2022 Vidalia Onion

Extension and Research Report

UNIVERSITY OF GEORGIA
EXTENSION

2022 University of Georgia Vidalia Onion Extension and Research Report

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Much of the research presented in this report was sponsored by the Vidalia Onion Committee. We thank them for their support.

2022 University of Georgia Vegetable Extension and Research Report

UGA Vidalia Onion Variety Trial 2020-2021 Crop Season

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Introduction

The University of Georgia (UGA) evaluated short day onions to determine their performance characteristics in standardized growing practices. The varieties included in the trial were provided by participating seed companies. These trials are conducted at the Vidalia Onion and Vegetable Research Center.

Materials and Methods

There were 50 varieties entered into the 2020–2021 trial. Transplants were grown on seedbeds at the Vidalia Onion and Vegetable Research Center in Lyons, GA. Seedbeds were fumigated with 75 gallons per acre of metam-sodium. The seedbeds were sown on September 22, 2020, and the trial was transplanted on December 8, 2020. Upon harvest and grading, yield measurements were taken, and a 10-bulb sample of jumbo onions per plot was sent to the UGA Crop Quality Laboratory in Athens, GA, to undergo flavor testing. Seedbed fertility, trial fertility, and fungicide programs are listed below. The trial evaluated all 50 varieties in 20-ft-long by 6-ft-wide plots. Each variety was replicated four times and harvested based on maturity. The plant population for the trial was equivalent to 87,120 plants per acre.

Seedbed Fertility:

- 300 lb/acre of 10-10-10 applied September 21, 2020 (preplant incorporated)
- 200 lb/acre of 10-10-10 applied September 23, 2020
- 200 lb/acre of 10-10-10 applied October 14, 2020
- 200 lb/acre of 10-10-10 applied October 28, 2020
- 100 lb/acre of 10-10-10 applied November 2, 2020
  Total pounds/acre applied:
  100 (N) – 100 (P) – 100 (K) – 120 (S)

Note: All fertilizer applications were applied with a First Products brand drop spreader.

Seedbed Pesticides Applied:

Date	Product Applied
Aug. 11, 2020	Vapam HL (75 gallon/acre)
Sept. 21, 2020	Lorsban (1 quart/acre) preplant incorporated
Sept. 22, 2020	Dacthal (4 pint/acre)
Oct. 27, 2020	Fontelis (16 oz/acre) + Kocide 3000 (.75 lb/acre)
Nov. 2, 2020	Inspire Super (20 oz/acre) + Kocide 3000 (.75 lb/acre)

Trial Fertility:

- 300 lb/acre of 5-10-15 applied December 16, 2020
- 300 lb/acre of 5-10-15 applied January 11, 2021
- 300 lb/acre of 5-10-15 applied February 4, 2021
- 128 lb/acre of calcium nitrate applied February 25, 2021
- 178 lb/acre of calcium nitrate applied March 9, 2021
  Total pounds/acre applied:
  92.43 (N) – 90 (P) – 135(K) – 27 (S)

Note: Soil sample test results called for 125–150 lb/acre nitrogen, 60 lb/acre of phosphorus, 90 lb/acre of potash, and 40–60 lb/acre of sulfur. All fertilizer applications were applied with a First Products brand drop spreader.

Fungicides Applied:

Date	Fungicide Applied
Jan. 21, 2021	Mazate Pro-Stick (3 lb/acre) + Kocide 3000 (0.75 lb/acre)
Feb. 3, 2021	Luna Tranquility (27 oz/acre) + Bravo Weather Stik (3 pint/acre)
Feb. 24, 2021	Miravis Prime (12 oz/acre) + Quadris Top (14 oz/acre)
Mar. 8, 2021	Inspire Super (20 oz/acre) + Lifegard WG (2 oz/acre)
Mar. 15, 2021	Bravo Weather Stik (3 pint/acre) + Manzate Pro-Stick (3 lb/acre) + Kocide 3000 (1.5 lb/acre)
Mar. 23, 2021	Kocide 3000 (1.5 lb/acre) + Omega 500 (1 pint/acre)
Apr. 6, 2021	Kocide 3000 (1.5 lb/acre) + Omega 500 (1 pint/acre)
Apr. 13, 2021	Kocide 3000 (1.5 lb/acre) + Lifegard WG (2 oz/acre) + Pristine (18.5 oz/acre)

Insecticides Applied:

Date	Product Applied
Dec. 16, 2020	Lorsban (1 quart/acre)
Mar. 8, 2021	Torac (24 oz/acre)
Mar. 15, 2021	Radiant (10 oz/acre)
Mar. 23, 2021	Torac (24 oz/acre)
Apr. 6, 2021	Radiant (10 oz/acre)
Apr. 13, 2021	Torac (24 oz/acre)

Herbicides Applied:

Date	Product Applied
Dec. 9, 2020	Goal 2XL (1 quart/acre) + Prowl (1 quart/acre)

Harvest Timing

Each variety was evaluated and selected for harvest based upon signs of weak tops and/or adequately sized bulbs. A committee of Extension agents determined the harvest/pulling of varieties. Participating seed companies reserve the right to specify when or what characteristics determine the harvest of their variety. Varieties were clipped 7 days after their dig date. Growing degree days (GDD) aid in forecasted harvest maturity date. A base temperature of 50 °F is used in formulating GDDs accumulated.

Variety	Maturity	Planting date	Dig date	Days after transplanting to digging	GDD 50 °F base
Fast Track, Quick Start, WI-129, Candy Joy, Candy Ann, DP 1407	Very Early	December 8, 2020	April 6, 2021	119	674
Sweet Emotion, New Frontier, Candy Kim, Vidora, Sweet Agent, Vulkana,	Early	December 8, 2020	April 13, 2021	126	797
Sapelo, NUN 1011, Tania, Red Maiden, Sofire, Dulciana, Maragogi, Red Sensation	Medium	December 8, 2020	April 19, 2021	132	894
A1639, Sabrina, Emy 55126, Plethora, J3013, Pirate, J3018, Sivan, Miss Scarlet, Monja Blanca, Rio Dulce, EMR 57357, Red Duke	Med–Late	December 8, 2020	April 26, 2021	139	984
Superex, SON-109Y, GA Boy, Emy 55045, Emy 55455, Emy 55457, Macon, Allison, Sweet Azalea, PRR, Sweet Magnolia, Century, Rio Del Sol, Red Hunter, Lucille, Mata Hari	Late	December 8, 2020	May 3, 2021	146	1143

Results and Discussion

The following tables show field weights, marketable yields, colossal yields, jumbo yields, medium yields, and cull yield. For additional information, please contact your Extension agent or the Vidalia Onion and Vegetable Research Center.

Variety Entries in the 2020-2021 Trial

Variety name	Company	Type
A1639	Hazera	Yellow Granex
Sivan	Hazera	Pink/Red
Miss Scarlet	Hazera	Red
Sweet Emotion	Clifton Seed	Yellow Granex
Fast Track	Clifton Seed	Yellow Granex
Quick Start	Clifton Seed	Yellow Granex
Sabrina	East-West Seed Co.	Yellow Granex
Superex	Takii	Yellow Granex
Rio Del Sol	Takii	Yellow Grano
Rio Dulce	Takii	Yellow Grano
WI-129	Wannamaker	Yellow Granex
New Frontier	Wannamaker	Yellow Granex
SON-109Y	Sakata	Yellow Granex
Candy Joy	Solar	Yellow Granex
Candy Ann	Solar	Yellow Granex
Candy Kim	Solar	Yellow Granex
Sapelo	DP Seeds	Yellow Granex
Miss Megan	DP Seeds	Yellow Granex
1407	DP Seeds	Yellow Granex
GA Boy	DP Seeds	Yellow Granex
Lucille	DP Seeds	Red
EMY 55045	Emerald	Yellow Granex
EMY 55126	Emerald	Yellow Granex
EMY 55455	Emerald	Yellow Granex
EMY 55457	Emerald	Yellow Granex
EMR 57357	Emerald	Red
NUN 1011	Nunhems	Yellow Granex
Vidora	Nunhems	Yellow Granex
Plethora	Nunhems	Yellow Granex
Vulkana	Nunhems	Yellow Globe
Sofire	Nunhems	Red
Mata Hari	Nunhems	Red
Dulciana	Nunhems	Yellow Grano
J3013	Bejo	Yellow Granex
Pirate	Bejo	Yellow Granex
Macon	Bejo	Yellow Granex
Tania	Bejo	Yellow Granex
Allison	Bejo	Yellow Granex
J3018	Bejo	Yellow Granex
Red Hunter	Bejo	Red
Monja Blanca	Bejo	White
Maragogi	Bejo	Yellow Granex
Red Sensation	Bejo	Red

continued on next page

Variety name	Company	Type
Red Duke	Bejo	Red
Sweet Azalea	Seminis	Yellow Granex
Sweet Agent	Seminis	Yellow Granex
PRR	Seminis	Yellow Granex
Sweet Magnolia	Seminis	Yellow Granex
Century	Seminis	Yellow Granex
Red Maiden	Seminis	Red

Table 1. Vidalia onion field weight (40-lb bags per acre) measured *before* grading.

Variety	Company	Total yield 40 lb. bags/acre	
Sweet Azalea	Seminis	1550	a
EMY 55457	Emerald	1527	ab
GA Boy	DP Seeds	1493	abc
Sweet Magnolia	Seminis	1457	abcd
Macon	Bejo	1449	abcde
Superex	Takii	1428	abcdef
Rio Del Sol	Takii	1421	abcdefg
EMY 55455	Emerald	1416	abcdefg
Lucille	DP Seeds	1416	abcdefg
Allison	Bejo	1405	abcdefgh
SON-109Y	Sakata	1376	abcdefghi
EMY 55045	Emerald	1358	abcdefghi
Mata Hari (red)	Nunhems	1353	abcdefghij
Plethora	Nunhems	1318	bcdefghijk
J3018	Bejo	1317	bcdefghijk
J3013	Bejo	1316	bcdefghijk
A1639	Hazera	1288	cdefghijkl
Miss Megan	DP Seeds	1264	defghijklm
Rio Dulce	Takii	1248	defghijklmn
EMY 55126	Emerald	1241	efghijklmno
Red Hunter (red)	Bejo	1234	efghijklmnop
Century	Seminis	1233	fghijklmnop
Monja Blanca	Bejo	1231	fghijklmnop
PRR	Seminis	1210	ghijklmnop
Sabrina	East-West Seed	1200	hijklmnopq
Red Duke (red)	Bejo	1181	ijklmnopq
Pirate	Bejo	1179	ijklmnopq
Vidora	Nunhems	1141	jklmnopqr
Maragogi	Bejo	1126	klmnopqrs
NUN 1011	Nunhems	1111	klmnopqrs
Miss Scarlet	Hazera	1096	lmnopqrs
Red Sensation (red)	Bejo	1065	mnopqrst
New Frontier	Wannamaker	1047	nopqrstu
Sapelo Sweet	DPSeeds	1031	opqrstuv
Candy Kim	Solar	1021	pqrstuv
Tania	Bejo	1021	pqrstuv
1407	DPSeeds	995	qrstuvw
Sweet Emotion	Shamrock	939	rstuvwx
Dulciana	Nunhems	936	rstuvwx
Candy Ann	Solar	932	rstuvwx
WI-129	Wannamaker	925	stuvwx
Sweet Agent	Seminis	864	tuvwx
Red Maiden (red)	Seminis	839	uvwxy
Sivan	Hazera	818	vwxy
Fast Track	Shamrock	804	wxy
Candy Joy	Solar	797	wxy
Sofire (red)	Nunhems	782	wxy
EMY 57357	Emerald	768	xy
Quick Start	Shamrock	753	xy
Vulkana	Nunhems	647	y

Note. Letters that are the same between varieties indicate that those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 2. Vidalia onion marketable yield (40-lb bags per acre) measured after grading.

