EXPERIMENTS ON ORGANIC PRODUCTION OF VIDALIA ONIONS

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Introduction

There has been increasing demand for organic Vidalia onions. This has prompted several growers, both conventional and organic to attempt to produce Vidalia onions organically. Certified organic production requires that a strict set of guidelines be followed as outlined in the National Organic Program of the USDA. Certifying agents must inspect and certify that growers claiming to produce organic produce adhere to these guidelines.

Currently the most successful growers of organic onions are conventional growers that have set aside a small section of land that they maintain in organic production. Most have found a suitable piece of fallow land that they have brought into certification within a year. Land in conventional production would require a three year transition period. In addition, most of these growers are producing their onions on black plastic, which gives them the necessary weed control during dry bulb onion production. Careful record keeping is a necessity in such dual operations to prevent co-mingling of organic and non-organic products.

These experiments were undertaken to investigate different fertility regimens for producing both onion transplants and dry bulb onions.

Materials and Methods

In the first experiment, various fertility regimens were evaluated for production of onion transplants. On certified organic land, untreated seed of XON-202Y (Sakata Seed, Morgan Hill, CA), HSX-19406 F_1, HSX-61304 F_1, and HSX-18201 F_1 (Hortag Seed, Chapel Hill, NC) were seeded on 1 Oct. 2004.

Beds were prepared and shaped with 6-ft center-to-center spacing. Treatments with compost had the compost applied prior to the final pass with the rotovator. Seed were sown with a Monosem vacuum planter (model 540, ATI, Lenexa, KS) set to sow 4 rows 12 in. apart with 60 seed per linear ft. Each variety as mentioned above was placed in one of the 4 hoppers.

One-half the fertilizer treatments was placed immediately after seeding on 1 Oct. 2004 with the second half applied on 1 Nov. 2004. Poultry litter at rates of 0, 2, 4, 6, 8, and 10 tons/acre were split-applied on the dates indicated above. In addition, there were treatments with compost (Longwood Plantation, Newington, GA) at rates of 5 and 10 tons/acre both with and without pelleted poultry litter fertilizer (Perdue AgriRecycle,

Horsham, PA), which has an analysis of 4-2-3 with 3% Ca. This fertilizer when used was applied to supply 130 lbs/acre nitrogen.

Three additional treatments with pelleted poultry litter at rates of 100, 130, and 160 lbs/acre nitrogen were included. Finally Humate (JTS Natural Products, Marietta, GA) a humic shale ore was applied at two rates of 2.5 and 5.0 lbs/100 sq. ft. with and without pelleted poultry litter applied at 130 lbs/acre nitrogen rate.

The experiment was arranged in a randomized complete block design with 4 replications. Each experimental unit or plot was 10 ft. of bed planted as described above. Onion plants were harvested on 13 Dec. 2004. Twenty randomly chosen plants from each plot was weighed and the gram weight reported.

In the second experiment, suitably sized transplants (approximately 150 gms/20 plts. or larger) from the first experiment were transplanted onto beds prepared 6 ft on centers. Four rows 12 in. apart and 5.5 in. in-row spacing were transplanted on 13 Dec. 2004.

Treatments consisted of poultry litter applied at rates of 0, 2, 4, 6, 8, and 10 tons/acre. In addition, compost was continually added to a treatment for weed control with addition of 150 lbs/acre nitrogen of pelleted poultry litter. Finally 5 and 10 tons per acre rate of compost was applied with and without pelleted poultry litter fertilizer at 150 lbs/acre nitrogen. Compost rate treatments had the compost applied prior to the final pass of the rotovator. Poultry litter and pelleted poultry litter fertilizer were split-applied with half the treatment applied on 13 Dec. 2004 and half on 20 Jan. 2005. This experiment was arranged in a randomized complete block design of 4 replications.

Onions were harvested on 31 May 2005 and after removal of the tops and roots were immediately weighed for total yield. They were then graded into size classes of jumbo (≥3 in.) and mediums (≥2 in. and <3 in.).

Results and Discussion

The largest transplants were produced with 10 tons/acre poultry litter with 188.2 gms/20 plts. (Table 1). This was significantly better than with 0 or 2 tons/acre poultry litter, as well as with compost alone. In addition, this was better than with any rate of pelleted poultry litter unless it was accompanied with a high rate of compost (10 tons/acre). Finally treatments with Humate whether with or without fertilizer did not perform as well as the 10 tons/acre poultry litter.

