

EFFECTS OF COMPOST TEAS IN CONTROLLING LATE BLIGHT DAMAGE TO
TOMATOES IN PENNSYLVANIA

Project # FNE98-221

By Donald J. Kretschmann

1. OBJECTIVE: To determine if manure teas can be used to control late blight in commercial tomato production.

2. FARM INFORMATION: I have commercially grown organic vegetables and fruit for 26 years. We currently own 60 acres and plant about 20 acres in vegetables each year. We also have a 2 acre apple orchard. We grow almost all common vegetables and market about 85% via 400 + subscription weekly deliveries (CSA); the remainder is wholesaled. The farm employs two people full time and 4-6 others seasonally. Several of our most important crops are: lettuce, tomatoes, potatoes, apples, peppers, carrots, herbs, beets, and spinach.

3. COOPERATORS: We thank Dr. Alan MacNab, Penn State for advice, his BLIGHTCAST reports, and the use and instruction in his tomato blight rating scale. Also, Lee Miller, Beaver Co. Extension Agent for advice and help in identifying the blights and for arranging the Extension vegetable meeting at our farm on vegetable diseases, the first time we tried the compost teas.

4. PROJECT DESCRIPTION:

Two composts were prepared in the way regularly used on the farm: municipal leaves were combined with chicken manure in approximately 5:1 proportion by volume. A small amount of soil was added as well. Mixing was done by loading into a manure spreader and creating long windrows approximately 5' in height and sloping to about 12' wide. This is done in the fall and allowed to compost until spring. It is turned and remixed twice during the winter/spring.

The "old" compost was prepared during the winter of 1996-1997, and the "new" compost was prepared during the winter of 1997-1998.

Field preparation included the plowdown of 10T./A composted chicken manure with an 18" cover crop of rye grain. Subsequently 1500#/A rock phosphate (30% total P, 3% available) was applied. The field was fitted and planted with tomatoes, 24" in-row spacing, 42" between rows on 5/16/98. Following several cultivations for weed control, the plants were staked and tied. Drip hoses were laid and row middles were mulched with straw.

Once plants were staked 9 blocks of 50 plants were marked with plastic tags on the adjoining tomato stakes. Each block consisted of 50 plants, half on each side of an adjoining aisle. Studied plant blocks were separated by 5' in the rows from adjoining blocks and by a buffer row between rows containing trial plants. Each experimental treatment was replicated in three separate blocks within the trial area. The trial layout is shown in Illustration 1.

The first report of late blight in Western PA was on June 25 in Erie Co., about 100 mi. north. BLIGHTCAST, Dr. Alan MacNab's (Penn State) system for determining when conditions are right for spread of blight, indicated that preventative measures were warranted here by July 8. Treatments of the compost teas were continued on a weekly basis until Aug. 20, after which time it was economically useless to continue.

The compost tea treatments were made by mixing 5 lbs. compost with 35 lbs. tap water and stirring daily. These were allowed to brew for 5-14 days and strained through a pillow case. Two gallons of tea were used to treat the three blocks of each trial.

Treatments were applied using a Solo backpack airblast sprayer at #2 setting. After applying in one direction, the application was made again in the opposite direction to insure good leaf coverage.

Beginning on 7/25/98 plants were monitored for percentage of diseased leaves using MacNab's rating scale of 0 to 11. See Appendix A. Monitoring continued weekly until 9/10/98. By this time about 90% of leaves were diseased.

5. RESULTS:

Inspection and disease ratings of test plants are reported in Table A. Seven plants were randomly selected in each test block and rated using MacNab's rating scale.

These ratings were averaged for the three replication blocks and the results are seen graphically depicted in Chart 1. One can see that all plants began with less than 5% diseased leaves. Early in the trial, septoria leaf spot (distinguished by its characteristic dark spot with lighter center) and early blight were observed. In time, late blight was observed as well. Curiously, even at the end of recorded observations with most plants 90% diseased, late blight was observed on only a minor portion of plants. (Control-6 with late blight, "new"compost-6, "old" compost -5) Also, late blight infected plants did not go into the swift catastrophic decline characteristic of late blight, but continued to produce *some* marketable tomatoes and maintain some foilage. (This same odd phenomenon was observed by Lee Miller, the Beaver Co. Extension Agent.)

It appears that there was very little effect of the compost teas in controlling late and early blight. Except for the second week, the plants treated with "new" compost tea rated better on the disease scale, but not by much--about 5-10%.

It was intended, for the purpose of a controlled experiment, that all tomatoes in the trial would be of the Sunbeam variety. By mistake, one of the four rows was Belstar. By the time it was discovered, treatments had begun and the experiment was continued. When disease began to take its toll, it was clear that Belstar was far more susceptible to the blights. Table B and Charts 2, 3, and 4 show comparisons disease in the blocks containing the Belstars and those with Sunbeams. The difference is very apparent. (Since there were two "old" compost, one "new" compost, and one control block with the Belstars, and two "new", one "old" compost and two control blocks with Sunbeams,] the scores for the "new" and control Belstars and the "old" Sunbeams were doubled to even the numbers in both groups.) Considering that the blocks with the Belstars contained half Sunbeams, the difference would have been even more pronounced had it been purely a variety comparison. ?

In conclusion, the effects of the compost teas on controlling blights in tomatoes was minimal. Because of the accident of having unintentionally included different varieties in the trial it was clear that a far greater factor is the tomato variety.

6. SITE SPECIFIC INFORMATION: The continuing problem with using compost teas is that it is very difficult to come up with a "standardized" compost, no less a tea. In writing up this experiment, it occurred to me that I had used 10T/acre of compost to fertilize the tomatoes, the very same compost I used to make the one tea. Did this have a beneficial effect on *all* the trials?

7. ECONOMIC FINDINGS: Because early blight is almost always present in tomatoes and causes almost no economic loss, but only a slow decline in vigor, farmers are not prone to seeing it as a great problem. If in some years they encounter late blight, they are apt to want to control this catastrophic disease, but deal with it in the same way they might deal with early blight--"wait and see". By this time, any measures are a waste of effort.

8. NEW IDEAS TO SOLVE THE PROBLEM: In this experiment, treatment began as if late blight were the only disease. It seems that given the presence of two separate fungal diseases in tomatoes, it would be wise if trialing experimental treatments, to begin to treat for early blight in early June and continue with the intention of controlling late blight as well. .

If indeed others' claims are true that compost teas are effective in controlling fungal blights, it would be good to have a method of assessing a compost well in advance to find if it is effective. And it would be good to have a way to preserve that compost in its effective state for future use. This would get to the heart of the difficulty in using compost teas.

9. CONTINUATION OF THE EXPERIMENTAL TREATMENT: I find it very difficult to prepare a consistent tea. As stated above, I found no positive result from the teas and composts I was able to prepare.

10. WORD OF MOUTH: I tell other producers my experience with the use of compost teas.

11. OUTREACH: Thus far, other than printing project reports of the original project in 1995 for inclusion in notes presented at vegetable growers meetings, I have had little outreach. This will doubtless occur again.