnny's	50	Green	4-5

Table 5

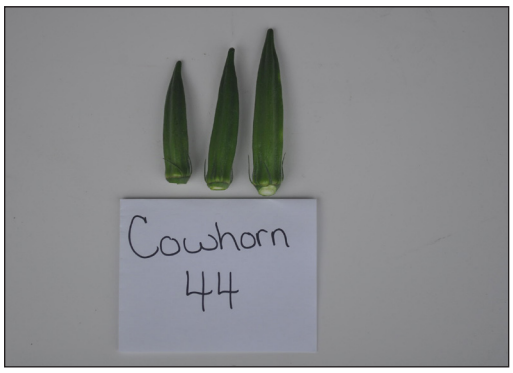
Total Marketable Yield of Selected Okra Varieties

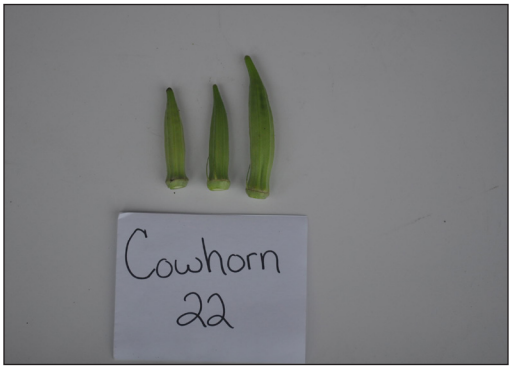
Variety	Total Marketable Yield (lbs/acre)
Clemson Spineless	10,520
Jambalaya	9,431
Clemson Spineless 99	8,991
Cowhorn 44	4,822
Cowhorn 22	4,789
R^2	0.94
CV	11
LSD	1,249

OKRA

OKRA


Jambalaya


Cowhorn
44


Cowhorn
22


Clemson
Spineless


Clemson
Spineless
99


Jambalaya


Cowhorn
22
Cowhorn
44
Clemson
Spineless
Clemson
Spineless
99
Jambalaya

First Kohlrabi Trial Conducted in South Alabama

Joe Kemble, Edgar Vinson and Randy Akridge

A kohlrabi variety trial was conducted at the Brewton Agriculture Research Unit (BARU) in Brewton, Ala. (Tables 6, 7 and 8)

On Oct. 8, 2013, kohlrabi was direct-seeded on double staggered rows with a 12-inch spacing between rows and one-inch spacing within row. White plastic mulch and drip irrigation were used. Plots were 20 feet long on five foot centers. Varieties were replicated four times and arranged in a randomized complete block experimental design.

Soils were fertilized according to the recommendations of the Auburn University Soil Testing Laboratory. Current commercial kohlrabi production information for Alabama — including insect, disease, and weed management as well as recommended fertigation and spray schedules — is available in the Southeastern U.S. Vegetable Crop Handbook. Copies are available from your county Extension office or online at www.thegrower.com/south-east-vegetable-guide.

Kohlrabi was harvested when stems reached a diameter of 2 to 3 inches on Dec. 18, 2013, and Jan. 8, 2014.

In terms of marketable yield per acre, 'Kongo' produced significantly higher yields than all varieties with the exception of 'Quickstar.' The varieties 'Kossak' and 'White Vienna' produced similar yields that were significantly lower than all other varities.

In the marketable number category, a similar pattern was exhibited. 'Kongo,' 'Quickstar' and 'Kolibri' produced, statistically, the same number of fruit per acre. These yields were higher than both 'Kossak' and 'White Vienna.'

According to the spacing used in the trial, a yield of approximately 1,400 lbs. per acre was expected. 'Kongo,' 'Kolibri' and'Quickstar' produced beyond the expected yield. This preliminary trial suggests that 'Kossak' and 'White Vienna' may not be adapted to the area. More trials are needed to determine the best varieties for the region.

