# FUMIGATION TRIALS FOR TOMATOES AND STRAWBERRIES IN NORTHWEST FLORIDA

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Fumigation trials were conducted during spring production periods of 1993 for tomatoes and 1994 for strawberries and tomatoes on a Dothan loamy fine sand. Tomato cultivar used both years was 'Colonial' and strawberry cultivar used was 'Chandler'. Total fertilizer applied was 175-54-175 lbs/A of $N-P_2O_5-K_2O$. Treatments, rates and method of application are listed in Tables 1-3. Bed size used for tomatoes was 36 inches and for strawberries 30 inches. Between row spacing was 72 inches. Plot length was 45 feet for tomatoes and 40 feet for strawberries. All fumigant treatments were applied using a Varea-Meter flow meter with product tanks pressurized at 80 psi with $N_2$ gas. Equipment was calibrated and materials applied 9 inches deep with 3 chisels spaced 12 inches apart. Black polyethylene mulch was applied immediately after fumigant application. The Basamid treatments and Vapam treatment applied modified broadcast were applied to the soil surface, rotovated in, beds pulled up, pressed and mulch applied, in 1994 no rotovating was done in tomato crop. The remaining Vapam treatments (amount based on percentage of row covered with mulch) were applied through the drip lines which were 6 inches off center (in center of bed for strawberries) buried approximately 1 inch deep. The amount of Vapam per plot was measured out and diluted with water so that injection time was about 1.5 hours in 1993 and 3 hours in 1994. Drip tube used was Chapin Twin Wall IV, 10 mils thick with delivery rate of 0.5 gpm at 10 psi. Tomato plots consisted of eighteen plants with the center 12 plants used for yield data and root knot gall rating after final harvest. Strawberry plots consisted of double row of plants 40 feet long (80 plants) with center 25 feet used for yield data (50 plants). Design was a random complete block with 4 replications (6 reps for tomatoes in 1994). Planting dates for tomatoes were 23 March 1993 and 31 March 1994. Strawberry planting date was 21 Oct 1993. Data collected for tomatoes included yield of medium (2.25 - 2.50 inches), large (2.50 - 2.75 inches) and extra-large (> 2.75 inches) fruit, total yield (only total yield presented), average fruit weight, root gall rating. Strawberry data collected included yields, fruit weight and nematode populations (not presented due to low populations).

Fumigant treatments did not affect yield of tomatoes in either production year (Tables 1 and 2). Fruit weight was lowest in 1993 with the Telone C17 treatment (Table 1), while in 1994 treatments did not affect fruit weights (Table 2). In 1993 (Table 1) plants in the methyl bromide treatment had the lowest root gall rating and with many root systems galling was very hard to find. The next best treatments were the Telone C17 and Vapam applied as modified broadcast and tilled in.

There were no differences among the Basamid or Vapam treatments applied through the drip lines. The untreated check had an average rating (average of 48 root systems) of 6.6 which translates to about 75% of the root system is heavily galled and lost for production (copy of rating system included with report). Two of the Vapam treatments had similar ratings to the untreated check. When rating the Vapam treatments applied through the tube, the root system portion that was on the tube side would be much less galled than that which was in the off tube area indicating that there was limited lateral movement of the Vapam. In 1994 (Table 2) tomato plants in the Telone C17 plots had the lowest root gall rating (0.7 average of 72 root systems),but not significantly different from either methyl bromide treatment. Treatments with most injury and highest root knot populations (data not presented) were the Basamid and Vapam (applied through drip line) treatments. There was a high correlation ($R^2$ = 0.69, P < 0.001) between gall rating and nematode population but no correlation between yield and root gall rating ($R^2$ = 0.001, P = 1.00). Even though root knot nematodes were at a fairly high population, there effect on yield was minimal due to the high fertility and drip irrigation.