Variety	Total yield 40 lb. bags/acre	
EMY 55457	1407	a
Macon	1332	ab
Rio Del Sol	1316	abc
Lucille	1295	abc
GA Boy	1248	abcd
Mata Hari	1236	abcd
Sweet Azalea	1236	abcd
Sweet Magnolia	1202	abcde
J3013	1180	abcdef
A1639	1168	abcdef
Plethora	1157	abcdef
EMY 55455	1155	abcdef
Superex	1150	abcdef
Rio Dulce	1148	abcdef
J3018	1130	abcdef
Allison	1123	bcdefg
EMY 55045	1118	bcdefg
Monja Blanca	1112	bcdefg

Variety	Total yield 40 lb. bags/acre	
Red Hunter	1103	bcdefg
Vidora	1084	bcdefg
NUN 1011	1082	bcdefg
SON-109Y	1069	bcdefgh
EMY 55126	1066	bcdefgh
Sabrina	1060	bcdefghi
Miss Megan	1050	cdefghij
Red Sensation	1016	defghijk
Maragogi	1010	defghijkl
Red Duke	994	defghijkl
Tania	935	efghijklm
Sapelo Sweet	923	fghijklm
Miss Scarlet	914	fghijklm
Pirate	908	fghijklmn
Dulciana	905	fghijklmn
PRR	869	ghijklmno
Candy Kim	803	hijklmno
New Frontier	787	ijklmnop
1407	778	jklmnop
Candy Ann	751	klmnop
Century	735	lmnop
Red Maiden	710	mnop
Sweet Agent	703	mnop
WI-129	701	mnop
Sofire	678	mnopq
Fast Track	674	mnopq
Candy Joy	635	nopq
Sivan	626	opq
EMY 57357	601	opq
Quick Start	592	opq
Sweet Emotion	533	pq
Vulkana	408	q

Note. Letters that are the same between varieties indicate that those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 3. Vidalia onion colossal yield (40-lb bags per acre) measured after grading.

Variety	Total yield 40 lb. bags/acre	
GA Boy	184	a
Rio Del Sol	136	ab
Sweet Magnolia	136	ab
Century	120	abc
Miss Megan	93	bcd
Sweet Azalea	93	bcd
Macon	86	bcd
EMY 55455	86	bcd
Lucille	68	cde
EMY 55457	68	cde
EMY 55045	64	cdef
Allison	61	cdef
PRR	54	cdef
Plethora	48	def
SON-109Y	45	def
Superex	45	def
Pirate	34	def
Mata Hari	18	ef
J3018	18	ef
Red Hunter	14	ef
Miss Scarlet	9	ef
J3013	7	ef
Red Duke	5	ef
Fast Track	2	ef
Monja Blanca	2	ef
Sabrina	2	ef
New Frontier	2	ef
NUN 1011	2	ef
Rio Dulce	2	ef
Sapelo Sweet	2	ef
Vulkana	2	ef
Tania	2	ef
Vidora	2	ef
A1639	2	ef
Candy Ann	2	ef
EMY 55126	2	ef
EMY 57357	0	f
Maragogi	0	f
Quick Start	0	f
Red Maiden	0	f
Red Sensation	0	f
Sivan	0	f
Sofire	0	f
1407	0	f
Dulciana	0	f
Sweet Agent	0	f
Candy Joy	0	f
Candy Kim	0	f
Sweet Emotion	0	f
WI-129	0	f

Note. Letters that are the same between varieties indicate that those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 4. Vidalia onion jumbo yield (40-lb bags per acre) measured after grading.

Variety	Total yield 40 lb. bags/acre	
EMY 55457	1302	a
Macon	1180	ab
Lucille	1155	abc
Mata Hari	1130	abcd
Sweet Azalea	1114	abcde

Variety	Total yield 40 lb. bags/acre	
J3013	1114	abcde
A1639	1098	abcde
Superex	1078	abcdef
Plethora	1062	abcdef
Rio Del Sol	1044	abcdef
J3018	1041	abcdef
Rio Dulce	1041	abcdef
Sweet Magnolia	1023	abcdefg
EMY 55455	1019	abcdefg
Allison	1005	abcdefgh
GA Boy	1005	abcdefgh
EMY 55126	1003	bcdefgh
Monja Blanca	994	bcdefgh
EMY 55045	991	bcdefgh
Sabrina	987	bcdefgh
Red Hunter	966	bcdefghi
SON-109Y	955	bcdefghij
Vidora	951	bcdefghij
Miss Megan	883	bcdefghijk
Maragogi	880	cdefghijk
NUN 1011	878	cdefghijk
Red Duke	878	cdefghijk
Pirate	851	defghijk
Miss Scarlet	819	efghijkl
Red Sensation	794	fghijkl
Tania	787	fghijklm
PRR	783	fghijklm
Sapelo Sweet	728	ghijklmn
Dulciana	710	hijklmn
Candy Kim	678	ijklmno
New Frontier	662	jklmno
1407	601	klmnop
Century	588	klmnop
Candy Ann	538	lmnopq
Sweet Agent	495	mnopq
Sivan	476	nopq
Sofire	467	nopq
WI-129	463	nopq
EMY 57357	458	nopq
Sweet Emotion	438	nopq
Fast Track	433	nopq
Red Maiden	395	opq
Quick Start	358	pq
Candy Joy	336	pq
Vulkana	284	q

Note. Letters that are the same between varieties indicate that those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 5. Vidalia onion medium yield (40-lb bags per acre) measured after grading.

Variety	Medium yield 40 lb. bags/acre	
Red Maiden	315	a
Candy Joy	299	ab
WI-129	238	abc
Fast Track	238	abc
Quick Start	234	abcd
Red Sensation	222	abcde
Candy Ann	211	bcdef
Sofire	211	bcdef
Sweet Agent	209	bcdef
NUN 1011	202	bcdefg
Dulciana	195	cdefgh
Sapelo Sweet	193	cdefgh
1407	177	cdefghi
Sivan	150	cdefghij
Tania	145	cdefghijk
EMY 57357	143	cdefghijk
Rio Del Sol	136	cdefghijkl
Vidora	132	defghijklm
Maragogi	129	efghijklmn
Candy Kim	125	efghijklmno
New Frontier	123	fghijklmno
Vulkana	123	fghijklmno
Red Hunter	123	fghijklmno
Monja Blanca	116	fghijklmno
Red Duke	111	fghijklmno
Rio Dulce	104	ghijklmno
Sweet Emotion	95	hijklmno
Mata Hari	88	ijklmno
Miss Scarlet	86	ijklmno
Miss Megan	75	ijklmno
Lucille	73	jklmno
J3018	70	jklmno
Sabrina	70	jklmno
SON-109Y	68	jklmno
A1639	68	jklmno
Macon	66	jklmno
EMY 55045	64	jklmno
EMY 55126	61	jklmno
GA Boy	59	jklmno
J3013	59	jklmno
Allison	57	jklmno
EMY 55455	50	jklmno
Plethora	48	jklmno
Sweet Magnolia	43	klmno
EMY 55457	36	lmno
PRR	32	mno
Sweet Azalea	29	mno

Variety	Medium yield 40 lb. bags/acre	
Superex	27	no
Century	27	no
Pirate	23	o

Note. Letters that are the same between varieties indicate that those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 6. Vidalia onion cull yield (40-lb bags per acre) measured after grading.

Variety	Culls yield 40 lb. bags/acre	
Century	498	a
Sweet Emotion	406	ab
PRR	341	abc
Sweet Azalea	313	abcd
SON-109Y	307	bcde
Allison	282	bcdef
Superex	278	bcdef
Pirate	271	bcdefg
Red Duke	265	bcdefgh
EMY 55455	261	bcdefg
New Frontier	260	bcdefg
Sweet Magnolia	254	bcdefgh
GA Boy	245	bcdefgh
EMY 55045	239	bcdefghi
Vulkana	238	bcdefghi
WI-129	223	bcdefghij
Candy Kim	218	cdefghij
1407	217	cdefghij
Miss Megan	213	cdefghijk
Sivan	192	cdefghijk
J3018	187	cdefghijk
Candy Ann	182	cdefghijk
Miss Scarlet	182	cdefghijk
EMY 55126	175	cdefghijk
EMY 57357	167	cdefghijk
Candy Joy	162	cdefghijk
Plethora	161	cdefghijk
Sweet Agent	161	cdefghijk
Quick Start	161	cdefghijk
Sabrina	141	defghijk
J3013	136	defghijk
Red Hunter	132	defghijk
Fast Track	130	defghijk
Red Maiden	129	defghijk
EMY 55457	120	efghijk
Lucille	120	efghijk
A1639	119	fghijk
Monja Blanca	119	fghijk
Macon	117	fghijk
Maragogi	117	fghijk
Mata Hari	117	fghijk
Sapelo Sweet	108	fghijk
Rio Del Sol	105	fghijk
Sofire	103	fghijk
Rio Dulce	100	fghijk
Tania	86	ghijk
Vidora	57	ijk
Dulciana	51	hijk
Red Sensation	49	jk
NUN 1011	28	k

Note. Letters that are the same between varieties indicate that those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

UGA Variety Trial Quality Report 2020-21 Crop Season

Jason Lessl, Daniel Jackson, Chris Tyson, Jason Edenfield, Ben Reeves, Aubrey Shirley, Derrick Bowen, Denny Thigpen, Daniel Clark, Steven Powell, Savannah Tanner, Zack Williams, and Ross Greene

Introduction

Each season the University of Georgia evaluates flavor-associated compounds from short-day onions grown in the annual variety trial. These onion varieties are submitted by participating seed companies, grown at the Vidalia Onion and Vegetable Research Center, harvested, dried, and submitted to the Agricultural and Environmental Services Laboratories for analysis of the pungency-related compounds, pyruvic acid lachrymatory factor (LF), and methyl thiosulfinates. Because of the association of Vidalia onions with low pungency and sweet flavor, this annual evaluation provides useful information about the relative flavor quality of these onion varieties.

This publication summarizes the flavor analysis results from the 2020–2021 growing season, and compares the performance of each variety over the past three growing seasons.