Table 6

Ratings of 2013 Kohlrabi Variety Trial

Location	BARU
Weather	5
Fertility	5
Irrigation	5
Pests	5
Overall	5

Note: See introduction for description of ratings scales

Table 7

Seed Source, Earliness, and Descriptions of Selected Kohlrabi Varieties

Variety	Seed Source	Days to Harvest From Seed	Bulb Color	Bulb Shape	Years
Kolibiri	Seedway	50	Purple	Round	2013
Kongo	Seedway	48	White	Flat Round	2013
Kossack	Seedway	85	White	Flat Round	2013
Quickstar	Sakata	49	Green	Flat Round	2013
White Vienna	Seedway	55	Green	Round	2013

Table 8

Yield of Selected Kohlrabi Varieties

Variety	Total Marketable Yield (lbs/acre)	Marketable Number (#/acre)
Kongo	3,274	14,935
Quickstar	2,799	12,941
Kolibiri	2,395	10,585
Kossack	663	2,610
White Vienna	339	1,595
R^2	0.86	0.84
CV	33	39
LSD	509	5,561

Yield Differences Found Among Hardneck Garlic Varieties

Joe Kemble, Edgar Vinson and Randy Akridge

A garlic variety trial was conducted at the Brewton Agriculture Research Unit (BARU) in Brewton, Ala. (Tables 9, 10 and 11).

Cloves from seven hardneck type garlic varieties were planted on bare ground on Oct. 22, 2013, following a tomato crop. Experimental plots were 10 feet in length and consist of double staggered rows spaced 24 inches apart.

Soils were fertilized according to the recommendations of the Auburn University Soil Testing Laboratory. Current commercial hardneck garlick production information for Alabama — including insect, disease, and weed management as well as recommended fertigation and spray schedules — is available in the Southeastern U.S. Vegetable Crop Handbook. Copies are available from your county Extension office or online at www.thegrower.com/south-east-vegetable-guide.

Garlic was harvested when approximately 40-60 percent of the leaves turned yellow or brown. Fresh weights of each variety were taken immediately following harvest. Bulbs were then placed in a cool dark place and allowed to dry. Once cloves were sufficiently dry, dry weights were recorded.

The varieties ‘Purple Haze,’ ‘Lokalen’ and ‘Duganski’ produced the highest yields in the fresh yield category (Table 11). Yield of ‘Turkish Giant’ was similar to ‘Duganski’ but statistically lower than both ‘Purple Haze’ and ‘Lokalen.’ In dry weight yield ‘Lokalen’ and ‘Purple Haze’ produced yields significantly higher than all other varieties. Future trials are needed to determine top yielding varieties and whether current varieties are adapted for the region.

Table 9

Ratings of 2013 Hardneck Garlic Variety Trial

Location	BARU
Weather	5
Fertility	5
Irrigation	5
Pests	5
Overall	5

Note: See introduction for description of ratings scales

Table 10

Seed Source, Earliness, and Descriptions of Selected Hardneck Garlic Varieties

Variety	Seed Source	Harvest Season	Wrapper Color	Clove Color	Years Evaluated
Duganski	Territorial	Mid	Purple	Violet	2013
Korean Red	Territorial	Mid	Purple	Purple	2013
Lokalen	Territorial	Mid	White	Beige	2013
Metechi	Territorial	Mid	Violet	White	2013
Music	Territorial	Mid	White	White	2013
Purple Glazer	Territorial	Mid	Violet	White	2013
Turkish Giant	Territorial	Mid	Purple	Red	2013

Table 11

Yield of Selected Hardneck Garlic Varieties

Variety	Marketable Fresh Yield (lbs/acre)	Marketable Dried Yield (lbs/acre)
Purple Glazer	5,438	931
Lokalen	5,361	1,154
Duganski	4,851	822
Turkish Giant	4,253	697
Music	3,007	539
Korean Red	2,791	490
Metechi	2,659	485
R^2	0.70	0.75
CV	25	23
LSD	685	253

Evaluation of Cantaloupes for Georgia Production

George Boyhan, Suzzanne Tate and Randy Hill

Cantaloupe are an important crop in Georgia with almost $27 million of farm gate value (Wolfe & Luke-Morgan, 2011). In addition, cantaloupe production encompasses over 4,700 acres.

