EVALUATION OF DRIP INJECTED ETHANEDINITRILE (EDN) FOR PEST CONTROL IN STRAWBERRY AND CANTELOUPE

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A variety of fumigants are registered for use in strawberry and cucurbit production in Florida. Growers throughout the state predominately rely on metam potassium or combinations of 1,3-dichloropropene (1,3-D) plus chloropicrin (Pic) or dimethyl disulfide (DMDS) + Pic for pest control. All of the registered fumigants have a low vapor pressure compared with methyl bromide, are less volatile and do not move readily through the soil. As a result, inadequate pest control can often be attributed to the fumigants not coming in contact with the pest. This problem can be partially overcome by placing the fumigant in the appropriate management zone or adopting application technology that improves distribution. However, there is still a need for fumigants that more readily move through the soil.

EDN Fumigas (EDN) is a soil fumigant with the active ingredient ethanedinitrile. It is currently being evaluated for use in a wide variety of fruit and vegetable crops throughout the USA. EDN is of particular interest because its vapor pressure is greater than methyl bromide and it has a low molecular weight. Combined, this means that EDN should move readily through the soil. In addition, EDN decomposes rapidly in soil, water and air and this should permit transplanting as soon as 14 days after application. Preliminary research has found that EDN can effectively control a range of pests and pathogens. For example, Rosskopf et al. (2007) found that EDN controlled yellow nutsedge, common purslane, sicklepod, and root-knot nematode.

Experiments were initiated in 2017 at the North Florida Research and Education Center (NFREC), the Gulf Coast Research Education Center (GCREC) and in Dover Florida, to evaluate the efficacy of 70 kg ha^{-1} of Paladin, 46 kg ha^{-1} of Pic-Clor 60 and 55, 74, and 92 kg ha^{-1} of EDN on weeds, nematodes and pathogens. All experiments were set up as randomized complete blocks with four reps. The beds were formed, drip tape installed, and beds covered with TIF plastic mulch (Berry Plastics). All fumigants were injected through the drip tape. EDN was injected using a 'mixer' to distribute the fumigant as small bubbles within the water. Strawberries will be transplanted at GCREC and Dover. Canteloupe will be planted at NFREC. Only nutsedge data are presented within this summery but additional information will be presented at the meeting including weed control,

crop safety, and control of *Macrophomina* inoculum and Macrophomina infected strawberry crowns.

EDN injections significantly reduced nutsedge densities above the drip tape compared to the nontreated control and Pic-Clor 60 (Table 1). Similar trends were observed on the opposite side of the bed but control levels were lower. Paladin was as effective as all rates of EDN above the tape and tended to be more effective on the opposite side of the bed although the difference was not statistically significant. There was no significant rate effect with EDN but nutsedge control levels tended to increase with rate. At GCREC, all fumigant applications reduced nutsedge density compared to the nontreated control (Table 2).

Literature Cited

Rosskopf, E.N., N. Kokalis-Burelle, G. Peterson, and C. Waterford. 2007. Preliminary investigation of ethanedinitrile for control of weeds and nematodes important to Florida production systems.
https://naldc.nal.usda.gov/download/15297/PDF

Table 1. Effects of fumigation on nutsedge density 30 days after treatment on the side of the bed where the drip tape occurs (on-tape) and on the side of the bed where there is no drip tape (off-tape) in Quincy, Florida in 2017.

Fumigant	Rate	on-tape	off-tape
	kg ha^{-1}	----------# m^{-2}----------	
Nontreated	-	70 ab	98 ab[a]
EDN Fumigas	55	24 bc	55 bc
EDN Fumigas	74	14 c	57 bc
EDN Fumigas	92	1 c	44 bc
Paladin Pic-21	70	1 c	13 c
Pic-Clor 60	46	97 a	134 a
P-value	-	0.0103	0.0085

[a]Means followed by the same letter are not significantly different based on Tukey adjusted means comparisons at $p<0.05$.

Table 2. Effects of fumigation on nutsedge density on strawberry beds 7 days after treatment at the Gulf Coast Research and Education Center in Balm, Florida, in 2017.

Fumigant	Rate	Nutsedge
	kg ha^{-1}	-----# m^{-2}-----
Nontreated	-	4 a[a]
EDN Fumigas	55	0 b
EDN Fumigas	74	1 ab
EDN Fumigas	92	0 b
Paladin Pic-21	70	0 b
Pic-Clor 60	46	0 b
P-value	-	0.0658

[a]Means followed by the same letter are not significantly different based on Tukey adjusted means comparisons at $p<0.05$.