Materials and Methods

Fifty onion varieties were analyzed as part of the 2020–2021 variety trial. Each variety was grown at the Vidalia Onion and Vegetable Research Center in quadruplicate plots. Harvested onions from each plot were dried and submitted to the lab individually. Cores were taken from 10 onions within each replicate, composited, and pressed to collect onion juice which was analyzed following the procedures described in Kim et al. (2017).

Results and Discussion

The following tables compare the concentrations of flavor-associated compounds in onions grown as a part of the 2020–2021 variety trial. It should be noted that as the three measured parameters decrease, the onions are considered to have a more superior flavor quality. In this year's trials, the pyruvic acid (pungency) content ranged from 1.99–4.19 µmol/ml, which is a decrease of 35% compared to the past two growing seasons. Lachrymatory factor ranged from 1.41–5.27 µmol/ml, which was consistent with the past two seasons. Finally, methyl thiosulfinates ranged from 6.4–46 nmol/ml with an overall decrease of 10% compared to the last two growing seasons. Overall, the quality results in the 2021 onion crop saw a 14% improvement (decline in overall quality parameters) as compared to the past two seasons. This could be attributed to a milder, wetter, more favorable growing season along with a 25% reduction in sulfur fertilizer applied (from 36 to 27 lb/acre). The cumulative variety flavor-quality rankings also are provided below for this year's data, along with the average rating of yellow-onion varieties grown over the past three seasons. For additional information regarding the performance of a given variety, please contact your Extension agent or the Vidalia Onion and Vegetable Research Center. We would like to thank the participating seed companies as well as the Vidalia Onion Committee for their support of this trial.

References

Kim, H., Jackson, D., Adhikari, K., Riner, C., & Sanchez-Brambila, G. (2017). Relationship between consumer acceptability and pungency-related flavor compounds of Vidalia onions. *Journal of Food Science*, *82*(10), 2396–2402.

Table 1. Pungency (pyruvic acid) content in onions submitted to the UGA Agricultural & Environmental Services Labs as a part of the 2020–2021 variety trial.

Variety	Pyruvic ccid µmole/ml	
Monja Blanca	1.99	a
Red Hunter	2.22	ab
WI-129	2.50	abc
J3018	2.68	abcd
Sweet Magnolia	2.69	abcd
Candy Joy	2.70	abcd
Vidora	2.71	abcd
Sweet Azalea	2.75	abcde
New Frontier	2.92	abcdef
XON-109Y	2.95	abcdefg
Sweet Agent	2.99	abcdefg
Pirate	3.01	abcdefg
Candy Kim	3.09	abcdefg
EMY 55457	3.14	abcdefg
Red Sensation	3.15	abcdefg
Macon	3.17	abcdefg
Red Duke	3.19	abcdefg
Candy Ann	3.19	abcdefg
Quick Start	3.19	abcdefg
Century	3.20	abcdefg
Allison	3.21	abcdefg
Fast Track	3.21	abcdefg
Sivan	3.24	bcdefg
Superex	3.26	bcdefg
EMY 55455	3.26	bcdefg
Miss Megan	3.27	bcdefg
EMY 55045	3.29	bcdefg
Plethora	3.30	bcdefg
1407	3.32	bcdefg
Sweet Emotion	3.35	bcdefg
GA Boy	3.38	bcdefg
EMY 57357	3.40	bcdefg
J3013	3.43	bcdefg
EMY 55126	3.45	bcdefg
NUN 1011	3.48	cdefg
Rio Dulce	3.48	cdefg
Miss Scarlet	3.53	cdefg
Tania	3.55	cdefg
Maragogi	3.57	cdefg
Dulciana	3.64	cdefg
Rio Del Sol	3.69	cdefg
Mata Hari	3.69	cdefg
Vulkana	3.78	defg
Sapelo Sweet	3.81	defg
Sabrina	3.85	defg
PRR	3.88	defg
Lucille	3.91	defg
A1639	3.97	efg
Red Maiden	4.01	fg
Sofire	4.19	g

Note. Similar letters between varieties indicate those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 2. Onion lachrymatory factor (propanethial S-oxide) content in onions submitted to the UGA Agricultural & Environmental Services Labs as a part of the 2020–2021 variety trial.

Variety	Lachrymatory factor µmole/ml	
Red Hunter	1.41	a
Monja Blanca	1.72	ab
Century	2.18	abc
Sweet Magnolia	2.23	abc
Sweet Azalea	2.60	abcd
Rio Del Sol	2.61	abcd
EMY 55457	2.71	abcde
Superex	2.74	abcde
Sivan	2.88	abcde
Candy Joy	2.90	abcde
Plethora	2.94	abcde
Red Sensation	3.02	abcde
Pirate	3.02	abcde
Candy Ann	3.07	abcde
Red Duke	3.13	abcde
Fast Track	3.13	abcde
Maragogi	3.16	abcde
WI-129	3.16	abcde
Macon	3.19	abcde
XON-109Y	3.20	abcde
New Frontier	3.28	abcdef
J3018	3.29	abcdef
Allison	3.31	abcdef
Tania	3.41	abcdef
Lucille	3.51	bcdef
NUN 1011	3.51	bcdef
Miss Scarlet	3.53	bcdef
EMY 55045	3.56	bcdef
Sweet Emotion	3.59	bcdef
Quick Start	3.60	bcdef
Dulciana	3.62	bcdef
PRR	3.68	bcdef
Sweet Agent	3.69	bcdef
Vidora	3.71	bcdef
Rio Dulce	3.73	cdef
EMY 55455	3.87	cdef
Miss Megan	3.91	cdef
EMY 57357	3.93	cdef
Candy Kim	3.95	cdef

Variety	Lachrymatory factor µmole/ml	
Red Maiden	4.02	cdef
Sapelo Sweet	4.17	cdef
EMY 55126	4.18	cdef
GA Boy	4.24	def
1407	4.37	def
J3013	4.46	def
Sofire	4.58	def
A1639	4.58	def
Mata Hari	4.69	ef
Sabrina	4.71	ef
Vulkana	5.27	f

Note. Similar letters between varieties indicate those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 3. Methyl thiosulfinate content in onions submitted to the UGA Agricultural & Environmental Services Labs as a part of the 2020–2021 variety trial.

Variety	Methyl thiosulfinates nmole/ml	
Sweet Magnolia	6.4	a
Sweet Azalea	7.4	ab
Dulciana	10.0	abc
Red Hunter	10.8	abc
Monja Blanca	10.9	abcd
EMY 55045	11.6	abcde
Plethora	11.8	abcde
EMY 57357	12.7	abcde
PRR	13.0	abcde
Superex	13.2	abcde
GA Boy	14.1	abcde
Allison	14.5	abcdef
Vulkana	14.6	abcdef
EMY 55126	15.3	abcdefg
EMY 55455	15.4	abcdefg
Miss Megan	15.4	abcdefg
J3013	15.7	abcdefg
Century	15.8	abcdefg
Red Duke	16.4	abcdefg
XON-109Y	17.7	abcdefg
A1639	18.1	abcdefg
Red Sensation	18.1	abcdefg
Vidora	18.2	abcdefg
EMY 55457	18.8	abcdefg
Rio Del Sol	19.1	abcdefg
Pirate	19.3	abcdefg
J3018	20.1	abcdefgh
NUN 1011	20.9	abcdefghi
Rio Dulce	21.1	abcdefghi
Red Maiden	21.6	abcdefghi
Sweet Agent	22.8	abcdefghi
Macon	24.6	abcdefghij
Mata Hari	25.3	abcdefghij
Miss Scarlet	25.7	abcdefghij
Maragogi	25.8	abcdefghij
Sabrina	25.9	abcdefghij
WI-129	26.7	abcdefghij
Sofire	26.7	abcdefghij
Tania	27.4	abcdefghij
Lucille	27.8	abcdefghij
Sapelo Sweet	28.6	abcdefghij
Sweet Emotion	30.5	bcdefghij
Candy Kim	31.9	cdefghij
New Frontier	34.1	defghij
Sivan	34.4	efghij
Fast Track	37.6	fghij
1407	38.4	ghij
Candy Joy	43.1	hij
Quick Start	43.3	ji
Candy Ann	46.8	j

Note. Similar letters between varieties indicate those varieties are not significantly different according to Tukey test ($p \leq 0.05$).

Table 4. Overall flavor quality ranking of the 2020–2021 variety trial onions ranked on lowest pyruvic acid, lachrymatory factor, and methyl thiosulfinates.

Variety	Rank
Monja Blanca	1 (t)
Red Hunter	1 (t)
Sweet Magnolia	3
Sweet Azalea	4
Century	5
WI-129	6
Plethora	7 (t)
J3018	7 (t)
Vidora	7 (t)
Red Duke	10 (t)
Red Sensation	10 (t)
XON-109Y	10 (t)
Superex	10 (t)
Allison	14 (t)
EMY 55045	14 (t)
EMY 55457	14 (t)
Pirate	14 (t)
Dulciana	18 (t)
EMY 57357	18 (t)
Macon	18 (t)
Rio Del Sol	18 (t)
Candy Joy	22 (t)
EMY 55126	22 (t)
EMY 55455	22 (t)
Maragogi	22 (t)

Variety	Rank
Miss Megan	22 (t)
New Frontier	22 (t)
PRR	22 (t)
Sweet Agent	22 (t)
Fast Track	30 (t)
GA Boy	30 (t)
NUN 1011	30 (t)
Rio Dulce	30 (t)
Sivan	30 (t)
Sweet Emotion	30 (t)
Tania	30 (t)
Candy Kim	37 (t)
J3013	37 (t)
Miss Scarlet	37 (t)
Lucille	40 (t)
Candy Ann	41 (t)
Sapelo Sweet	41 (t)
A1639	43 (t)
Quick Start	43 (t)
Red Maiden	43 (t)
Mata Hari	46 (t)
Vulkana	46 (t)
Sabrina	48
1407	49
Sofire	50

Table 5. Overall flavor quality ranking of yellow variety trial onions grown in three consecutive years (2019–2021).

Variety	Rank
Sweet Magnolia	1
Sweet Azalea	2
Century	3
Plethora	4
Alison	5(t)
XON 109Y	5(t)
Sweet Agent	5(t)
Dulciana	5(t)
Macon	5(t)
Vidora	5(t)
EMY 55126	5(t)
Pirate	12
EMY 55455	13(t)
PRR	13(t)
WI-129	13(t)
New Frontier	13(t)
Tania	13(t)
Vulkana	13(t)
Candy Joy	19(t)
Candy Kim	19(t)
Sweet Emotion	19(t)
Candy Ann	22(t)
Fast Track	22(t)
1407	24(t)
Quick Start	24(t)
Sapelo	26

Note. Varieties are ranked in order of lowest overall pyruvic acid, lachrymatory factor, and methyl thiosulfinates. Only those yellow varieties with data from all three growing seasons were included in the table.