Although 'Athena' and similar varieties have dominated the industry, there is growing interest in other types of cantaloupes. The Tuscany cantaloupe and winter melons offer a potential new source of revenue for growers.

There is also a need to evaluate the disease resistance of varieties because this can help determine future breeding objectives. The objective of this study (Table 12 and 13) was to evaluate several different cantaloupe varieties for their yield, characteristics, and disease resistance.

Thirteen varieties were sown on May 2, 2013, in Fafard mix 3B (Conrad Fafard, Inc., Agawam, Mass.) into 6-pack inserts. Seedlings were grown in the greenhouse at the Durham Horticulture Farm in Watkinsville, Ga. Fertilizer (10-4-3) — from Daniels Plant Foods in Sherman, Texas — was applied twice at 100 ppm.

Land was prepared at the Vidalia Onion and Vegetable Research Center (VOVRC) in Lyons, Ga., according to University of Georgia Cooperative Extension Service recommendations and covered with black plastic mulch on May 30, 2013. Just prior to laying the plastic, 800 lbs/acre of 10-10-10 was incorporated.

Plants were transported to the VOVRC and transplanted on June 3, 2013. Bed spacing was 6-foot-on-center between beds and plants were planted with a 3-ft in-row spacing. There were 10 plants per plot or experimental unit. The experiment was arranged as a randomized complete block design with four replications.

Plants were grown according to University of Georgia Cooperative Extension Service recommendations for cantaloupe production (Boyhan et al., 1999). This included weekly applications of appropriate fungicides.

Fruits were harvested beginning July 22, 2013. There were three other harvest days as well — July 24, 29 and 31. The total marketable weight and count were recorded for each plot. In addition, two fruit from each plot harvested on July 24, 2013, were measured for length, width, flesh depth, soluble solids (% sugar) and firmness.

Table 12

Vidalia Onion and Vegetable Research Center Trial Conditions

Location	VOVRC
Weather	2
Fertilizer	5
Irrigation	5
Pests	3
Overall	5

Note 1: See introduction for description of ratings scales.
Note 2: The soil type at the VOVRC was Tifton Loamy Sand with a water holding capacity of 0.06-0.15 in./in.

Table 13

Cantaloupe variety trial conducted at the Vidalia Onion & Vegetable Research Center, 2013

			Yield		Unmarketable Estimate*	
Entry	**Company**	**Type**	**(lbs/acre)**	**(No./acre)**	**(No./acre)**	**(lbs/acre)**
Tirreno F_1	Enza Zaden	Eastern	20,752	5,203	1,029	4,102
Aphrodite	Syngenta	Eastern	15,972	3,449	2,118	9,807
Sunbeam	Harris Moran	Specialty/Yellow Canary	15,367	4,296	1,634	5,844
Athena	Syngenta	Eastern	15,004	4,114	2,118	7,723
Earli-Dew F_1	Harris Seed	Honeydew	13,492	4,719	3,388	9,686
Versailles F_1	Harris Moran	Specialty	12,584	5,264	1,210	2,893
Samoa	Harris Moran	Western/Harper	11,495	5,264	1,694	3,700
Melon Amy F_1	Harris Seed	Casaba	10,588	4,901	2,420	5,228
RML0609	Syngenta	Eastern	10,043	3,691	3,025	8,232
Majus F_1	Enza Zaden	Eastern	9,438	2,783	2,481	8,412
Early Hybrid Crenshaw	Burpee	Crenshaw	7,623	1,694	1,997	8,984
Jim's Entry	Jim	Tuscany	3,630	2,783	787	1,026
Savor F_1	Johnny's	Charentais	2,239	1,210	1,271	2,350
		CV	41%	28%	37%	
		LSD (p≤0.05)	6,714	1,529	1,026	

*Estimated from the fruit count and average weight per fruit

Results of the 2013 National Sweetpotato Collaborators' Trial

Joe Kemble, Edgar Vinson and Arnold Caylor

National Sweetpotato Collaborators' trials were conducted at the North Alabama Horticulture Research Center (NAHRC) in Cullman, Ala. (Tables 14 and 15.).

