

2017 Vegetable Fumigant Systems For Plasticulture in Georgia

A. S. Culpepper, J. C. Smith, and B. Dutta; University of Georgia

Effective alternatives to methyl bromide exist but selecting the ideal fumigant, mulch, and herbicide program is challenging. Growers must understand how soil texture, moisture, bed compaction, and their cultural practices influence fumigant activity, planting intervals, and off-gassing concerns. This circular is provided to assist growers with developing the most effective system for their farm. Figure 1 compares fumigant options; more detailed information regarding fumigants is below with herbicide programs on the back.

Fig 1. Fumigant Systems For Weeds & Nematodes In Order of Consistency.

1. Paladin Pic + Vapam	Mulch: TIF	Good to excellent on all common weeds	Excellent on nematode
2. UGA 3-WAY	Mulch: TIF		
3. Paladin Pic	Mulch: TIF	Good nutsedge, Fair grass and pigweed	Excellent on nematode
4. UGA 3-WAY	Mulch: LDPE	Fair nutsedge, Excellent grass and pigweed	Excellent on nematode
5. Pic Chlor 60	Mulch: TIF	Fair nutsedge, Good grass and pigweed	Fair/Good on nematode

MULCH SELECTION AND FUMIGANT PLANT BACK INTERVALS

1. **LDPE** = Low Density Polyethylene; **VIF** = Virtually Impermeable Film; **TIF** = Totally Impermeable Film.
2. For Paladin Pic systems, TIF must be used to avoid off-gassing concerns. With the UGA 3-WAY and Pic Chlor 60, any mulch can be used although research suggests VIF has little fit. When comparing LDPE to TIF, consider 1) LDPE is cheaper, 2) TIF provides better pest control, and 3) TIF increases length of time fumigant is in soil.
3. Fumigant systems applied under TIF are often so effective that fumigants can remain in the soil over 35 d in the spring and over 15 d in the fall; thus, check beds for presence of fumigants prior to planting.
4. Wet conditions often trap fumigants in the bed and can be problematic, especially with Telone II.

FUMIGANT OPTIONS IN DETAIL (rates provided as broadcast only):

1. UGA 3-WAY includes Telone II at 12+ GPA, chloropicrin at 150 lb/A, and metam sodium (Vapam, etc.) at 75 GPA. Telone II is typically applied 14-18" deep followed by chloropicrin injected 8-10" deep with 3 knives in a typical 32" wide bed top. Place metam in the final bed with injection points 4" below the final bed top & 4" apart. If replacing Telone II & chloropicrin with Pic Chlor 60, the rate of ≥ 21 GPA is in order but less nematode control is to be expected. An LDPE mulch is effective for loamy sand soils during spring fumigation of fields lightly infested with nutsedge. TIF would be far more effective in controlling nutsedge on sandy soils, during summer fumigation, and in fields with heavy nutsedge infestations. In addition to nutsedge control, metam is critical for controlling annual grass and broadleaf weeds.

2. Paladin Pic includes a 79:21 mixture of DMDS:chloropicrin. Applications of 40-50 GPA should be injected 8-10" below the bed top covered with TIF. Higher rates should be used for intense nutsedge infestations or with warm soil temperatures. Good nutsedge but poor annual grasses and broadleaf weed control is expected. Thus, adding metam sodium to the system is suggested using the same application methods noted above with the UGA 3-WAY. If metam is not included, then an herbicide program is likely needed (see back). *Paladin has a distinct odor and applicators must be careful to avoid off-target odor issues; use in areas where odor concerns to one's neighbors do not exist.*

3. Pic Chlor 60 applied under TIF at 28 GPA (340 lb/A) can be an effective option, especially when 1) producing only 1 or 2 crops prior to mulch removal, 2) applying in fields containing light nutsedge and nematode infestations, and 3) when growing crops that allow topical Sandea applications. The addition of herbicides should be considered (see back).