Irrigation and Nitrogen Fertilizer Strategies for Vidalia Onion Production

Hanna de Jesus, Joara Candian, Chris Tyson, Bhabesh Dutta, Andre da Silva, and Timothy Coolong

Introduction

The sandy loam soils of Southeast Georgia can greatly increase the risk of soil nitrogen (N) leaching due to heavy rains or irrigation and consequently impact the production of sweet onions. Therefore, enhanced management of N fertilization may both reduce leaching and ensure soil N availability throughout onion development. The objective of this study was to evaluate the effects of irrigation method, N fertilizer rates, and timing for the last N fertilizer application on sweet onion production.

Materials and Methods

A field experiment was conducted in the 2021 Vidalia onion season at the University of Georgia Vidalia Onion and Vegetable Research Center in Lyons, GA. Onions were seeded during September 2020 in nursery beds and transplanted to the field on December 10, 2020. The experimental area was comprised of four adjacent beds approximately 5 in. tall, 370 ft long, with 6-ft center-to-center spacing. Each bed was comprised of four onion rows with an in-row spacing of 4 in., and experimental plots were 30 ft long with 5-ft alleys between adjacent plots within each bed. Crop management practices associated with soil preparation, transplanting, and management of pest, weeds, and diseases followed UGA recommendations.

The experiment had two irrigation methods, three N fertilizer rates and three timings for the last N fertilizer application (Table 1), with four replications of each treatment combination. The N fertilizer applications were performed at transplanting, at 27 and 49 days after transplanting (DAT), and the last N application was made either at 68, 78, or 88 DAT. Three total N fertilizer rates of 75, 105 and 135 lb/acre N were used. Each application timing received 20% of total N applied, except for the last application, in which the remaining 40% of the season-total N was applied. Irrigation was performed according to crop requirements (evapotranspiration), with overhead or drip irrigation.

Onions were harvested on April 20, 2021 (131 DAT), cured for 20 days, and graded according to the USDA standards for Granex-type onions. Statistical analyses were performed to compare total yield and bulb size distribution among treatments. Center rot and sour skin bulb symptoms were assessed 30 days after harvest following incubation at 34 °F and 75–80% relative humidity.

Table 1. Treatment combinations.

Irrigation method	N rate (lb/acre)	Last N application timing
Drip	75	Before bulb swelling
Overhead	105	At bulb swelling
	135	After bulb swelling

Results and Discussion

During the 2021 onion production season, 28 in. of rain fell, which was greater than the onion crop water need. This may have induced nutrient leaching. Still, rainfall events were not uniformly distributed throughout the season and irrigation was required during dry periods.

The results for total yield and bulb size distribution are presented on Table 2. For the N rate treatments, the highest total yield was obtained with 135 lb/acre N, while the lowest total yield was obtained with 75 lb/acre N. However, no significant differences were measured between 135 and 105 lb/acre N, and between 105 and 75 lb/acre N. Similar results were obtained for the yield of jumbo onions, which represents 68.85% of total yield. In contrast, the different N rates did not affect the yield of colossal and medium sizes and culls, representing 1.0%, 23.9%, and 6.3% of total yield, respectively.

Total yield and yield of jumbo onions were significantly higher with the use of overhead system compared to the drip system. In contrast, the highest yield for medium onions was obtained under drip irrigation. No differences were measured among irrigation methods for the yield of colossal onions and culls.

For the N application timing treatments, the highest total yield was measured when N was applied before bulb swelling, while the lowest total yield was obtained with N applied after bulb swelling.

Table 2. Total yield and bulb size distribution for Vidalia onions grown in the 2021 season.

Treatments	Total yield	Colossal	Jumbo	Medium	Culls
	Yield (40-lb bags per acre)				
N Rate					
75 lb/acre	1056 b*	4 a	697 b	288 a	67 a
105 lb/acre	1106 ab	7 a	775 ab	256 a	68 a
135 lb/acre	1147 a	10 a	813 a	258 a	67 a
Irrigation method					
Drip	1071 b	6 a	703 b	288 a	74 a
Overhead	1136 a	8 a	820 a	247 b	61 a
Last N application timing					
Before bulb swelling	1152 a	6 a	840 a	239 b	68 a
Bulb swelling	1116 ab	8 a	784 a	262 b	61 a
After bulb swelling	1043 b	8 a	660 b	302 a	73 a

Note. Values followed by the same letters indicate no significant difference by the Tukey test ($p < 0.05$) among N rates, irrigation methods, or last N fertilizer application.

The N applied after bulb swelling causes a significant reduction in the yield of jumbo, resulting in a greater yield of medium bulbs. No significant differences were measured among the different timings in the yield of colossal onions and culls.

The incidence of diseases on onion bulbs after harvest was low, regardless of treatment combinations, and no significant differences were measured among treatments on center rot and sour skin bulb incidence (Table 3).

Table 3. Center rot and sour skin bulb incidence after harvest.

Treatments	Center rot	Sour skin
	Incidence (%)	
N Rate		
75 lb/acre	0.26 a	0.00 a
105 lb/acre	0.75 a	0.00 a
135 lb/acre	0.75 a	0.00 a
Irrigation		
Overhead	0.86 a	0.00 a
Drip	0.31 a	0.00 a
Last application timing		
Before bulb swelling	0.75 a	0.00 a
Bulb swelling	0.42 a	0.00 a
After bulb swelling	0.58 a	0.00 a

Conclusion

The N rate treatments mainly affected the yield of jumbo onions. The highest yield was measured with 135 lb/acre N, but there was not statistical difference between 135 and 105 lb/acre N. Additionally, onion yield benefited from an earlier last N application—either before or at bulb swelling—as well as using overhead irrigation to supply crop water demands during the season. Bacterial diseases occurred at a very low percentage for onions harvested in the 2021 trial.

Sulfur Content and Leaching Rate Differs in Soils of the Vidalia Onion Production Region

Daniel Jackson, Jason Lessl, and Chris Tyson

Introduction

Previous work by the University of Georgia has demonstrated that large quantities of sulfur exist in the subsurface soil layers within the Vidalia region. Fieldwork conducted in 2014 and 2016 suggests a high-yielding onion crop has an average peak sulfur uptake and removal of 23 lb/acre and 11 lb/acre, respectively. Meanwhile, each growing season 30–60 lb/acre or more of additional S is commonly applied to fields in the region, through the incorporation of the SO_4-S in the industry-standard complete fertilizer blend and poultry litter applications. This excess sulfur readily leaches through the sandy surface soil horizon, but accumulates in the claypan, which is commonly 12–16 in. below the soil surface in many of the soils of the Vidalia area. Previous observations have shown onion roots can easily reach and penetrate the claypan during the growing season, and therefore have access to the large sulfur deposits that accumulate within these subsurface soil horizons. With such large soil sulfur deposits, Vidalia onions potentially have access to sizable reservoirs of unaccounted sulfur, which could negatively affect flavor profile. Therefore, before accurate fertilization recommendations can be made to support sweet onion production, the rate of leaching of the existing sulfur deposits needs to be understood.

Materials and Methods

Soil samples were collected in December 2019 from six onion fields from across the Vidalia production region, representing multiple counties and soil types (Table 1). Individual soil samples were collected from each soil horizon (top [surface] 6 in. and subsurface claypan) at each site. Samples were then dried, ground, and sulfur content (total and plant available) was determined. Leachate columns were constructed using moist, unground soil in 2-in. PVC pipe to mimic the soil profile of each location based on the depths of each soil horizon (three replicates per site = 18 total columns). A ¼-in. hole was drilled into the PVC cap glued to the bottom end of the column to allow draining. Specific volumes of deionized water (DI H_2O) were applied to the columns every 2 weeks based on the mean historical rainfall of Lyons, GA, during the corresponding 2-week period. For example, the historical mean precipitation for April is 3.05 in., so the equivalent of ~1.5 in. of DI H_2O was applied during two leaching events that occurred in April. Leachate was collected in 1-L plastic bottles. Approximately 5–7 days after each event, the leachate was collected and analyzed for available nutrients using inductively coupled plasma (ICP). A control column was created using lab-grade sand, which was leached and analyzed along with other columns (Figure 1).

Results and Discussion

The amount of sulfur contained in the leachate differed considerably between soils from the various grower locations, as well as among the leaching events (Figure 2). The first two leaching events (February 10, 2020, and March 3, 2020) resulted in the greatest sulfur loss for many of the soils, particularly the soils from Growers 2 and 5, and the Vidalia Onion and Vegetable Research Center. Following these initial leaching events, the amount of DI H_2O applied was increased and a smaller secondary peak in the concentration of sulfur in the leachate occurred from soils across all sites. Indicating more sulfur being leached during the summer months (June–August) when seasonal rainfall is generally higher compared to the drier fall and early winter (October–December). The amount of sulfur leached increased in March 2021 compared to the previous few months, mirroring the historical season precipitation, but also indicating that even following a full year of leaching, these soils contain reserves of leachable sulfur.

Prior to planting and fertilization, soils across the Vidalia region contained a considerable amount of sulfur, ranging from 106–227 lb S/acre in the topsoil horizon, and 67–825 lb S/acre in the subsoil claypan (Table 2). Between the two soil horizons, the subsurface claypan generally contained a much higher concentration of sulfur, which is expected because of the adsorptive properties of iron and aluminum oxides commonly associated with the clay particles in this horizon. Of the sulfur contained in the topsoil layers, about 30% or 67 lb/acre on average, was in the plant-available sulfate (SO_4^{2-}) form. Prior research conducted by UGA in 2014 and 2016 suggests a high-yielding onion crop has an average peak sulfur uptake and removal of 23 lb/acre and 11 lb/acre. This indicates that many of the soils in the Vidalia region may already contain enough sulfur in the topsoil layer to support a high-yielding onion crop without the addition of sulfur-containing fertilizers.

As expected, the soils collected from all grower locations and horizons had reduced sulfur content following the 12-month leaching period, losing about 34% of the total sulfur on average. However, this indicates that even following an entire year without applying additional sulfur, some soils in the Vidalia onion region will likely still contain sufficient sulfur to support onion growth.

The specific amount of sulfur leached varied substantially between locations, ranging from an average of 55 lb S/acre in the soil collected from Grower 3, to 354 lb S/acre on average from the soil from Grower 2. The amount of sulfur leached likely depends on amount of sulfur originally contained within the soil, as well as the physiological and chemical characteristics of the soil like pH, texture, and the concentrations of aluminum and iron oxides.

Conclusion

This study indicates that many of the soils in the Vidalia growing region contain large deposits of sulfur within the onion rooting zone, and while these reserves are depleted over time due to leaching, even after a full year without additional fertilizer applications the sulfur contained in these soils may often exceed the requirements of a high-yielding onion crop. Therefore, developing a fertilizer program that considers the amount of sulfur already contained within the soil is critical when growing sweet onions within the Vidalia region.

Table 1. County location and soil series description of the soil types used to construct the leaching columns.

