DAZOMET ACTIVITY TOWARDS SOUTHERN BACTERIA WILT AND NONACTIVITY TOWARDS FUSARIUM IN PLASTICULTURE TOMATO PRODUCTION

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INTRODUCTION; North Carolina growers produce approximately 2, 500 acres of tomatoes, predominately for the vine ripe fresh market. Both bacteria wilt, Pseudomonas *solanacearum*, (BW) and fusarium wilt race 3. *Fusarium oxysporum sp.* lycopersici, (FR3) are problematic diseases in N. C. The presence of these diseases, can destroy the economic productivity of this acreage for subsequent tomato crops. Standard soil fumigation with methyl bromide/ chloropicrin (67/33%, respectively) (MB/CHL) does not effectively control BW or FR3. N. C. tomato producers are presently seeking alternative methods of controlling these diseases. Alternative methods include changes in fumigant selection, modified application techniques, and breeding for disease resistant hybrids. For FR3, resistant hybrids are currently being evaluated within the N. C. Tomato Breeding Program, but are not commercially available (availability is expected in 1998). BW however, remains a serious problem in many production areas, with no effective resistance in commercially available hybrids. With the potential phase out and loss of methyl bromide, pest management in N. C. tomato production will be further complicated.

In N. C., alternatives to methyl bromide for use in pre-plant soil fumigation are being evaluated. One potential alternative that is being considered is dazomet. Dazomet (DAZ) is the active ingredient of BASAMID** Basamid™ is produced and marketed by BASF Corp., Agricultural Products Division. DAZ has broadspectrum pesticidal activity towards weeds, and sod home fungal and bacterial disease, and insects. DAZ is formulated as a micro-granule When properly activated, DAZ releases MITC (similar to metam sodium), as the prominent biocide, as well as four other less prominent biocides (formaldehyde, carbon disulfide, hydrogen sulfide, and methyl amine).

Directions for use of DAZ specify the need for thorough, or uniform incorporation of the micro-granule into the soil. To properly activate DAZ, the micro-granules must react with adequate, and uniform soil moisture. The level of soil moisture required is dependent on soil type. For research use in plasti-culture tomato production, recommendations require DAZ to be uniformly incorporated into pre-moistened soil prior to plant bed preparation. Immediately after incorporation plant beds should be prepared and covered with plastic row cover.

OBJECTIVE and METHODS; Our objective was to evaluate the activity of DAZ against FR3 and BW compared to that of MB/ CHL Our hypothesis was that, DAZ being a different active ingredient, may have a different spectrum of control. As well, the DAZ fumigating gases have lower vapor pressures, causing the gases to remain in the sod longer, potentially resulting in unproved activity towards diseases.

A field study was conducted in Tryon, NC, in 1997 to compare DAZ applied at 350, 450 and 550 lb product/ acre, and MB/ CHL (67/ 33%, respectively) at 200 lb / acre, to an untreated control, towards FR3 and BW in an FR3 susceptible tomato hybrid. The field had a five year history of FR3, uniformly distributed throughout the field (limiting profitable production). The field also had a less predominant history of BW. Each treatment was replicated six times with plot length being 200 ft (Or 133 plants/ plot). To prevent plot to plot gas movement, the plastic between plots was cut and ends covered.

DAZ rate was calculated based on soil volume rather than banded application. DAZ rates were equivalent to amount of product per soil volume equivalent to 43,560 ft^2 by 1/2 ft (or 6 in.) soil depth. DAZ was incorporated into pre-moistened soil to 6 in. soil depth, with a North West Power Tiller in 6 ft wide bands. Using Gandy Drop Boxes, the DAZ was applied during sod incorporation. After incorporation, plant beds were prepared and covered with 1.2 mi. black plastic row cover. With the soil type being a clay-loam, soil moisture of 40% Field Capacity (F.C.) was desired. This was achieved with 1/2 in. of overhead-irrigation 48 hrs prior to study establishment. MB/ CHL was injected into the plant bed using conventional equipment.

Evaluations included test for depth of DAZ placement, and rate of MITC dissipation from the covered plant beds. Test for DAZ placement utilized lettuce seed bioassay (refer to conducting germination test in BASAMID G label). For this assay, soil samples were taken from; 0-2, 2-4, 4-6, 6-8, 8- 10 and 10- 12 in. bed depth. Soil samples were placed in air tight (Mason Jars). Small dishes containing moist cotton balls with lettuce seed, were placed on the top of the soil. Two sets of samples were prepared. One set had 10 nil of additional waster added, and to the other, no additional water added. This addition of water was used to confirm the existing

level of soil moisture being adequate for complete dazomet activation. Containers were allowed to sit in full sun for 3 days. After three days, if MITC was present, the lettuce seed would not germinate

Rate of MITC dissipation was determined using the same bioassay. For this, soil samples were taken from 2- in. soil depth from the 550 lb DAZ/ acre plots; 7, 14 and 21 days after treatment (DAT).

Pesticidal activity of DAZ towards BW and FR3 was evaluated at harvest by visual observations (Howard et. al. 1994) for numbers of plants demonstrating symptoms.

RESULTS and CONCLUSIONS; Dazomet Activation and MITC Dissipation**.** In this clay-loam soil, sod moisture of 40% F.C. was adequate for complete activation of DAZ to MITC. DAZ placement was from 0 to 12 in- bed depth (with broadcast application prior to bed preparation, and hilling of the treated soil during bed preparation). With soil temp. of 65 F at 6 in bed depth, soil treated with 550 lb DAZ/ acre was MITC free 14 DAT.

Dazomet Activity Towards Disease . in the initial observation (43 DAT), symptoms of BW could be differentiated from FR3. However, in the 57 and 72 DAT observations, BW symptoms were masked by advanced plant decline due to FR3 wilting. Neither DAZ, or MB/ CHL provided season-long control of FR3 (Table 1.). In the first evaluation (43 DAT), both DAZ and MB/ CHL demonstrated activity towards BW (Table 1.). In the untreated control, 12% of the plants expressed BW symptoms. In the MB/CHL treatment, 4% were infected. In the DAZ treated plots, less than 1% of the plants expressed symptoms.

Conclusions . DAZ at 350, 450 or the highest rate of 550 lb/ acre, did not control FR3. In the future, this disease will be less of a problem as FR3 resistant tomato hybrids are available and adopted. Presently, high quality BW resistant hybrids are not available. The initial activity of DAZ towards BW warrants further investigation. DAZ is known to control diseases in other crops related to BW. Research will be conducted in 1998 to quantify the activity of DAZ towards BW.

Table 1. Activity of Dazomet Towards Fusarium Race 3 (FR3)* and Bacteria Wilt (BW)*

Treatment	BW (43 DAT)	FR3 (43 DAT)	FR3 (57 DAT)	FR3 (72 DAT)
Untreated.	12%	20.3%	45.1%	56.4%
MB/ CBL	3.8	9.8	45.1	52.6
DAZ 350	0.8	20.3	47.4	57.1
DAZ 450	0.8	19.5	53.4	58.6
DAZ 550	0.8	12.0	37.6	45.9

*Data are percentage (%) of plants with visible symptoms per 133 plants per 200 ft plot.

Disease Reference

Howard, R.J., J.A. Garland and, W.L. Seaman- 1994. Diseases and Pests of Vegetable Crops in Canada. Canadian Pytopathological Society and Entomological Society of Canada.