Strawberry yields were affected by fumigation treatment (Table 3. Both Basamid treatments and the methyl bromide treatment had significantly higher yields than the untreated check. The Basamid treatment at 400 lbs/A also provided the highest fruit weight. Very low numbers of ring (*Criconemoides*), spiral (*Helicotylenchus)* and root knot (*Meloidogyne*) nematodes were present but not at populations that would cause significant damage.

Table 1. Effect of fumigant treatments on yield, fruit weight and root gall ratings of 'Colonial' tomatoes. NFREC Quincy, FL. 1993.

| Treatment | Rate/A broadcast | Yield (25 lb box) | Fruit wt. (oz) | Root gall rating |
|---|---|---|---|---|
| Untreated | | 2233 a[z] | 6.5 a | 6.6 a |
| Methyl bromide 98:2 | 235 lbs | 2434 a | 6.4 ab | 0.6 d |
| Vapam[y] | 50 gal | 2160 a | 6.5 a | 5.2 ab |
| Vapam[y] | 75 gal | 2114 a | 6.5 a | 4.4 b |
| Vapam[y] | 100 gal | 2212 a | 6.4 ab | 5.3 ab |
| Vapam[x] | 100 gal | 2331 a | 6.5 a | 2.4 c |
| Telone C17 | 21.4 gal | 2223 a | 6.0 b | 2.6 c |
| Basamid[x] | 150 lbs | 2263 a | 6.2 ab | 4.5 b |
| Basamid[x] | 300 lbs | 2066 a | 6.2 ab | 4.4 b |

[z] Mean separation Duncan's Multiple Range Test, 5% level.
[y] Applied through drip line at 50% of broadcast rate.
[x] Applied as a modified broadcast (50%) and tilled in before mulch was applied.

Table 2. Effect of fumigant treatments on yield, fruit weight and root gall ratings of 'Colonial' tomatoes. NFREC Quincy, FL. 1994.

| Treatment | Rate/A broadcast | Yield (boxes/A) | Fruit wt. (oz) | Root gall rating |
|---|---|---|---|---|
| Untreated | | 1819 a[z] | 6.1 a | 4.2 bc |
| Methyl bromide 98:2 | 400 lbs | 1947 a | 6.0 a | 2.1 de |
| Methyl bromide/ chloropicrin 67:33 | 350 lbs | 1989 a | 6.0 a | 1.0 e |
| Chloropicrin | 350 lbs | 1920 a | 6.0 a | 3.3 cd |
| Vapam[y] | 100 gal | 1823 a | 6.0 a | 6.5 a |
| Vapam[x] | 100 gal | 1844 a | 6.1 a | 5.0 ab |
| Telone C17 | 35 gal | 1719 a | 6.2 a | 0.7 e |
| Basamid[x] | 400 lbs | 1888 a | 6.2 a | 6.2 a |

[z] Mean separation Duncan's Multiple Range Test, 5% level.
[y] Applied through drip line at 50% of broadcast rate.
[x] Applied as a modified broadcast (50%) and tilled in before mulch was applied.

Table 3. Effect of fumigant treatments on yield and fruit weight of 'Chandler' strawberries. NFREC Quincy, FL. 1994.

| Treatment | Rate/A broadcast | Yield (flat/A) | Fruit wt. (gms) |
|---|---|---|---|
| Untreated | | 1273 b[z] | 14.6 ab |
| Methyl bromide 98:2 | 400 lbs | 1624 a | 14.4 b |
| Vapam[y] | 100 gal | 1494 ab | 14.0 b |
| Vapam[x] | 100 gal | 1581 ab | 14.2 b |
| Telone C17 | 21.4 gal | 1608 ab | 14.8 ab |
| Basamid[x] | 200 lbs | 1632 a | 14.2 b |
| Basamid[x] | 400 lbs | 1682 a | 15.6 a |

[z] Mean separation Duncan's Multiple Range Test, 5% level.
[y] Applied through drip line at 42% broadcast rate.
[x] Applied as modified broadcast and tilled in before mulching.