Sample ID	County	Soil Type
Control	—	Sand
Grower #1	Tattnall	Leefield
Grower #2	Toombs	Carnegie
Grower #3	Toombs	Tifton
Grower #4	Tattnall	Tifton
Grower #5	Candler	Tifton
VOVRC*	Toombs	Irvington

* Vidalia Onion and Vegetable Research Center

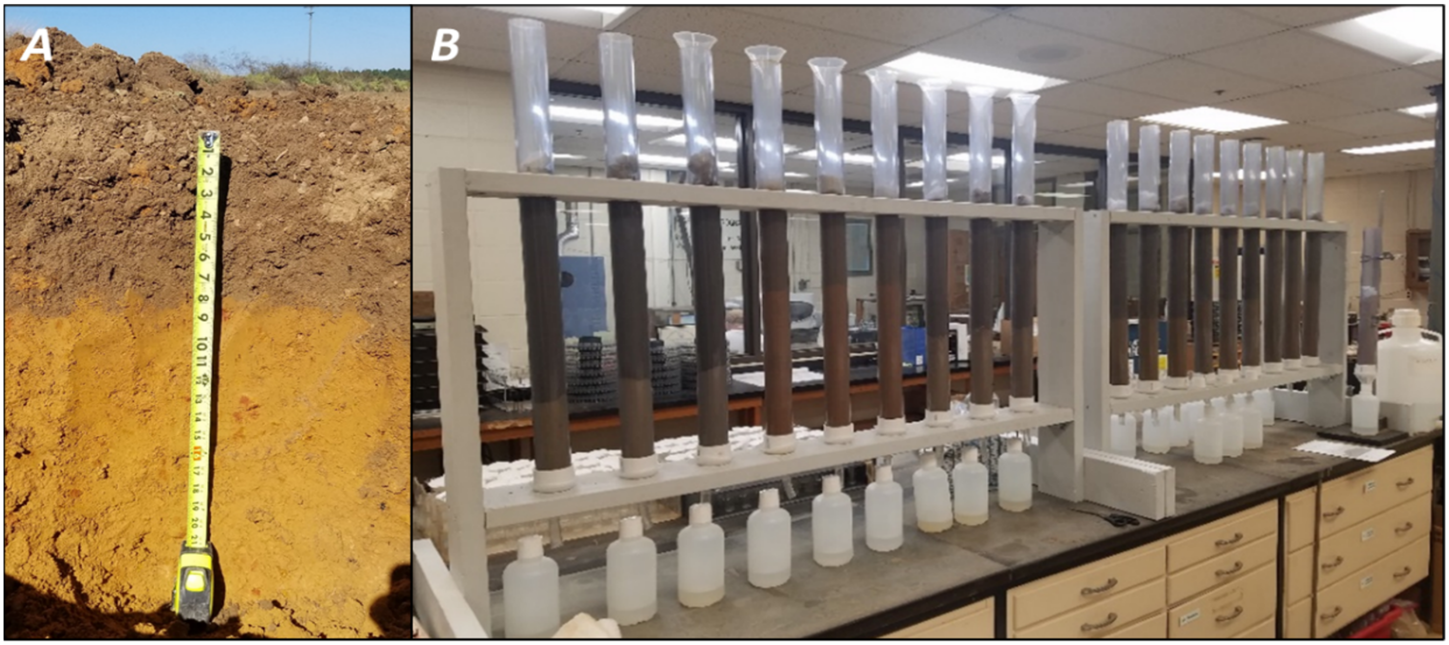

Figure 1. A) Photo of one of the six field sites used to create the leaching columns, and B) photo of all 18 leaching columns assembled in racks, plus a control column constructed with lab-grade sand.

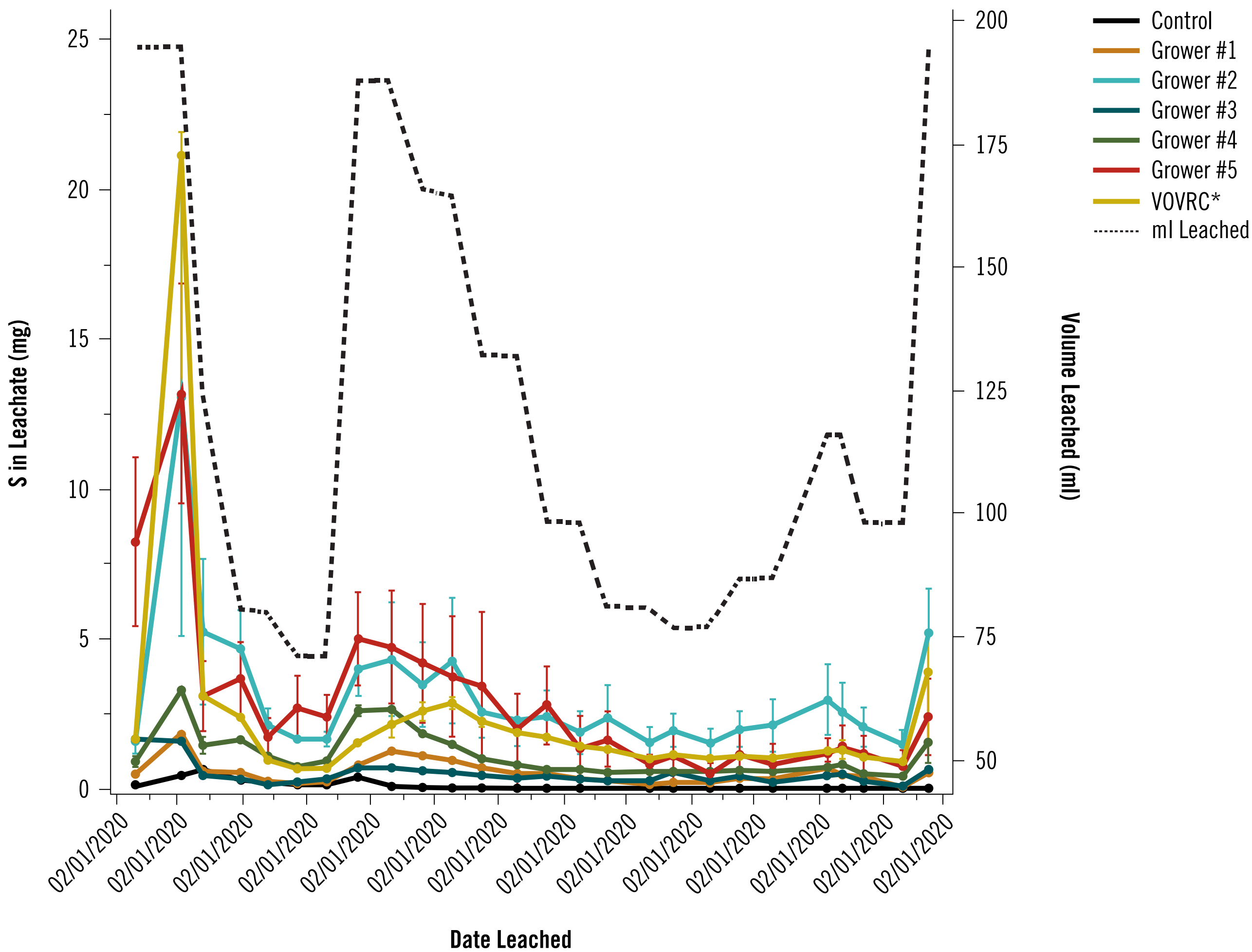

Figure 2. Graph illustrating the amount of S collected from leaching columns constructed from six soil profiles from the Vidalia region (five onion producers' fields as well as the UGA Vidalia Onion and Vegetable Research Center [VOVRC]). Each soil profile was replicated three times and leached every 2 weeks for 1 year with volumes of water equal to the historical rainfall of Lyons, GA, during that period.

Table 2. Amount of sulfur pre- and post-leaching collected from six soil profiles across the Vidalia onion production region.

Sample Location	Soil Layer	Plant-available S		Total S		S Leached (lb/acre)
		Pre (lb/acre)	Post (lb/acre)	Pre (lb/acre)	Post (lb/acre)	
Control Sand	—	55	7	53	8	12
Grower #1	Top	98 ± 98	39 ± 3	203 ± 20	141 ± 25	62 ± 9
	Bottom	27 ± 11	12 ± 2	44 ± 12	22 ± 9	
Grower #2	Top	32 ± 3	22 ± 1	195 ± 11	136 ± 15	354 ± 51
	Bottom	531 ± 114	514 ± 188	825 ± 52	617 ± 166	
Grower #3	Top	41 ± 5	29 ± 0	181 ± 15	150 ± 14	55 ± 10
	Bottom	25 ± 3	18 ± 0	67 ± 4	46 ± 3	
Grower #4	Top	39 ± 3	20 ± 1	132 ± 29	88 ± 7	128 ± 6
	Bottom	53 ± 14	26 ± 1	112 ± 12	68 ± 5	
Grower #5	Top	53 ± 33	17 ± 2	106 ± 18	76 ± 11	330 ± 188
	Bottom	216 ± 186	85 ± 69	356 ± 236	165 ± 76	
VOVRC*	Top	55 ± 5	42 ± 4	227 ± 6	201 ± 13	268 ± 13
	Bottom	118 ± 5	50 ± 8	255 ± 9	145 ± 9	

Note. Samples were collected from five onion producers' fields as well as the UGA Vidalia Onion and Vegetable Research Center (VOVRC). Total amount of sulfur leached over a 1-year period from each profile also is included. Soil results have been normalized based on the volume of soil represented by each horizon (top/bottom). All leaching values were extrapolated to a 1-acre area based on the square footage occupied by a leaching column. Because of the very deep claypan associated with Leefield soils, the bottom layer for Grower #1 represents a highly leached, sandy eluvial (E) layer and not a claypan like the other sites.

Vidalia Onion Yield as Influenced by Chemical and Organic Fertilizers

Juan Carlos Díaz-Pérez

Introduction

Vidalia onions are primarily grown using chemical fertilizers (Boyhan et al., 2007). Continuous utilization of chemical fertilizers along with inadequate fertilization practices may have an environmental impact such as a decrease in soil quality (Pan et al., 2020). The utilization of organic fertilizers is of growing interest to improve soil quality and increase environmental sustainability. There is still, however, limited information on the use of organic fertilizers for Vidalia onion production (Boyhan & Hill, 2008; Díaz-Pérez et al., 2018). The objective of this study was to evaluate the effects of chemical, mixed, and organic fertilizers on plant growth, bulb yield and quality, and mineral nutrients of Vidalia onion. The present report is based on an article recently published (Díaz-Pérez et al., 2021).

Materials and Methods

The study was carried out at the University of Georgia Horticulture Farm, Tifton Campus. In all treatments, the crop received a total of 134 lb/acre of nitrogen (N). Onion seedlings 'Yellow Granex PRR' were transplanted on December 12, 2012, December 12, 2013, and December 20, 2016.

Plants were grown on raised beds (6 ft center-to-center). Each bed had four rows 7 in. apart, with an in-row plant spacing of 5 in. Beds were covered with black plastic film mulch. There were two lines of drip tape, each drip tape being located midway between alternate rows.

The chemical treatment received 67 lb/acre N from 10-10-10 fertilizer (Agrium Super Rainbow, Denver, CO) before planting, plus additional 67 lb/acre of both N (applied as 28N-0P-0K fertilizer) and K (applied as potassium thiosulfate [0N-0P-21K + 17S]) supplied weekly through the irrigation system starting 9 weeks after transplanting.