Sweet potato roots from selected commercial varieties and breeding lines were planted in a heated bed on April 14 for slip production. Slips 8 to 12 inches long of two sweet potato lines were planted on June 14. Varieties were replicated four times. Plots contained two rows that were 25 feet long and 3.5 feet wide. Within-row spacing was one foot.

Soils were fertilized according to the recommendations of the Auburn University Soil Testing Laboratory and consisted of (per acre) 50 lbs N, 100 lbs P_2O_5 and 150 lbs K_2O. Consult your local county Extension agent for current recommendations for pest and weed control in vegetable production in Alabama.

Sweet potatoes were harvested on Oct. 22, 2013. Roots were graded as US #1 (roots 2 to 3.5 inches in diameter, three to nine inches in length, well-shaped and free of defects), canner (roots one to two inches in diameter, two to seven inches in length), jumbo (roots that exceed the diameter, length, and weight requirements of the US #1 grade, but that are of marketable quality), or cull (roots at least one inch in diameter but so misshapen or unattractive that they could not be classified as marketable roots). Marketable yield was calculated by adding the yields of the US #1, canner, and jumbo grades. Percent US #1 was calculated by dividing the yield of the US #1 grade by the marketable yield (Table 15).

Table 14

Ratings Of The 2013 National Sweetpotato Collaborators' Trial

Location	NAHRC
Weather	5
Fertility	5
Irrigation	5
Pests	5
Overall	5

Note: See introduction for description of ratings scales

Table 15

Total Production and Grade Distribution of Sweet Potato Selections (50-lbs bu/a)

Selection	Total Marketable bu/a	US #1 bu/a	Jumbo bu/a	Canner bu/a	Percent US #1	Cull bu/a
NC-7364	995	663	144	189	67	19
Covington	659	488	22	149	74	22
Orleans	691	470	12	187	66	104
B-63*	688	454	45	196	62	56
B-14*	584	386	44	154	66	40
L 07-146	568	359	24	189	66	15
R^2	0.68	0.66	0.54	0.25	0.31	0.68
CV	18	17	97	20	10	58
LSD	199	52	102	55	10	37

* = Modified versions of 'Beauregard'

Note: Average yields are given on a per acre basis.

US #1's - Roots 2" to 3 1/2" diameter, length of 3" to 9", must be well shaped and free of defects.

Canners - Roots 1" to 2" diameter, 2" to 7" in length.

Jumbos - Roots that exceed the diameter, length and weight requirements of the above two grades, but are of marketable quality.

Percent US #1's - Calculated by dividing the weight of US #1's by the total marketable weight (Culls not included).

Culls - Roots must be 1" or larger in diameter and so misshapen or unattractive that they could not fit as marketable roots in any of the above three grades.

APPENDIX

Seed Sources
(Alabama Trials)

Seeds Donated by:

Sakata
P.O. Box 880
Morgan Hills, CA
95038-0880
Tech. Rep: Jay Jones
(239) 289-2130

Wax Seeds
121 Front Street North
Amory, MS 38821
(662) 256-3511

Other Seed Companies:

Johnny's Select Seeds
To Order: (207) 437-4395
955 Benton Ave
Winslow, ME 04901
Tech. Rep: Steve Woodward
(207) 861-3900
info@johnnyseeds.com

Willhite Seeds
P.O. Box 4938
Modesto, CA 95352
Tech Rep: Terry Kelly
(229) 947-3253
t.kelly@hmclause.com

Seedway
To order: (800) 952-7333
1225 Zeager Road
Elizabethtown, PA 17022
Tech Rep: James J. Pullins
(717) 367-1075 - Phone
(717) 367-0387 - Fax
info@seedway.com

Territorial Seeds
2221 North Park Ave.
Tifton GA 31796
Tech Rep: Rusty Autry
(229) 386-0750