EVALUATION OF INTRACEPT® FOR ONION PRODUCTION

Clinton C. Shock, Erik B. G. Feibert, and Lamont D. Saunders
Malheur Experiment Station
Oregon State University
Ontario, OR

Introduction

The objective of this trial was to evaluate the effect of Intracept® on onion yield and grade. Intracept is manufactured by Northwest Agricultural Products (Pasco, WA) and is marketed as a foliar-applied micronutrient fertilizer and plant growth enhancer.

Methods

The trials were conducted on both a drip-irrigated and furrow-irrigated field at the Malheur Experiment Station. The experimental designs were randomized complete blocks with seven replicates. The two treatments were an untreated check and Intracept applied at 16 oz/acre on June 2. Intracept was applied as a foliar spray in 13 gal of water per acre using 8004 nozzles spaced 20 inches apart at a pressure of 40 PSI. Each plot was four double onion rows 25 ft long.

Furrow-irrigated field

The field was irrigated when the soil water tension at 8-inch depth reached 25 cb (1 cb = 1 kPa). The field was sidedressed with 100 lb of N/acre as urea on May 25 and on June 21. The last irrigation was on August 23. An onion root tissue analysis on July 14 from onions in the untreated check plots showed the need for potassium (Table 1). On July 21, potassium was water run at 20 lb/acre during a normal irrigation.

Drip-irrigated field

Drip tape (T-tape, T-systems International, San Diego, CA) was laid at 4-inch depth between the two double onion rows at the same time as planting. The distance between the tape and the double row was 11 inches. The drip tape had emitters spaced 12 inches apart and a flow rate of 0.22 gal/min/100 ft. The field was irrigated when the soil water tension at 8-inch depth reached 20 cb (1 cb = 1 kPa). The last irrigation was on August 31. The field had 50 lb of N/acre as urea applied through the drip tape on June 8 and June 22. An onion root tissue analysis on July 14 from onions in the untreated check plots showed the need for potassium (Table 1). On July 21, potassium at 20 lb/acre was injected through the drip tape.

Both fields

The onions in both fields were grown on Owyhee silt loam previously planted to wheat. In the fall of 2005, the wheat stubble was shredded and the fields were irrigated and disked. Soil analyses on September 13, 2005 (Table 2) for both fields indicated the

need for 100 lb phosphate/acre, 100 lb sulfur/acre, 2 lb copper/acre, and 1 lb/acre of boron, which were broadcast in the fall of 2005 after disking. The fields were then moldboard-plowed, groundhogged, roller-harrowed, and bedded.

Onion (cv. 'Vaquero', Nunhems, Parma, ID) was planted in two double rows, spaced 22 inches apart (center of double row to center of double row) on 44-inch beds on March 23 in the furrow-irrigated field and on March 28 in the drip-irrigated field. The two rows in the double row were spaced 3 inches apart. Onion was planted at 150,000 seeds/acre. For preventive control of onion maggot, after planting the onion rows received 3.7 oz of Lorsban 15G® per 1,000 ft of row (0.82 lb ai/acre), and the soil surface was rolled.

The onions were managed to avoid yield reductions from weeds, pests, and diseases. Weeds were controlled with an application of Prowl® at 1 lb ai/acre on April 28. On May 9, Goal® at 0.1 lb ai/acre, Buctril® at 0.3 lb ai/acre, and Select® at 0.25 lb ai/acre were applied. On May 17, Goal at 0.2 lb ai/acre and Buctril at 0.3 lb ai/acre were applied. On May 30, Goal at 0.2 lb ai/acre, Buctril at 0.3 lb ai/acre, and Select at 0.25 lb ai/acre were applied. After lay-by the field was hand weeded as necessary. Thrips were controlled with aerial applications of the following insecticides: June 12, Warrior®; June 18, Warrior plus Lannate®; July 1, Carzol®; July 17, Warrior plus Mustang®; July 24, Carzol; July 29, Warrior plus MSR®; August 10, Warrior plus Lannate. Carzol was applied at 0.69 lb ai/acre, Warrior at 0.03 lb ai/acre, Lannate at 0.45 lb ai/acre, Mustang at 0.05 lb ai/acre, and MSR at 0.5 lb ai/acre.

Soil water tension was monitored by six granular matrix sensors (GMS, Watermark Soil Moisture Sensors Model 200SS, Irrometer Co. Inc., Riverside, CA) installed in mid-June below the onion row at 8-inch depth. The sensors were automatically read hourly with an Irrometer monitor (Irrometer Co.).

After lifting on September 8, onions from the central 20 ft of the middle two rows in each plot were topped, bagged, and hauled to a barn on September 15.

