EFFECT OF BED WIDTH ON DRIP APPLIED K-PAM® FOR PURPLE NUTSEDGE CONTROL

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Introduction: Metam sodium (VAPAM®) and metam potassium (K-PAM) have shown promising results in Florida trials for the control of nutsedge, annual weeds, nematodes and soil borne diseases in multiple vegetable crops. Several different fumigant combinations and methods of application have been used with good success. Applications through drip irrigation systems provide many benefits and could become a preferred method of application. Extremely sandy soils, common in Florida production areas, make it virtually impossible to wet the entire bed when using one drip line in the center of 32 to 36 inch beds, which is currently the standard drip irrigation practice. In IR-4 trials, drip applied VAPAM has provided good to excellent nutsedge control when applied through three drip lines on 32 to 36 inch beds. However, three drip lines results in added expense and also may clutter the bed top, interfering with transplanting in commercial operations. Application of VAPAM or K-PAM through two drip lines may be an acceptable alternative. This trial was designed to evaluate if using narrower bed widths would result in acceptable control of nutsedge when K-Pam is applied through two drip lines per bed.

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. 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 and 36 inches. Fumigation treatments were metam potassium (K-PAM) at 60 gallons per treated acre and untreated. Soil was pressed to form beds six inches high at the various widths. Black high-density polyethylene mulch and drip tape were applied to the preformed beds. Two drip tapes were applied to each plot. They were positioned to be a distance of one-third of the total bed width from each shoulder and three inches deep from the bed top.

K-PAM was applied to the treated beds on March 13 by using a mechanical proportioner (Dosatron, Clearwater, FL) set at an injection ratio of 1:50 (K-PAM:water). The injection time to deliver the required amount of product for each bed width is shown in Table 1. Hendrix and Dail personnel provided technical support for the injection process. In this procedure, the concentration of the K-Pam in solution remained the same and the injection time was increased based on wider beds resulting in a greater treated area.

Purple nutsedge (*Cyperus rotundus L*) counts were made at 18 and 30 days after treatment to evaluate control. No crop was planted in the beds. Counts were made in five-foot sections of each bed width. The differing bed widths complicated evaluation as the two drip lines were variable distances apart in each bed. Since the tendency is for poorer control on the "shoulders" of the bed, counts were made on six-inch wide sections on each side of the bed. Counts were also taken in the bed "centers". The width of the bed center varied from 12 inches in the 24 inch bed to 24 inches in the 36 inch bed. Therefore, the data for "total" and "center" nutsedge counts per linear bed foot shown in Table 3 is actually for different total surface areas.

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

Fumigation Treatment: Table 2, which pools all the various bed widths together, indicates that K-PAM significantly reduced purple nutsedge populations on the shoulder, center and total counts at 18 DAT. Nutsedge control was 65% on the bed shoulders and 60% in the bed centers. At 30 DAT, K-PAM continued to provide significant reduction in nutsedge populations on the bed shoulders. Control was 67% on the shoulders, however counts from the center sections of the bed indicated that control was no longer significant.

Bed Width: Table 2, which includes counts for both treated and untreated plots, shows that there was no significant differences in nutsedge populations for the center area counts at either 18 or 30 DAT. For the shoulder area at 18 DAT, the 28 inch beds had the lowest number of nutsedge and had significantly less nutsedge than the 36 inch beds. At 30 DAT for shoulder counts, the 32 inch beds had the lowest number of nutsedge and were significantly less that both the 24 and 36 inch beds.

Conclusions: K-PAM provided fair to good nutsedge control on the bed shoulders, but only fair to poor control in the bed centers. No clear conclusions can be drawn on the effect of bed width on nutsedge control with K-PAM. A complicating factor is water movement in the beds. It should be noted that the length of run time varied based on the row width. In these very sandy soils, the water does not move laterally as well as in heavier soils. It is likely that the varied bed widths, position of the drip lines, and the length of injection run resulted in some situations where the water carried the K-PAM deeper than optimum or the concentration of K-PAM was insufficient for best results.

These trials conducted under very heavy nutsedge pressure, indicate that drip applied K-PAM does have promise for nutsedge control in Florida soils. Additional work to refine the water movement from drip applied K-Pam is needed. Combination treatments with chloropicrin injected in the bed prior to drip applications should also be considered.

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 metam potassium on nutsedge populations for total bed, bed shoulder, and bed center on two dates.

Fumigant	Nutsedge (No. per 100 linear bed foot)					
	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] No significant difference (p=0.05) was found between means in the column (NS).

Table 3. Effect of bed width on nutsedge populations for total bed, bed shoulder, and bed center on two dates. (Includes treated and untreated beds)

Bed Width (in)	Nutsedge (No. per 100 linear bed foot[1])					
	31 March 2003			12 April 2003		
	Total[1]	Shoulder	Center[1]	Total[1]	Shoulder	Center[1]
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] No significant difference (p=0.05) was found between means in the column (NS).
[1] Note that the actual area as designated by lbf varies among the different bed widths.

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