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ONION VARIETY AND NITROGEN RATE STUDIES 1987-88

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INTRODUCTION

Information on varieties and nitrogen (N) rates for onion (*Allium cepa* L.) production in East Texas is limited. The majority of the available information concerns production in the Rio Grande Valley, Coastal Bend, Laredo, Winter Garden, Rolling Plains, and High Plains areas of Texas (Fuqua and Howell, 1975; Longbrake et al., 1987).

East Texas' major production area is in the Noonday vicinity, where approximately 200 ac of shortday onions are produced annually. These are sold locally as 'Noonday Sweet Onions' at about $35 per 50 lb sack. Several growers have developed a mail order business selling 24 onions per box at a price of $12.95.

The most widely grown shortday varieties in East Texas are 'Granex' and 'TG 1015Y'. With new marketing ideas such as offering specialty packages of large bulbs (>4 in), it is important to examine the production and yield of other shortday varieties. Some of the newer varieties which are later maturing and have improved shipping quality and storage characteristics (Pike et al., 1988bc) need to be tested in order to extend the marketing period and maintain quality.

Onions responded to N fertilization in N deficient soil (Creel, 1964; Paterson, 1984; Longbrake et al., 1987). Maintaining adequate N in the shallow root zone of crops such as onions is a problem in deep sandy soils (Lorenz and Maynard, 1980). Timely applications of water are recommended to keep onions growing continuously (Longbrake et al., 1987). Irrigation, in combination with normal rainfall, compounds the degree of N leaching from the root zone.

Tests were initiated in the spring of 1987 to evaluate yield and grade of selected short and intermediate day onion varieties, and in the spring of 1988 to (1) evaluate marketable bulb production of selected shortday onion varieties, and (2) determine the influence of pre- and postplant applications of N on yield and bulb size.

MATERIALS AND METHODS

1987 Trial

Seven varieties of shortday onions and 3 intermediate day onions were tested in a randomized complete block design with 4 replications (Gomez and Gomez, 1984). Fertilizer at the rate of 104N-104P_2O_5-104K_2O lb/ac was applied 4 in. deep in double bands 12 in. apart on a single bed. On 5 March 1987, the 1/4 to 3/4 in. diameter plants were transplanted in plots 10 ft. long by 3.3 ft. wide. The Bowie fine sandy loam (fine-loamy, siliceous, thermic Plinthic Paleudult) had a pH of 6.7. Irrigation was by trickle and pest control was by recommended procedures (Longbrake et al., 1987). The shortday varieties (TG 1025Y, White Granex, N.M. Yellow Grano, TG 1015Y, Yellow Granex, White Grano and TEG502) were harvested on 4 June 1987, and the intermediate varieties (Armada, Vega and Snowwhite) on 22 June 1987.

1988 Trial

Four rates of N were interacted with 6 varieties of shortday onions in a 4x6 factorial experiment in a randomized complete block design (Gomez and Gomez, 1984) with 4 replications. Nitrogen treatments were 0, 40, 80, and 120 lbs N/ac from ammonium nitrate (NH_4NO_3). On 29 Feb. 1988, the ac equivalent of 90 lbs P_2O_5 and 90 lbs K_2O were applied 4 in. deep in double bands 12 in. apart on a single bed 30 ft. long and 3.3 ft. wide. The ac equivalent of 40 lb N was applied on all plots except the control. On 1 March 1988, 6 varieties of onion plants were randomly assigned to adjacent rows 12 in. apart and planted in each plot. The 1/4 to 3/4 in. diameter transplants included the varieties Yellow Granex, Granex Y33, TEG 502, TG 1015Y, TG 1025Y, and TG 1105Y. Postplant applications of N at 40 and 80 lbs/ac were made on 13 April 1988. The Bowie fine sandy loam (fine-loamy, siliceous, thermic Plinthic Paleudult) had a pH of 6.7. Irrigation was by trickle and pest control was by recommended procedures (Longbrake et al., 1987). All plots were harvested on 14 June 1988.

RESULTS AND DISCUSSION

1987 Trial

Texas Grano 1025Y produced the greatest number of 50 lb sacks of onions (Table 1). This is mainly due to the production of a larger percent of Jumbo's (>3 in.). The total yield of the shortday varieties was similar. They tended to produce more medium size bulbs (2-1/2 to 3 in.). The intermediate varieties had a tendency to produce a thick neck instead of bulb sizing, and therefore, the largest majority of bulbs graded out as prepaks (2-1/2 in.). Since the data from this test indicate that total yield is a function of bulb size, it was determined that supplemental N rates should be evaluated in a future test.

1988 Trial

In this test, it was found that TG 1105Y had the capability of producing large total yields (Table 2) followed by TG 1025Y. This again appeared to be due to production of a larger percent of Jumbo's (>3 in.), which can be attributed to the fact that both are later maturing varieties having more growing time for bulb sizing (Pike et al., 1988bc). The two Granex varieties also produced a high percent of Jumbo's. The TEG 502 and TG 1015Y varieties tended to produce more medium to Jumbo size (2-1/2-3-1/2 in).

