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POULTRY LITTER COMPOST EFFECTS ON FALL SPINACH PRODUCTION

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INTRODUCTION

Spinach (Spinaca oleracea L.) grown for the processing or fresh market is an important crop for vegetable producers in the Arkansas River Valley of western Arkansas and the Mississippi delta region of eastern Arkansas. Nutritional deficiencies are common with spinach. The crop has a shallow root system, and because of its sensitivity to water logged soils, it is generally grown in coarse textured soils. An intense soil fertility management program is required to consistently produce a high quality product. Recent work by Wells et al. (1989 and 1991) has shown the importance of sulfur fertilization especially for overwinter production.

One tactic for supplementing nutrients is addition of organic fertilizers such as poultry litter. Problems associated with use of raw litter on vegetable crops such as spinach include potential for contamination of product with pathogenic organisms and weed infestation of fields from bedding material (rice hulls). Composting can alleviate these problems. In addition, there is less odor with composted litter. Poultry litter that has been composted, dried and pelletized is commercially available in several states. This form is easier to apply than raw litter, and because the pelletized poultry litter (PPL) products are produced with a standardized NPK analysis, a consistent and uniform fertilizer application is easily attained. In this study, we evaluated response of spinach to applications of PPL in a commercial production setting.

MATERIALS AND METHODS

A commercial spinach production field at Burton Farms in Woodruff County near Tupelo, Arkansas was the site of the study. The Dubbs fine sandy loam soil (fine-silty, mixed, thermic Typic Hapludalfs) had been limed to a pH of 6.5 to 6.8. 'Cascade' spinach was direct seeded on 4 Sep 1992 in 6 rows per bed with 12 inch row spacing. Beds were spaced 24 inches apart. All plots received the same fertilizer inputs as the rest of the commercial field. Preplant fertilizer of 15-0-75 NPK /ac with 10 lbs S and 0.5 lbs B/ac was applied on 4 Sep. Fertilizer sidedress applications were made on 25 Sep with 37 lbs N/acre and again on 2 Oct with 40 lbs N + 19.5 lbs S. Irrigation was provided via overhead sprinkler.

The experiment was arranged in a randomized complete block design with 4 replications. Treatments included an untreated control and a 4-4-4 analysis PPL (Organigro Inc., Watts, OK) applied at 250, 750 and 1250 lbs/acre. PPL was applied 1 wk prior to planting and was incorporated in top 2 to 4 inches of the soil with a rolling cultivator immediately after application. Plots were 10 ft wide by 25 ft long with 10 ft untreated buffer areas separating plots. On 28 Sep, 12 Oct and 28 Oct, 5 randomly selected plants in each plot were collected for determination of dry matter accumulation and leaf area index. Plots were harvested on 2 Nov by hand cutting all plants from a previously undisturbed 4 ft X 4 ft area in 4 rows of each plot. Data were evaluated using analysis of variance procedure with mean separation by LSD.

RESULTS

Results from soil tests indicated that soil pH in the experimental area was within the recommended range for quality spinach production. Also, test results from soil samples taken from individual plots prior to fertilization showed no differences between treatment plots. Observations of dry matter accumulation and leaf area showed no significant or clear response to PPL (Table 1). Some differences between treatments were observed in results from tissue analyses of combined leaf and petiole samples; however, no clear patterns associated with PPL applications were apparent (Table 2).

The major finding in the study was the effect of PPL applications on yield. Yield of the commercial field (machine harvested) surrounding the study was 7 tons/acre (U.S). Mean yield in the hand harvested research plots receiving 0 litter was 8 tons/ac (Table 3). In those plots receiving PPL, mean spinach yields were significantly higher. PPL plots receiving 250 lbs/ac which produced just over 10 tons/acre. These results suggest that poultry litter can improve spinach yield in a high fertilizer input system. When applied in the composted form, poultry litter should not result in weed or potential food safety problems.

LITERATURE CITED

1. Wells, B. R. , T. E. Morelock and D. R. Motes. 1989. Response of 'Fall Green' spinach to sulfur fertilization. Ark. Agr. Exp. Sta. Res. Ser. 425. pp 9-11.

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Table 1. Dry matter accumulation, leaf area index values and yield for 1992 spinach[1].

PPL/ac	Dry Wgt/Plant			Leaf Area Index			Yield
	28 Sep	12 Oct	28 Oct	28 Sep	12 Oct	28 Oct	
	. . . . . g						tons/ac
0	0.37 a	4.41 a	8.68 ab	0.42 a	3.03 a	10.66 a	8.04 a
250	0.49 a	4.81 a	12.65 a	0.56 a	3.57 a	13.66 a	10.32 b
750	0.54 a	3.03 a	9.62 ab	0.53 a	2.63 a	12.30 a	9.58 ab
1250	0.43 a	3.58 a	7.54 b	0.46 a	3.14 a	9.79 a	11.25 b

[1] Values in a column followed by the same letter are not significantly different ($P < 0.05$).

Table 2. Nutrient levels in spinach leaf and petiole tissue, 2 Nov 1992[1].

PPL	P	K	Ca	Mg	Na	S	Fe	Mn	Zn	Cu	Al	As	Ba	Pb	Se
lbs/ac	. . . . . (ppm)														
0	52.1	495.7	107.6	96.8	20.7b	43.3	23.4	4.1b	1.12	0.12	31.5	0.25ab	0.75ab	0.22a	0.21
250	50.9	437.7	107.9	90.5	24.1ab	38.1	25.6	4.4b	1.24	0.10	31.9	0.24ab	0.73b	0.20ab	0.21
750	55.9	496.4	110.9	94.5	29.4a	41.3	20.0	4.1b	0.94	0.10	24.5	0.21b	0.64b	0.17b	0.19
1250	54.1	500.4	109.3	87.9	28.6a	40.9	32.2	6.2a	0.92	0.11	35.4	0.26a	0.95a	0.21ab	0.21

[1] Means in a column followed by the same letter or no letter are not significantly different ($P < 0.05$).