HERBICIDE PROGRAMS: Herbicides are often not needed under mulch when applying metam except in fields heavily infested with weeds. If not applying metam under mulch, herbicides are often beneficial if applied correctly. When applying herbicides under mulch, the spray must be made after the final bed is formed which includes laying of drip tape. Additionally when laying mulch, the treated bed must not be disturbed. *If using herbicides for the first time, try on a limited basis. Rates below are broadcast, adjust accordingly. Also, follow all labeled guidelines and restrictions.*

BELL PEPPER				
Preplant Under Mulch	Typically 7-14 d after transplant	POST 14 d after transplant but before bloom	Typically when grasses are < 3 inches in height	Row Middles (herbicides may damage or kill cover crops)
Devrinol 50 DF (2-4 lb/A)	Dual Magnum ¹ (8-10 oz/A)		Select Max (9 oz/A) <i>(no adjuvant)</i>	<p>Prior to planting: <i>Chateau 4 oz/A + Dual Magnum 1 pt/A</i> (include Treflan if rain expected within 24 hr; Prowl not currently labeled). Avoid contact with mulch, must get rain before planting.</p> <p>After transplanting: <i>Sandea + Surfactant</i> will control nutsedge; the addition of Roundup will improve weed control but be extremely careful to not drift on the crop.</p> <p>Roundup, Gramoxone, and Aim are also labeled for row middle applications; avoid all contact with the crop which is often difficult with sprays even when using hoods.</p>
Devrinol 50 DF (2-4 lb/A) + Command ² 3ME (1-2.5 pt/A)				
Devrinol 50 DF (2-4 lb/A) + Reflex ² 2 SL (12 oz/A)				
Devrinol 50 DF (2-4 lb/A) + Reflex ² 2 SL (12 oz/A) + Command ² 3ME (1-2.5 pt/A)				
<p>¹Dual Magnum can be applied under mulch but pepper are occasionally stunted, especially in the fall when drip irrigation is run more frequently. If applying under mulch, use conservative rates and do not exceed 1 pt/A of Dual Magnum for both under mulch and over the crop applications.</p> <p>²Carryover from Reflex and Command can be tremendous when applied under mulch, check rotational intervals closely.</p>				
TOMATO				
Devrinol 50 DF (2-4 lb/A) + Dual Magnum (8-12 oz/A)	Dual Magnum (8 oz/A)	Sandea (0.75 oz/A) + NIS (0.25% V/V)	Select Max (9 oz/A) <i>(no adjuvant)</i>	<p>Prior to planting: <i>Chateau 4 oz/A + Dual Magnum 1.3 pt/A</i> (include Treflan if rain expected within 24 hr; Prowl not currently labeled). Avoid contact with mulch, must get rain before planting.</p> <p>After transplanting: <i>Metribuzin + Adjuvant</i> is effective on numerous broadleaf weeds; the addition of Roundup will improve weed control but be extremely careful to not drift on the crop.</p> <p>Roundup, Gramoxone, and Aim are also labeled for row middle applications; avoid all contact with the crop which can be difficult with sprays even when using hoods.</p> <p>Envoke² can also be used for morningglory and nutsedge.</p>
Devrinol 50 DF (2-4 lb/A) + Reflex ² 2 SL (12 oz/A)				
Dual Magnum (8-12 oz/A) + Reflex ² 2 SL (12 oz/A)				
Dual Magnum (8-12 oz/A) + Metribuzin ² 75 DF (0.5 lb/A)				
<p>¹Dual Magnum applied under mulch but tomato are occasionally stunted, especially in the fall when drip irrigation is run more frequently. If applying under mulch, use conservative rates and do not exceed 1 pt/A of Dual Magnum for both under mulch and over the crop applications.</p> <p>²Carryover from Reflex, metribuzin and Envoke can be tremendous, check rotational intervals closely.</p>				
EGGPLANT				
Devrinol 50 DF (2-4 lb/A)			Select Max (9 oz/A) <i>(no adjuvant)</i>	Row middle applications are identical to pepper above EXCEPT Dual CANNOT be used in eggplant.

REDUCING FUMIGANT COSTS OVER TIME

A holistic approach to nutsedge control is the key to improved economic pest management in plasticulture. Consider the following:

1. Always manage nutsedge between rows of plasticulture; Sandea is available for many crops.
2. Always terminate the crop and weeds (especially nutsedge) as soon as harvest has been completed.
3. Rotate a full use rate of Roundup with disking when crops and mulch are not present (3 wk intervals).
4. Rotate Roundup and Gramoxone when crop is not present but mulch is present; wash mulch prior to planting.



THE UNIVERSITY OF GEORGIA
COOPERATIVE EXTENSION
Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences

The University of Georgia and Ft. Valley State University, the U.S. Department of Ag. and counties of the state cooperating. Cooperative Extension, the University of Georgia College of Agricultural and Environmental Sciences, offers educational programs, assistance and materials to all people without regard to race, color, national origin, age, gender or disability.

An Equal Opportunity Employer/Affirmative Action Organization
Committed to a Diverse Work Force

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, The University of Georgia College of Agricultural and Environmental Sciences and the U.S. Department of Agriculture cooperating.
Sam Pardue, Dean and Director