The mixed fertilizer received 67 lb/acre N from organic fertilizer (microSTART60 3-2-3, Perdue AgriRecycle, LLC) applied 3 weeks before planting, plus additional 67 lb/acre of both N (applied as 28N-0P-0K) and K (applied as potassium thiosulfate [0N-0P-21K + 17S]) supplied weekly through the irrigation system, as mentioned above.

The organic treatment received 134 lb/acre N from organic fertilizer (microSTART60 3-2-3 [3N-0.87P-2.48K], Perdue AgriRecycle, LLC) applied 3 weeks before planting. No additional fertilizer was applied after transplanting.

The experimental design was a randomized complete block with three fertilizer treatments and four replications. Fertilizer treatments consisted of the application of chemical (100% N), mixed (chemical [50% N] + organic [50% N]) and organic (100% N) fertilizers.

Results

Fertilizer treatments did not differ with respect to plant growth, macro- and micronutrients, and marketable and total yields (Table 1).

Conclusion

Vidalia onion plants grown with organic fertilizer alone or mixed (50% organic N + 50% inorganic N) produced bulb yields and quality comparable to those grown with chemical fertilizer.

Table 1. Vidalia onion marketable and total yields as affected by chemical fertilizer, organic fertilizer, and a mix of chemical + organic fertilizer, Tifton, GA. Data are averages for three seasons.

Fertilizer treatment	Marketable yield		Total yield	
	1000 bulbs/acre	ton/acre	1000 bulbs/acre	ton/acre
Chemical	38.8	30.0	54.5	36.9
Mix	41.4	32.7	56.4	40.5
Organic	37.4	29.9	54.0	37.3
p	0.341	0.291	0.667	0.191

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Thrips Control in Onions 2021

David Riley

Introduction

Thrips are tiny (1–2 mm in length), slender, plant feeding insects (see magnified image of tobacco thrips, *Frankliniella fusca*) that affect plants when adults and nymphs directly feed on leaves, which results in the formation of silvery patches on the leaf surface. Heavy feeding during the time of bulb formation can reduce the size of harvested bulbs. Thrips complete their life cycle from egg to adult in 2–3 weeks under warm conditions, so in a warm, dry spring we can have multiple generations before harvest. For the Vidalia area I recommend a first insecticide application at an average of one thrips per plant and subsequent applications at five thrips per plant until harvest. Choosing an effective insecticide is critical, thus the need for annual testing.

Material and Methods

In 2021, an insecticide efficacy trial was conducted in onions at the Vidalia Onion and Vegetable Research Center in Tattnall County, GA. Onions, hyb. 'CandyAnn', were transplanted on November 16, 2020, into four rows per bed at approximately 4–6 in. between plants and maintained with standard cultural practices. A total of 600 lb of 10-10-10 was applied to clay loam field plots. Irrigation was applied at about ½ in. weekly with an overhead sprinkler system if there was no rainfall. Total numbers of thrips per plant were counted on 10 plants per plot on February 25, March 4, March 19, March 25, March 31, April 7, and April 21, and collected from onion tops during the test to determine species of thrips. Most of the thrips collected from the plant during bulb formation were tobacco thrips, *Frankliniella fusca* (Hinds), with a few other *Frankliniella* spp., and very few onion thrips, *Thrips tabaci* Lindeman. Three applications of insecticide were made on March 12, March 25, and April 6. Foliar insecticide treatments were applied with CO2 hand sprayer delivering 32 GPA with four TX18 hollow cone tips per bed. Products used included: Radiant, spinetoram (IRAC Group 5), with broad spectrum activity; NAI-2303, tolfenpyrad, is a mitochondrial complex 1 electron transport inhibitor (IRAC Group 21A) and Group 39 fungicide, PQZ, and an unsprayed check. All spray treatments included the adjuvant Kinetic at 0.25% v/v. Harvested onions were from the center 15 ft of plots.

Results

Tobacco thrips *F. fusca* were the most prevalent species in this test. The results indicated that late in the test (April 21; Table 1), Radiant and NAI-2303 insecticide treatments provided significant control (~80% kill) of tobacco thrips. Surprisingly, there was a significant effect on yield, but no treatments were significantly better than the check (Table 2). We suspect that thrips numbers were too low to adequately evaluate effects on yield. The combination treatment, PQZ 6.4 fl oz/acre + NAI-2303 24 fl oz/acre resulted in the highest bulb weight, but the increase was not statistically different from the check. The bottom line is that the NAI-2303 24 fl oz/acre and Radiant 1SC 10 fl oz/acre treatments provided the best control of tobacco thrips in this test. NAI-20303, Tolfenpyrad, or Torac is an IRAC Group 21A insecticide used for thrips, lepidopteran larvae, and other pest control in vegetables, Radiant or spinetoram is Group 5, and pyrifluquinazon, or PQZ, is an IRAC Group 9B insecticide with translaminar activity used mainly for aphids and whiteflies in leafy vegetables.

Table 1. Treatment effects on thrips per 10 plants by date in April 2021.

Treatment and product rate	Total thrips on April 21	*F. fusca* on April 21	*F. tritici* on April 21	*T. tabaci* on April 21	Avg. thrips overall
Untreated	10.8 a	10.3 a	0.3 a	0.0 a	2.7 a
Bifenthrin 2EC 6.4 fl oz/acre	9.8 a	9.3 ab	0.0 a	0.0 a	2.2 a
PQZ 6.4 fl oz/acre	9.8 a	9.0 ab	0.5 a	0.0 a	2.6 a
PQZ 6.4 fl oz/acre + NAI-2303 24 fl oz/acre	6.8 ab	5.3 bc	0.0 a	0.0 a	1.6 a
Radiant 1SC 10 fl oz/acre	3.0 bc	2.3 c	0.0 a	0.3 a	0.7 a
NAI-2303 24 fl oz/acre	2.3 c	1.8 c	0.5 a	0.0 a	0.8 a

Note. Means within columns followed by the same letter not significantly (LSD, $p < 0.05$). Thrips were collected at the Vidalia Onion and Vegetable Research Center near Reidsville, GA.

Table 2. Treatment effects on onion yield per 15 ft of bed in spring 2021.

Treatment and product rate	Weight of colossal bulbs (lb)	Weight of jumbo size bulbs (lb)	Weight of medium size bulbs (lb)	Total weight of bulbs per plot (lb)
Untreated	21 ab	24 a	42 a	87 a
Bifenthrin 2EC 6.4 fl oz/acre	15 bc	26 a	43 a	84 a
PQZ 6.4 fl oz/acre	18 abc	13 b	45 a	76 a
PQZ 6.4 fl oz/acre + NAI-2303 24 fl oz/acre	23 a	22 a	45 a	91 a
Radiant 1SC 10 fl oz/acre	13 c	27 a	45 a	84 a
NAI-2303 24 fl oz/acre	15 bc	19 ab	45 a	79 a

Note. Means within columns followed by the same letter not significantly (LSD, $p < 0.05$). Onions were harvested from the Vidalia Onion and Vegetable Research Center near Reidsville, GA.

Conclusion

Tolfenpyrad NAI-2303 24 fl oz/acre and Radiant 1SC 10 fl oz/acre provided the best control of tobacco thrips in this test.

Evaluation of Foliar Products on Yield, Storage, and Calcium in Vidalia Onion

Chris Tyson, Aubrey Shirley, Derrick Bowen, and Angelos Deltsidis

Introduction

In Vidalia onion production, there have been questions from growers and industry about possible yield and storage benefits to using foliar calcium and related fertility products in addition to a standard soil-applied fertilizer program. Two research trials were conducted during the 2020–2021 onion season to evaluate foliar product application programs.

Material and Methods

Two different experiments were conducted during the 2020–2021 onion growing season at the Vidalia Onion and Vegetable Research Center located near Reidsville, GA. The objective of these studies was to evaluate a total of six foliar-applied products used in onions. These foliar programs were in addition to a standard soil-applied fertility program. Soil samples of the trial location were taken prior to any of the treatment applications. The pH was 6.5 and soil sample results called for 125 lb/acre nitrogen, 40 lb/acre phosphorus, 100 lb/acre potassium, and 40–60 lb/acre sulfur. Calcium levels in all pretreatment soil samples were above 1000 lb/acre. Vidalia onion variety 'Vidora' was transplanted on December 10, 2020. Plots were 20 ft long and 6 ft wide. Each plot consisted of four rows of onion plants. Rows were spaced approximately 11 in. apart. Plants were spaced 4 in. apart in the row. The plant population for the trial was equivalent to 87,120 plants per acre. Each treatment was replicated four times. Soil-applied fertilizer was spread across all treatments and plots at the same rate with a First Products brand drop spreader. The soil-applied fertility program consisted of the following:

- 300 lb/acre 5-10-15 granular applied December 22, 2020
- 300 lb/acre 5-10-15 granular applied January 15, 2021
- 300 lb/acre 5-10-15 granular applied February 3, 2021
- 128 lb/acre calcium nitrate, 15.5-0-0 applied February 25, 2021
- 178 lb/acre calcium nitrate, 15.5-0-0 applied March 9, 2021
- Total pounds/acre of soil applied fertilizer: 92.43 (N) – 90 (P) – 135 (K) – 27 (S)
- Total 138 lb/acre of calcium

The foliar treatments used in this experiment included:

Trial 1:

1. **Untreated Check,** no foliar fertility products applied. These treatments relied exclusively on the soil-applied fertility program for plant nutrients.
2. **Bio-Syte,** a liquid plant hormone supplement, applied to the onions in early February and early March at a rate of 8 oz/acre.
3. **Fortalis,** a liquid product with an 8-0-0 fertilizer analysis and 10% calcium, applied to the onions four times at a rate of 14 oz/acre. Application timing was early and late February, and early and late March.

Trial 2:

1. **Untreated Check,** no foliar fertility products applied. These treatments relied exclusively on the soil-applied fertility program for plant nutrients.
2. **Fosfi-Cal Gold,** a liquid product with a 0-14-0 fertility analysis and 10% calcium, applied three times at a rate of 16 oz/acre. Application timing was early, mid, and late March.

3. **Fosfi-Cal WP,** a wettable powder product with a 0-33-0 fertility analysis and 22.5% calcium, applied three times at a rate of 1 lb/acre. Application timing was early, mid, and late March.

4. **Experimental "M" product,** a liquid product with an unknown fertility analysis, applied three times at a rate of 1 quart/acre. Application timing was early, mid, and late March.

5. **Experimental "Combo" product,** the combination of a liquid and powder product of unknown analysis, applied a rate of 1 quart/acre and ½ lb/acre, respectively. Application timing was early, mid, and late March.