Supplemental N rates increased the marketable yield of shortday onion varieties (Table 3). Yield was increased linearly and quadratically as the N rate increased from 0 to 120 lbs/ac. Yield increase can be attributed to increase in bulb size (Table 4). Bulb size increased linearly and quadratically with increase in supplemental N. No significant increase in bulb size occurred when N levels increased from 80 to 120 lbs/ac. The 120 lb N/ac rate significantly increased bulb size compared to the 40 lb rate. Bulb size was also found to be influenced by variety.

SUMMARY

The results of this experiment demonstrated that several varieties of shortday onions have the capability of producing very good yields. It was also found that consumer demands such as small, medium, or large size can be met by planting specific varieties. By planting several different varieties, the harvest period can be extended over a longer period of time. Intermediate day onion varieties do not appear to be suitable for production in the East Texas area.

Supplemental N application influenced both yield and size of onion bulbs. A rate of 80 lbs N per acre appeared to be sufficient to maximize yield and size of shortday onion varieties grown on East Texas soils.

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Table 1. Shortday and intermediate onion variety trial at Overton, Texas. 1987.

Variety	Yield in 50 lb sacks per acre: Total	Colossal (>4 in)	Large Jumbo ($3\frac{1}{2}$-4 in)	Jumbo (3-$3\frac{1}{2}$ in)	Medium ($2\frac{1}{2}$-3in)	Prepak ($2\frac{1}{2}$ in)	% Jumbo (>3 in)
TG 1025Y	1113	37	140	477	321	138	59
Armada	447	0	0	86	130	232	19
White Granex	612	0	4	157	246	204	23
N. M. Yellow Grano	438	0	4	54	197	183	13
Vega	578	0	9	66	182	321	12
Snowhite	481	0	10	21	193	257	6
TG 1015Y	657	0	5	147	293	212	20
Yellow Granex	674	3	14	165	329	163	27
White Grano	697	0	0	193	263	241	28
TEG 502	587	0	0	109	240	238	17
L.S.D. .01	225	36	41	150	104	96	18
L.S.D. .05	167	26	31	110	77	71	13

Table 2. Shortday onion variety trial at Overton, Texas. 1988.

Variety	Yield in 50 lb sacks per acre						
	Total	Colossal (>4 in)	Large Jumbo (3½-4 in)	Jumbo (3-3½ in)	Medium (2½-3 in)	Prepak (2½ in)	% Jumbo (>3 in)
Yellow Granex	734	238	211	178	99	8	82
Granex Y33	778	221	201	239	101	16	82
TEG 502	795	91	274	267	141	22	75
TG 1015Y	714	37	94	345	198	40	66
TG 1025Y	835	20	234	465	116	0	86
TG 1105Y	941	143	348	344	103	3	87
L.S.D. .01	291	294	243	166	108	32	24
L.S.D. .05	211	213	176	120	78	23	18

Table 3. Influence of nitrogen on total marketable yield of 6 onion varieties. 1988.

	Total marketable yield (50 lb sack/ac)				
	N rate (lbs/ac)				
Variety	0	40	80	120	AVERAGE
Yellow Granex	401	556	733	832	630 B[y]
Granex Y33	484	590	777	917	692 AB
TEG 502	508	682	794	993	744 AB
TG 1015Y	372	736	713	828	662 AB
TG 1025Y	500	801	835	722	714 AB
TG 1105Y	561	913	941	943	840 A
AVERAGE	471	713	799	873	L** Q*[z]

[z]Treatment effects in columns were significant at 1% (**) and were linear (L) or quadratic (Q).

[y]Mean separation, within average for rows and columns, is based on Duncan's multiple range test at the 1% level.

Table 4. Influence of nitrogen on average bulb size of 6 onion varieties. 1988.

	Average bulb size (oz)				
	N rate (lbs/ac)				
Variety	0	40	80	120	AVERAGE
Yellow Granex	4.1	5.7	7.5	8.5	6.5 B[y]
Granex Y33	4.9	6.0	7.9	9.3	7.0 AB
TEG 502	5.1	6.9	8.0	10.1	7.5 AB
TG 1015Y	3.7	7.5	7.2	8.4	6.7 AB
TG 1025Y	5.1	8.1	8.5	7.4	7.3 AB
TG 1105Y	5.7	9.3	9.6	9.6	8.6 A
AVERAGE	4.7	7.3	8.1	8.9	L** Q*[z]

[z]Treatment effects in columns were significant at 1% (**) and were linear (L) or quadratic (Q).

[y]Mean separation, within average for rows and columns, is based on Duncan's multiple range test at the 1% level.