Although the pelleted poultry litter has an analysis of 4-2-3, it does not perform as well as would be expected when applied to deliver the recommended rate of nitrogen (130 lbs/acre N) for transplant production. There are two possible reasons for this and they may be acting together. First there is a large amount of nitrogen in the ammonical form, which is highly volatile (strong ammonia odor). Over time significant amounts of nitrogen may be lost from this product. In addition, there may be significant amounts of nitrogen tied up in other organic forms that are not as readily available to plant growth as in conventional fertilizer.

The highest yielding treatment for total yield was 10 tons/acre poultry litter with 42.1 lbs/plot (Table 2). This did not differ from the treatment with 10 tons/acre compost with 150 lbs/acre nitrogen from pelleted poultry litter. Treatment 10 did not differ from either treatments 3 or 4, which had 4 and 6 tons/acre poultry litter, respectively, but was greater than treatment 5 with 8 ton/acre poultry litter. Previous work has suggested that 4

tons/acre poultry litter is adequate to produce organic onions (Boyhan et al., 2004). This experiment suggests that a higher rate, perhaps as high as 10 tons/acre poultry litter may be warranted. There were no differences among the treatments for jumbo yields.

In conclusion, poultry litter appears to be an excellent fertilizer source for onion production. Certified organic production requires that fresh manures be applied a minimum of 120 days prior to harvest for vegetables in contact with the ground. Onions are such a long season crop that this is not a problem. This is particularly true for growers that apply poultry litter preplant under plastic where only a single application prior to transplanting will be made.

Compost appears to enhance the effect of applied fertilizers, but alone does not appear adequate to supply the fertility needs of the crop. Slow mineralization of the compost probably limits the availability of nutrients from compost and therefore its benefits may not appear until subsequent seasons.

Pelleted poultry litter fertilizer has the benefit of a know analysis for application purposes and since it has been processed may be used up to date of harvest in certified organic production. The volatilization of ammonia and perhaps nitrogen tied up in other unavailable organic compounds may necessitate increasing the amount used of this material and perhaps applying it earlier in the crop cycle.

Literature Cited

Boyhan, G., R. Hicks, R. Torrance, J. Cook, R. Blackley, R. Hill, and T. Paulk. 2004. Evaluation of poultry litter as a fertilizer for organic onion production. 2004 Georgia Onion Research – Extension Report. Coop. Res-Ext. Publ. No. 3-2004.

Table 1. Effect of various organic fertility treatments on growth of onion transplants

Treatments	Weight/20 plants (gms)
0 tons/acre poultry litter	128.0
2 tons/acre poultry litter	116.4
4 tons/acre poultry litter	152.4
6 tons/acre poultry litter	164.2
8 tons/acre poultry litter	164.6
10 tons/acre poultry litter	188.2
5 tons/acre Smith compost	58.2
10 tons/acre Smith compost	100.0
5 tons/acre Smith compost with 130 lbs/acre N	118.8
10 tons Smith compost with 130 lbs/acre N	173.3
100 lbs N/acre Pelleted Poultry Litter	128.4
130 lbs N/acre Pelleted Poultry Litter	109.3
160 lbs N/acre Pelleted Poultry Litter	109.8
1089 lbs/acre Humate (2.5 lbs/100)	94.8
2178 lbs/acre Humate (5 lbs/100 sq ft)	74.7
1089 lbs/acre Humate with 130 lbs N	124.5
2178 lbs/acre Humate with 130 lbs N	117.8
CV	27%
LSD (p=0.05)	48.6

Table 2. Evaluation of Fertilizer Response for Organic Onion Production

No.	Treatments	Total Yield (lbs/plot)	Graded Yield: Jumbos (lbs/plot)	Graded Yield: Mediums (lbs/plot)
1	0 tons/acre poultry litter	21.0	10.0	3.7
2	2 tons/acre poultry litter	25.9	9.0	2.8
3	4 tons/acre poultry litter	32.5	14.2	2.2
4	6 tons/acre poultry litter	34.6	15.3	1.9
5	8 tons/acre poultry litter	27.1	11.9	1.3
6	10 tons/acre poultry litter	42.1	16.8	1.9
7	Compost for weed control with fertilizer	26.4	11.2	3.3
8	5 tons Compost w/fertilizer	20.9	8.7	1.7
9	5 tons Compost w/o fertilizer	20.9	9.3	5.1
10	10 tons Compost w/fertilizer	37.8	16.0	2.6
11	10 tons Compost w/o fertilizer	20.0	7.6	3.5
	CV	18%	42%	43%
	LSD (p=0.05)	7.2	NS	1.7