Foliar treatments were applied with a CO_2 backpack sprayer in a water volume equivalent to 25 gallons per acre at 40 psi with a ground speed of 3 mph. A grower-standard program for herbicides, fungicides, and insecticides was applied to all treatments. The onion plots were undercut on April 21, 2021, to allow the onions to begin field drying and curing. The onion plots were harvested on April 28, 2021, and dried with forced-air heat for 3 days. Onion plots were weighed and graded on May 6, 2021. After grading, bulb samples were taken from jumbo-sized bulbs of each treatment for calcium analysis in the bulbs. Samples of jumbo-sized bulbs also were taken from each treatment and placed in cold storage at 35 °F and 70–80% relative humidity. Cold storage samples were evaluated at 30 and 60 days of storage for weight loss, marketability, and disease incidence.

Results, Trial 1

Yield					
Treatment	**Field weight**	**Colossal**	**Jumbo (lb/plot)**	**Medium**	**Total**
Untreated	128.25	1.75	111	11.25	124
Fortalis	132.875	1	113.5	10.5	125
Biosyte	130.5	1.75	112.75	11	125
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Treatment	Soil calcium level, pretreatment (lb/acre)	Soil calcium level at harvest (lb/acre)	Bulb calcium level at harvest, %
Untreated	1254.25	1220.25	0.4250
Fortalis	1338.50	1101.50	0.3375
Biosyte	1252.00	1203.00	0.2950
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Low temperature storage — 30 days				
Treatment	**Marketable bulb weight**	**Cull weight (lb/plot)**	**Cull bulbs (lb/plot)**	**Weight loss (%)**
Untreated	128.25	1.75	111	11.25
Fortalis	132.875	1	113.5	10.5
Biosyte	130.5	1.75	112.75	11
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Low temperature storage — 60 days				
Treatment	**Marketable bulb weight**	**Cull weight (lb/plot)**	**Cull bulbs (lb/plot)**	**Weight loss (%)**
Untreated	23.1750	0.1375	0.25	1.3004
Fortalis	26.2500	0.0000	0	1.3151
Biosyte	25.2250	0.1375	1.00	1.2793
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Results, Trial 2

Yield					
Treatment	**Field weight**	**Colossal**	**Jumbo (lb/plot)**	**Medium**	**Total**
Untreated	133.250	1.25	117.50	10.25	129.00
Fosfi-Cal liquid	131.125	3.25	115.75	8.50	127.50
WP	131.625	1.25	114.75	12.00	128.00
M	136.375	2.25	120.50	10.50	133.25
Combo	132.375	3.5	114.75	11.75	130.00
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Treatment	Soil calcium level, pretreatment (lb/acre)	Soil calcium level at harvest (lb/acre)	Bulb calcium level at harvest, %
Untreated	1600.50	1213.00	0.2400
Fosfi-Cal liquid	1690.25	1184.75	0.2325
WP	1635.25	1278.25	0.2050
M	1705.50	1245.75	0.2250
Combo	1552.00	1238.25	0.1900
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Low temperature storage — 30 days				
Treatment	**Marketable bulb weight**	**Cull weight (lb/plot)**	**Cull bulbs (lb/plot)**	**Weight loss (%)**
Untreated	26.0167	0.9000	1.3333	1.7813
Fosfi-Cal liquid	26.3667	0.0000	0.0000	1.5602
WP	25.7000	0.1750	0.2500	1.3113
M	26.1750	0.9500	1.5000	1.5829
Combo	26.0333	0.5667	1.0000	1.2990
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Low temperature storage — 60 days				
Treatment	**Marketable bulb weight**	**Cull weight (lb/plot)**	**Cull bulbs (lb/plot)**	**Weight loss (%)**
Untreated	28.0667	0.5167	0.6667	0.9836 AB
Fosfi-Cal liquid	26.9500	0.7333	1.0000	1.6069 A
WP	27.3125	0.6625	1.0000	1.2354 AB
M	26.1667	0.8000	1.0000	0.9150 B
Combo	21.0167	0.9000	1.3333	0.9201 B
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Conclusion

There were no significant differences in yields, bulb calcium content, or storage parameters evaluated across both trials, except for minor differences in weight loss after 60 days of storage in Trial 2.

Evaluation of Foliar Fertility Programs on Vidalia Onion Yield

Chris Tyson, Aubrey Shirley, Derrick Bowen, and Timothy Coolong

Introduction

There have been questions from growers and industry about possible yield benefits to using foliar fertility products in addition to a standard soil-applied fertilizer program in Vidalia onion production. A research trial was conducted during the 2020–2021 onion season to evaluate foliar fertilizers.

Material and Methods

An experiment was conducted during the 2020–2021 onion growing season at the Vidalia Onion and Vegetable Research Center located near Reidsville, GA. The objective of the study was to evaluate four foliar fertility programs for their effect on onion yield. The three foliar programs were in addition to a standard soil-applied fertility program. Soil samples of the trial location were taken at planting, prior to any fertilizer applications. The pH was 6.5 and soil sample results called for 125 lb/acre nitrogen, 40 lb/acre phosphorus, 100 lb/acre potassium, and 40–60 lb/acre sulfur. Vidalia onion variety 'Vidora' was transplanted on December 10, 2020. Treatments plots were 20 ft long and 6 ft wide. Each plot consisted of four rows of onion plants. Rows were spaced approximately 11 in. apart. Plants were spaced 4 in. apart in the row. The plant population for the trial was equivalent to 87,120 plants per acre. Each treatment was replicated four times. Soil-applied fertilizer was applied across all treatments and plots at the same rate with a First Products brand drop spreader. The soil-applied fertility program consisted of the following:

- 300 lb/acre 5-10-15 granular applied December 22, 2020
- 300 lb/acre 5-10-15 granular applied January 15, 2021
- 300 lb/acre 5-10-15 granular applied February 3, 2021
- 128 lb/acre calcium nitrate, 15.5-0-0 applied February 25, 2021
- 178 lb/acre calcium nitrate, 15.5-0-0 applied March 9, 2021
- Total pounds/acre of soil applied fertilizer: 92.43 (N) – 90 (P) – 135 (K) – 27 (S)

The four foliar treatments evaluated in the trial were:

- **diKaP,** distributed by Redox Chemicals, a granular fertilizer derived from phosphoric acid and potassium hydroxide with a guaranteed analysis of 0-31-50, foliar applied at a rate of 2 lb/acre on February 8, February 27, March 8, and March 30, 2021.
- **Mainstay Si,** distributed by Redox Chemicals, a liquid product derived from calcium silicate with a guaranteed analysis of 10% calcium and 22% silicon dioxide, foliar applied at a rate of 1 quart/acre on February 8, February 27, March 8, and March 30, 2021.
- **diKaP + Mainstay Si,** applied at 2 lb/acre and 1 quart/acre, respectively, on February 8, February 27, March 8, and March 30, 2021.
- **Untreated Check,** no foliar fertility applied. These treatments relied exclusively on the soil-applied fertility program for plant nutrients.

Foliar treatments were applied with a CO_2 backpack sprayer in a water volume equivalent to 30 gallons per acre at 40 psi. A grower-standard program for herbicides, fungicides, and insecticides was applied to all treatments. The onion plots were undercut on April 21, 2021, to allow the onions to begin field drying and curing. The onions plots were harvested on April 28, 2021, and dried with forced-air heat for 3 days. Onions plots were weighed and graded on May 6, 2021.

Results

Table 1. Yield results.

Yield						
Treatment	**Field weight**	**Colossal**	**Jumbo (lb/acre)**	**Medium**	**Total**	**Cull**
Untreated	51,140	1,180	45,010	3,540	49,730	2.78 ab
diKap	49,730	1,360	44,290	3,360	49,010	1.50 b
Mainstay Si	50,140	910	43,740	3,540	48,010	4.30 a
diKaP + Mainstay Si	49,510	730	42,930	3,540	47,370	4.38 a
Sig. ($p < 0.05$)[z]	**NS**	**NS**	**NS**	**NS**	**NS**	**$p = 0.067$**

[z] NS= nonsignificant. For means separation, Tukey-Kramer's Honest Significant Difference procedure was used. Any means followed by the same letters are not significantly different.

Conclusion

There were no significant differences in field weight, total weight, or colossal, jumbo, and medium grades across any of the treatments.

Evaluation of Digging Method on Postharvest Incidence of External and Internal Bacterial Bulb Rot in Onion in Georgia, 2021

Bhabesh Dutta and Chris Tyson

'Plethora' onions were transplanted into 6-ft beds at a commercial onion grower's farm located in Glennville, GA. The fertility program, insect, and disease management were consistent with University of Georgia Cooperative Extension recommendations. Natural infection was relied upon. Two methods of digging were evaluated: a chain digger (TopAir, Inc., Parma, ID) and a straight-blade "under-cutter" (Parma Onion Harvesting Equipment, Parma, ID). After field curing, onion bulbs were clipped by hand. Onion roots and tops were cut with shears. A random sample of 100 bulbs was selected from bins from each digging method. The bulbs selected were visually examined and free from any detectable disease or other defects. Bulbs from each digging method were bagged and stored at 4 °C for 1 month. After the storage period, onion bulbs were individually cut using a sterile knife to evaluate for center rot and sour skin incidence. Data for mean center-rot and sours-skin incidences were analyzed using the Fisher's protected LSD test at $p \leq 0.05$. Weather during the experiment was moderately wet with 8.5 in. of accumulation occurring between March 15 and April 30.

External and internal bulb rot incidence were evaluated in onion bulbs after a month of storage under conditions mentioned above. The method of digging had a significant effect on internal bulb rot and but not external bulb rot incidence in storage (Table 1). A significantly higher incidence of internal rot was observed with the straight bed-ridge undercutter compared with the chain digger. Bulb rot due to postharvest fungal pathogens (*Botrytis* sp. and *Aspergillus* sp.) was not observed.

Table 1. Effect of onion digging method on external and internal bacterial bulb rot incidence.

Methods of onion digging	External rot incidence (%)[z]	Internal rot incidence (%)[y]
Chain digger	11.5 a	9.0 B[x]
Straight-blade undercutter	14.5 a	20.5 A
p	0.246	< 0.001

[z] Mean external bulb rot incidence was calculated as number of bulbs with external rot/total number of bulbs evaluated × 100.
[y] Mean internal bulb rot incidence was calculated as number of bulbs with internal rot/total number of bulbs evaluated × 100.
[x] Means followed by the same letter(s) within each column are not significantly different according to Fisher's protected LSD test at $p \leq 0.05$.

Evaluation of Neck Clipping Length on Postharvest Incidence of External and Internal Bacterial Bulb Rot in Onion in Georgia, 2021

Bhabesh Dutta and Chris Tyson

Four rows of 'Century' onions were transplanted into 6-ft beds on December 8 at the Vidalia Onion and Vegetable Research Center in Lyons, GA. The fertility program, insect, and disease management were consistent with University of Georgia Cooperative Extension recommendations. Experimental design consisted of a randomized complete block with four replications. Treated plots were 20 ft long and were separated on each side by nontreated borders. Plots were separated by a 3-ft bare-ground buffer within the row. Natural infection was relied upon. At harvest maturity, onion bulbs were undercut using a bed ridge frame undercutter (Parma Inc.) followed by a 3-day field curing period. Following curing, dried necks of onion bulbs were clipped manually at three different lengths: 1 in., 3 in., and 5 in. Roots also were clipped but care was taken not to clip too close to the basal plate. Onion bulbs from replicated plots (four replicates) were bagged and stored at 4 °C for 1 month. After the storage period, onion bulbs were individually cut using a sterile knife to determine the incidence of external and internal rot. Data for mean incidence of bacterial external and internal bulb rot were analyzed using the Fisher's protected LSD test at $p \leq 0.05$. Total rainfall accumulated from December 2020 to April 2021 was 14.2 in.