On September 29 the onions were graded. During grading, bulbs were separated according to quality: bulbs without blemishes (No. 1s), split bulbs (No. 2s), neck rot (bulbs infected with the fungus *Botrytis allii* in the neck or side), plate rot (bulbs infected with the fungus *Fusarium oxysporum*), and black mold (bulbs infected with the fungus *Aspergillus niger*). The No. 1 bulbs were graded according to diameter: small (<2.25 inches), medium (2.25-3 inches), jumbo (3-4 inches), colossal (4-4.25 inches), and supercolossal (>4.25 inches). Bulb counts per 50 lb of supercolossal onions were determined for each plot of every variety by weighing and counting all supercolossal bulbs during grading.

Treatment differences were compared using ANOVA and least significant differences at the 5 percent probability level, LSD (0.05).

Results

There was no significant difference in onion yield and grade between the Intracept-treated onions and the untreated onions in either of the two fields or when the data from the two fields were combined (Table 3). The furrow-irrigated field has a long-term history of high yields in previous years and had significantly higher total, marketable, and jumbo onion yields than the drip-irrigated field in 2006. This result was expected based on field history.

Intracept contains copper, iron, manganese, zinc, sulfur, and unknown polysaccharides and organic acids (Table 4). The amounts of these nutrients that were actually applied in one application of 16 oz of product per acre are listed in Table 4. Based on the onion root tissue analyses (Table 1) for the 2006 drip- and furrow-irrigated fields at the Malheur Experiment Station, the nutrients in the Intracept were not in short supply.

Table 1. Analysis of onion root tissue samples. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

Field	NO_3	P	K	S	Ca	Mg	Zn	Cu	Mn	Fe	B
	ppm	---------- % ----------						---------- ppm ----------			
June 21											
Furrow	6,193[a]	0.88	3.3	0.81	0.73	0.44	168	220	17	4,864	26
Drip	3,787[a]	0.97	4.02	1.63	0.66	0.43	101	274	15	3,321	25
Sufficiency range[b]	11,800	0.32-0.7	2.7-6	0.24-0.85	0.4-1.2	0.3-0.6	25-50	35-100	6-20	60-250	19-60
July 14											
Furrow	7,083[c]	1.39	2.53	0.87	0.61	0.32	41	139	13	1,930	73
Drip	4,430[c]	1	2.34	1.36	0.69	0.36	72	209	13	1,958	67
Sufficiency range	8,125	0.32-0.7	2.7-6	0.24-0.85	0.4-1.2	0.3-0.6	25-50	35-100	6-20	60-250	19-60

[a]These results were followed by corrective fertilizer.
[b]Western Labs, Parma, ID.
[c]Late season N was not applied.

Table 2. Analysis of soil sample taken on September 13, 2005. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

Field	pH	O.M.	NO_3	P	K	Sulfate	Ca	Mg	Na	Zn	Cu	Mn	Fe	B
		%	---------- ppm ----------											
Furrow	7.4	1.52	5	24	353	13	1,982	549	114	2.1	0.6	12	11	0.5
Drip	7.5	1.87	12	36	546	24	2,530	539	151	3.3	0.5	18	8	0.5

Table 3. Yield and grade for onions treated with Intracept® compared to an untreated check. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

Treatment	Total yield	Marketable yield by grade					Non-marketable yield		
		Total	>4¼ in	4-4¼ in	3-4 in	2¼-3 in	Total rot	No. 2s	Small
	cwt/acre						% of total yield	-- cwt/acre --	
Drip-irrigated field									
Check	658.6	632.4	0.0	50.5	542.6	39.3	0.8	2.8	17.8
Intracept	654.9	634.3	2.8	38.4	556.7	36.5	0.5	0.9	16.8
Average	656.8	633.4	1.4	44.4	549.6	37.9	0.7	1.9	17.3
Furrow-irrigated field									
Check	756.6	739.5	0.0	33.4	666.3	39.9	0.1	1.6	14.6
Intracept	745.2	725.7	0.0	35.8	650.0	39.9	0.3	4.1	13.0
Average	750.9	732.6	0.0	34.6	658.1	39.9	0.2	2.9	13.9
Average									
Check	707.6	686.0	0.0	41.9	604.5	39.6	0.5	2.2	16.2
Intracept	700.0	680.0	1.4	37.1	603.3	38.2	0.4	2.5	14.9
Average	703.8	683.0	0.7	39.5	603.9	38.9	0.5	2.4	15.6
LSD (0.05)									
Treatment	NS	NS	NS	NS	NS	NS	NS	NS	NS
Field	33.8	37.3	NS	NS	51.3	NS	NS	NS	NS
Trt X field	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 4. Intracept® nutrient content and the actual amounts of nutrients applied via Intracept. Malheur Experiment Station, Oregon State University, Ontario, OR, 2006.

	Cu	Fe	Mn	Zn	S	Polysaccharides	Organic acids
	% by weight						
Product analysis[a]	0.10	0.10	0.33	0.40	1.00	0.82	1.00
	lbs/acre						
Amounts applied[b]	0.00121	0.00121	0.004	0.005	0.0121	0.0099	0.0121

[a]Guaranteed analysis in product label. Product density is 9.75 lbs/gal.
[b]Amounts of each nutrient actually applied based on an application of 16 oz/acre of product.