
Effect of Metam Potassium Applied via Drip Irrigation on the Control of Purple Nutsedge (Cyperus rotundus L) on Four Widths of Polyethylene Covered Beds

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Introduction

The use of polyethylene mulch, drip irrigation, and the soil fumigant methyl bromide are all important components of successful cultural practices used by vegetable producers in North Florida. The US Congress legislated the phase-out of methyl bromide for this use by 2005. Nutsedge is a common weed in the Suwannee Valley region of North Florida that has been adequately controlled in field plasticulture systems by using methyl bromide. This trial was conducted to evaluate metam potassium as an alternative soil fumigant for the control of nutsedge when applied via two drip tapes per bed using various bed widths.

Materials and Methods

Plots were established in the spring of 2003 on a Lakeland fine sand at the North Florida Research and Education Center - Suwannee Valley near Live Oak, FL. The soil was prepared by rototilling to a depth of eight inches. Beds were formed on 5-ft centers and were fertilized with 500 lbs/A of 13-1.7-10.8 (N-P-K) as they were formed. Plots 100-ft long were arranged in a randomized split plot design with four replications. Main plots were bed width and split plots were fumigation treatments. Bed top widths were 24, 28, 32, or 36 inches. Fumigation treatments were metam potassium or untreated. Metam potassium (K-Pam, AMVAC, Los Angeles, CA) was applied at 60 gallons per treated acre (based on area under the plastic mulch).

Soil was pressed to form beds six-inches high at the various widths using an adjustable width bed press (Kennco Mfg, Ruskin, FL). Black high density polyethylene mulch (Sonoco, Charleston, SC) and drip tape (Robert's RoDrip, San Marcos, CA) were applied

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to the preformed beds using a speed layer mulch applicator (Kennco Mfg). Two drip tapes per bed were applied to each plot. The drip tapes were positioned to be a distance one-third of the total bed width from each shoulder and three inches deep from the bed top.

Metam potassium was applied to treated beds on 13 March by using a mechanical proportioner (Dosatron, Clearwater, FL) set at an injection ratio of 1:50 (metam potassium:water). Each injection of metam potassium for each bed width was conducted until the required amount was delivered for each bed width (Table 1). The amount delivered to each plot was calculated based on the actual width of the bed as the treated area. Untreated plots were watered for 240 minutes to fully wet the beds.

Purple nutsedge (*Cyperus rotundus* L) counts were taken on 31 March (18 DAT) and 12 April 2003 (30 DAT). Counts were taken within each plot by dividing the treated bed into 3 sections, the two outside 6-inch sections (shoulder area) of the bed, and the remaining center area. Counts were taken in this manner in a 5-ft long section of the bed. Data were analyzed by analysis of variance and mean separation was by Duncan's Multiple Range Test.

Results and Discussion

Interaction. There was no significant interaction between bed width and fumigation. Therefore, the discussion will focus on bed width and fumigation treatments separately.

Bed Width. Total bed and center bed nutsedge counts taken on 31 March were not significantly different among the various bed widths (Table 2). Nutsedge counts from the shoulder area on 31 March showed the lowest number (228) in the 28-inch wide beds (Fig 1) but were similar to counts in 24 and 32 inch wide beds. The highest nutsedge population was found in the bed shoulder of 36 inch wide beds (Fig 2), but was not significantly different from 24 and 32 inch wide beds.

Total bed nutsedge counts taken on 12 April were highest on 24 inch beds, but were not significantly different from 28 and 36 inch wide beds. The lowest total bed nutsedge counts were found in 32 inch beds but were not significantly different in 28 or 36 inch beds. The highest shoulder area nutsedge counts were found in 36, 24, and 28 inch beds. No significant difference was found among bed widths for bed center nutsedge counts. Overall, poor nutsedge control was found in all bed widths.

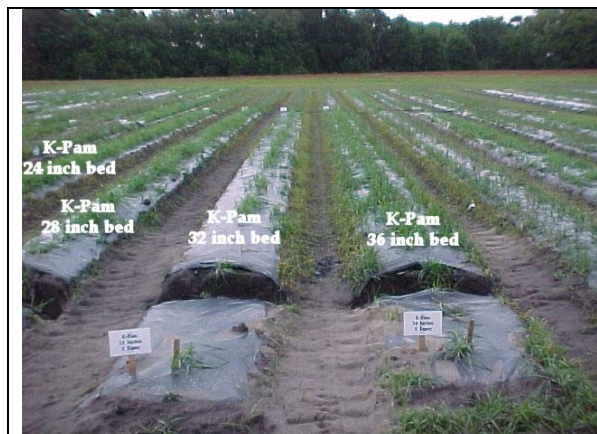


Figure 1. Metam potassium treatment via two drip tapes on 24, 28, 32, and 36 inch wide beds.



Figure 2. Metam potassium treatment via two drip tapes on a 36-inch wide bed.

Fumigation Treatment. Treating beds with metam potassium significantly reduced nutsedge counts on 31 March in terms of total bed, bed shoulder area, and bed center area (Table 3). Total bed nutsedge counts were reduced from 1254 to 471 per 100 linear bed feet with fumigation of metam potassium. On 12 April, nutsedge counts were significantly reduced by metam potassium in total bed and bed shoulder area only. However, on 12 April the bed center area only counts were not significantly different between the treated and untreated plots. Metam potassium significantly reduced nutsedge counts compared to an untreated control, but the level of control provided was not acceptable.

Conclusion

In general, metam potassium applied via two drip tapes per bed reduced purple nutsedge populations by about 50% or more at 18 days after treatment. However, by 30 days after treatment, the nutsedge populations in the bed center of treated vs. untreated beds were not significantly different. Even treating the narrow bed width of 24 inches with metam potassium via two drip tapes did not adequately control purple nutsedge.

Table 1. Metam potassium delivery times for each bed width.

Bed Width (in)	Injection Time (min)	Rate per Treated Acre ^z (gal)
24	230	60
28	263	60
32	301	60
36	331	60

^z Rate calculated based on the bed width of each treatment.

Table 2. Effect of bed width on nutsedge populations for total bed, bed shoulder, and bed center on two dates.

Bed Width (in)	Nutsedge (No./100 lbf)					
	31 March 2003			12 April 2003		
	Total	Shoulder	Center	Total	Shoulder	Center
24	926	424 ab ^z	503	1128 a	569 a	608
28	613	288 b	325	898 ab	380 ab	440
32	824	411 ab	413	719 b	314 b	345
36	1089	586 a	503	1056 ab	571 a	488
	NS ^y		NS ^y			NS ^y

^z Means in a column followed by the same letter are not significantly different.
^y Within column, means followed by different letters are significantly different according to DMRT at 5%; NS=Not significant.

Table 3. Effect of metam potassium on nutsedge populations for total bed, bed shoulder, and bed center on two dates.

Fumigant	Nutsedge (No./100 lbf)					
	31 March 2003			12 April 2003		
	Total	Shoulder	Center	Total	Shoulder	Center
K-Pam	471 b ^z	220 b	251 b	789 b	226 b	505
Untreated	1254 a	634 a	620 a	1111 a	691 a	435
						NS ^y

^z Means in a column followed by the same letter are not significantly different.
^y Within column, means followed by different letters are significantly different according to DMRT at 5%; NS=Not significant.