External and internal bulb rot were evaluated in onion bulbs after a month of storage under conditions mentioned above. The onion neck-clipping length had a significant effect on internal bulb rot incidence but not on the external rot (Table 1). Significantly higher incidence of internal bulb rot was observed with the neck-clipping length of 1 in. compared with the 3- and 5-in. lengths. Internal rot was associated mainly with *Pantoea* spp., and external rot was associated with *Burkholderia* spp. and *Pectobacterium* spp., based on randomly collected symptomatic samples. Bulb rot caused by postharvest fungal pathogens (*Botrytis* sp. and *Aspergillus* sp.) was not observed.

Table 1. Effect of onion neck-clipping length on external and internal bulb rot incidence.

Onion neck-clipping length (in.)	External rot incidence (%)[z]	Internal rot incidence (%)[y]
5	10.0 a[x]	4.5 B[x]
3	9.5 a	4.0 B
1	14.2 a	19.0 A
p	0.634	0.003

[z] Mean external bulb rot incidence was calculated as number of bulbs with external rot/total number of bulbs evaluated × 100.
[y] Mean internal bulb rot incidence was calculated as number of bulbs with internal rot/total number of bulbs evaluated × 100.
[x] Means followed by the same letter(s) within each column are not significantly different according to Fisher's protected LSD test at $p \leq 0.05$.

Evaluation of Harvesting Methods on Postharvest Incidence of External and Internal Bacterial Bulb Rot in Onion in Georgia, 2021

Bhabesh Dutta and Chris Tyson

Vidalia onions were transplanted into 6-ft beds at a commercial onion grower's farm located in Glennville, GA, in the fall of 2020. The fertility, insect, and disease management program was consistent with University of Georgia Cooperative Extension recommendations. Natural infection was relied upon. At harvest maturity, onion bulbs were dug using a chain-style digger and allowed to field cure. Following curing, two different harvesting methods were evaluated: manual harvest (hand clipping) and mechanical harvest using a Top Air Onion Harvester. A 100-bulb random sample was taken from the field for each method. For manual harvest, 100 onion bulbs were clipped with hand shears, and onion leaves (tops) were cut off flush with the top of the bulb. Onions that appeared soft or diseased at clipping were not included in the sample. Roots also were clipped but care was taken not to clip too close to the basal plate. For the mechanical harvest sample, 100 random bulbs were collected that had been topped and collected by the harvester. Approximately 3–4 in. of onion top remained on the bulbs gathered by the machine harvester. Roots were not clipped by the harvester. Field workers riding on the machine harvester also discarded any onions that appeared diseased or soft as they went across the harvester grading belt. These discarded bulbs were not included in the sample. The bulbs from each harvest method were bagged and stored at 4 °C for 1 month. After period of storage, onion bulbs were individually cut using a sterile knife to evaluate for center rot and sour skin incidence. Data for mean center-rot and sour-skin incidences were analyzed using Fisher's protected LSD test at $p \leq 0.05$.

External and internal bulb rot were evaluated in onion bulbs after a month of storage under conditions mentioned above. The method of harvest had a significant effect on internal bulb rot incidence, but not on external rot (Table 1). Significantly higher incidence of internal bulb rot was observed with the manual harvest compared with the mechanical harvest. Internal rot was associated with mainly *Pantoea* spp., and external rot was associated with *Burkholderia* spp. and *Pectobacterium* spp., based on randomly collected symptomatic samples. Bulb rot due to postharvest fungal pathogens (*Botrytis* sp. and *Aspergillus* sp.) was not observed.

Table 1. Effect of onion digging method on external and internal bacterial bulb rot incidence.

Methods of onion harvest	External rot incidence (%)[z]	Internal rot incidence (%)[y]
Mechanical harvest	12.5 a[x]	4.5 B[x]
Manual harvest	17.0 a	14.5 A
p	0.312	< 0.001

[z] Mean external bulb rot incidence was calculated as number of bulbs with external rot/total number of bulbs evaluated × 100.
[y] Mean internal bulb rot incidence was calculated as number of bulbs with internal rot/total number of bulbs evaluated × 100.
[x] Means followed by the same letter(s) within each column are not significantly different according to Fisher's protected LSD test at $p \leq 0.05$.

Evaluation of Bactericides and Plant Defense Inducers to Manage Internal Bacterial Rot of Onion in Georgia, 2021

Bhabesh Dutta, Michael Foster, and Michael Donahoo

Four rows of 'Century' onions were transplanted into 6-ft beds on December 10, 2020, at the University of Georgia, Tifton, GA. The fertility and insecticide programs were consistent with the University of Georgia Cooperative Extension recommendations. Experimental design consisted of a randomized complete block with four replications. Treated plots were 20 ft long and were separated on each side by nontreated border rows. Plots were separated by a 3-ft bare-ground buffer within the row. Treatments were applied with a backpack sprayer calibrated to deliver 40 gallons/acre at 75 to 80 psi through TX-18 hollow cone nozzles. Treatment applications were made on March 3, March 12, March 19, March 24, March 31, and April 4. Plots were irrigated once a week using overhead irrigation. Natural inoculum was relied upon. Foliar disease severity was assessed on March 15 and March 25, but no foliar symptoms were observed. Onion bulbs from the center of each plot with dimensions 6 ft × 3 ft were hand-harvested on April 18, field cured for 2 days and then stored at 4 °C for 30 days. On May 20, onion bulbs from each plot were individually cut using a sterile knife and assessed for the presence of internal rot symptoms. Data for percent internal rot incidence in bulbs were analyzed and means were compared using the Fisher's protected LSD test at $p \leq 0.05$. The total rainfall received from December 2020 to April 2021 was 12.8 in. The average high and low temperatures for the month of December 2020 were 54 and 39 °F, respectively, and for the month of April 2021 were 74 and 53 °F, respectively.

Foliar symptoms were not observed in the field or during harvest. External rot incidence was minimal and probably caused by injury during harvest; hence, only internal rot was assessed. Percent internal bulb rot incidence was significantly lower for all treatments compared with the nontreated check except for Theia (Table 1). Among the treatments, no significant differences in internal bulb rot were observed. Subsamples of symptomatic bulbs with internal rot were confirmed via isolation and PCR assay to be caused by *P. ananatis*.

Table 1. Effect of bactericides and plant defense inducers on internal bulb rot of onions.

Treatment and rate of product per acre	Internal bulb rot (%)[y]
Mankocide 2.5 lb	8.3 b[x]
Kocide 3000 1.5 lb	9.0 b
Champ 1.5 lb	10.3 b
Oxidate 5.0 1.28 oz per gal	9.5 b
Forticept 1.28 fl oz per gal	13.4 b
Agrititan 800 ppm	10.7 b
LifeGard 2 fl oz	7.0 b
Nordox 1 lb	24.7 b
MasterCop 1 pt	14.3 b
Howler 5 lb	8.6 b
Theia 3 lb	18.6 ab
NUCop 1.5 lb	5.5 b
Nontreated check	37.3 a
p	0.004

[y] Mean internal bulb rot incidence was calculated as number of bulbs with internal rot/total number of bulbs evaluated × 100.
[x] Means followed by the same letter in each column are not significantly different according to Fischer's LSD at $p < 0.05$.

Evaluation of Fungicides to Manage Botrytis Leaf Blight on Onion in Georgia, 2021

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Four rows of 'Vidora' onion were transplanted into 6-ft beds on 10 December (2020) at the Vidalia Onion and Vegetable Research Center, Lyons, GA. The fertility and insecticide programs were consistent with the University of Georgia Cooperative Extension recommendations. Experimental design consisted of a randomized complete block with five replications. Treated plots were 20 ft long and were separated on each side by nontreated border rows. Plots were separated by a 3-ft bare-ground buffer within the row. Treatments were applied with a backpack sprayer calibrated to deliver 40 gallons/acre at 75 to 80 psi through TX-18 hollow cone nozzles. Treatment applications were made on March 3, March 11, March 16, and March 24. Plots were irrigated once a week using overhead irrigation. Natural inoculum was relied upon. Disease severity was assessed on March 22, April 4, and April 20 as percent leaf area with symptoms per plot. Area under disease progress curve (AUDPC) was calculated using disease severity ratings from the four assessment periods. Data were analyzed in ARM software from Gylling Data Management, and means compared using the Fisher's protected LSD test at $p \leq 0.05$. The mean rainfall received during December 2020 and April 2021 was 6.5 in. and 3.5 in., respectively. The average high and low temperatures for the month of December 2020 were 58 and 42° F, respectively, and for the month of April 2021 were 83 and 55° F, respectively.

Botrytis leaf blight symptoms were first appeared on March 22 with significantly higher disease severity for the nontreated check (63.8%) and Scala (55.0%) than for the other fungicide-treated plots (Table 1). Among the treatments, except for Scala, disease severity was not significantly different from each other. Disease progressed over a 4-week period and reached 88.8% disease severity on April 20 in nontreated plots and 81.3% in Scala-fungicide treated plots, which were significantly higher than the other fungicide-treated plots. AUDPC values followed the similar trend as nontreated check and Scala-fungicide treated plots had significantly higher values compared with the fungicide treatments. Among the treatments, plots treated with Merivon had significantly lower final disease severity and AUDPC value compared to Rovral, Scala, experimental compound, and nontreated check. Phytotoxicity was not observed with any of the treatments used.

Table 1. Effect of fungicides on Botrytis leaf blight in onion.

Treatment and rate of product per acre	Initial disease severity (%) on March 22[y]	Final disease severity (%) on April 20	Area under disease progress curve (AUDPC)[w]
Rovral 1.5 pt	33.8 b	58.8 c[x]	1427.5 c
Scala 18.0 fl oz	55.0 a	81.3 ab	2056.8 a
Luna Tranquility 16.0 fl oz	25.0 b	51.3 cd	1165.6 cd
Omega 500 1.0 pt	25.0 b	47.5 cd	1098.7 cd
Miravis Prime 11.4 fl oz	20.0 b	51.3 cd	1106.2 cd
Merivon 11.0 fl oz	20.0 b	41.3 d	876.2 d
Experimental 3.2 fl oz	33.8 b	75.0 b	1762.5 b
Nontreated check	63.8 a	88.8 a	2318.7 a
p-values	<0.001	0.003	0.001

[y] Disease severity was rated on a 0 to 100 scale (0 = no infection and 100 = 100% of leaf area infection) on March 22, April 4, and April 20.
[x] Means followed by the same letter in each column are not significantly different according to Fischer's LSD at $p < 0.05$.
[w] AUDPC was calculated from ratings taken on March 22, April 4, and April 20.

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Annual Publication 114-3 **January 2023**

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