Improved Nutsedge Control on Bed Edges with Metam Potassium and Soil Surfactants

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Justification and Objective. Purple and yellow nutsedges (*Cyperus rotundus* and *C. esculentus*) are the two most troublesome weeds to control in vegetable and strawberry production in Florida. Soil fumigants, including metam potassium, are widely recommended to manage these weeds. Exposure of the underground weed structures (e.g., tubers, basal bulbs, stolons) to lethal doses of fumigants is principal to achieve effective control. However, lateral movement of metam potassium is closely related to water capillarity because metam potassium has low vapor pressure (a weak gas). In fumigated planting beds for tomato, pepper, cucurbits and strawberry, using a single drip tape is the most common practice. These beds are usually between 24 to 28 inches wide on top and lateral movement of water from a single drip tape does not reach more than 8 inches to each side of the drip line. Therefore, when metam potassium is injected through the drip lines, two untreated strips (each 4 to 6 inches wide) on the sides of beds occur. This translates on nutsedge growing unchecked in those untreated bed sides. On the other hand, soil surfactants, such as Integrate (Triblock Co Polymer 61% and Glucoethers 19%; Engage Agro USA, Prescott, Arizona, USA) are polymers used to improve soil wetting. Several studies in Florida have demonstrated consistently that this surfactant increased average soil moisture, root biomass, and early yields of drip-grown round tomato (Santos, unpublished data). The objective of this study was to evaluate the performance of metam potassium against nutsedge when Integrate was applied to the soil.

Materials and Methods. Two studies were conducted in spring and summer 2012 at the Gulf Coast Research and Education Center, IFAS, University of Florida. A standard bedder was used to create raised beds that were 5 ft apart at the center, 8 inches high, 28 inches wide across the top and 32 inches wide at base. Simultaneously with bed pressing, a single drip tape (0.45 gal/min per 100 ft of bed; T-Systems International, San Diego, California, USA) was buried 1 inch deep for irrigation and raised beds were covered with black virtually impermeable polyethylene mulch (Intergro, Clearwater, Florida, USA). Treatments consisted of: a) metam potassium, b) Integrate followed by metam potassium, and c) a non-fumigated control was added. A hydraulic injector was used to apply the surfactant at a rate of 1 gal/acre (5.5% v/v) and metam potassium at 60 gal/acre (5.5% v/v). Integrate was applied 1 day before the fumigant. Both studies were conducted in a randomized complete block design with 4 and 6 replications for the spring and summer trials, respectively. In spring 2012, beds were treated 2 weeks after bedding, whereas in summer 2012, this occurred 4 weeks after bedding. Nutsedge populations and soil moisture were measured at various times after fumigation. Data was analyzed within each sampling time with general linear model and separated with Fisher's-protected least significant test at the 5% level, if differences were found.

Results. Addition of Integrate to the soil prior to the fumigation improved nutsedge control and soil moisture at 5 inches deep (data not shown) in the both trials (Table 1). In spring 2012, plots

treated with the soil surfactant and metam potassium had consistently between 20 and 28% less nutsedge than plots treated with metam potassium alone. In summer 2012, when the applications were made 4 weeks after bedding and nutsedge was already emerged through the mulch, the combination of both products significantly increase nutsedge control in comparison with the fumigant alone. For instance, at nutsedge populations were 50, 52 and 39% less in plots treated with Integrate + metam potassium at 14, 21, and 28 days after treatment than in plots applied with metam potassium only. These preliminary results need to be validated to determine the potential reduction of nutsedge interference in plots planted with vegetable crops.

Table 1. Comparison of nutsedge populations in spring and summer 2012. Balm, Florida, USA.

Spring 2012					
Products	Nutsedge populations				
	10 days	12 days	17 days	20 days	41 days
	(plants/ft row)				
Control (natural population)	4.30 c	4.82 c	5.16 c	6.25 c	8.62 c
Metam potassium	2.13 b	2.30 b	2.70 b	3.28 b	5.00 b
Integrate + metam potassium	1.54 a	1.70 a	1.98 a	2.50 a	3.98 a
Significance (P<0.05)	*	*	*	*	*
Summer 2012					
Products	Nutsedge populations				
	0 days	7 days	14 days	21 days	28 days
	(plants/ft row)				
Control (natural population)	6.08	7.25 a	8.35 a	9.14 a	11.25 a
Metam potassium	6.02	2.78 b	4.06 b	5.91 b	6.15 b
Integrate + metam potassium	6.10	1.31 c	2.01 c	2.84 c	3.76 c
Significance (P<0.05)	NS	*	*	*	*

NS and * = non-significant and significant at the 5% level. Values followed by the same letter do not differ.