

Effect of Filter-Press Cake on Tomato Plants Grown in Sterilized and Unsterilized Soil

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INTRODUCTION

Filter-press cake is a waste product of the sugar industry obtained while filtering the juices prior to crystallization. This product is frequently used as manure because of its apparent beneficial effect on growth and development of plants. Yet some workers, such as Samuels and Landrau, Jr., (1)² found that when filter-press cake was included in sugarcane experiments, in combination with commercial mixed inorganic fertilizers, no appreciable increase in yield was obtained. On the other hand, filter-press cake when applied at 10 tons per acre increased the yields of tomatoes, peppers, and taniers. Nevertheless, there was no significant effect on corn, pigeonpeas, tobacco, yams, or sweetpotatoes.

Riollano (2) reported significant increases in yield of tomatoes when using 12 tons of filter-press cake plus 1,000 pounds of fertilizer 8-10-15, amounting to 20.5 percent over the treatment where fertilizer 8-10-15 was applied alone at the rate of 1,000 pounds per acre. Landrau, Jr., and Samuels (3) also reported increases in tomato yields when using 10 tons of filter-press cake per acre, but 20 tons decreased the yield.

Landrau, Jr., and Samuels (4) had low yields of sweetpotatoes when treated with filter-press cake. So did Bonnet, Lugo-López, and Rico-Balaster (5) with white beans and sweetpotatoes, but not with corn. Hernández-Medina (6,7,8) found that the addition of filter-press cake increased the yield of pineapple fruits, slips, and suckers significantly, in plants grown in half-drums and in the field, and Hernández-Medina, Lugo-López, and Cibes-Viadé (9) reported significant increases in yield in pineapples grown under field conditions.

The luxuriant effect on growth, development, and yield of pineapple plants, tomatoes, corn, and other crops and plant species, led to further study in order to determine whether there is some growth factor in filter-press cake, other than those to which some workers attribute the release of the minerals in the filter-press cake, or those that produce its beneficial effect on the physical properties of the soil, as indicated in the work of Lugo-López, Hernández-Medina, and Landrau, Jr., (10), and of Locsin (11).

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² Italic numbers in parentheses refer to Literature Cited, p. 170.

Filter-press cake undergoes a strong fermentation and micro-organisms thrive on it before and after fermentation. To eliminate the possible effect of the micro-organisms in the soil when using filter-press cake, we established an experiment in the greenhouse making use of sterilized soil and sand, compared with unsterilized soil and sand, adding 1 percent of filter-press cake, the customary quantity used in the field.

EXPERIMENTAL PROCEDURE

Tomato seedlings, variety Marglobe, were selected from a seedbed, all of nearly the same size, and were transplanted on December 11 into pots with a weighed amount of soil and sand to which 1 percent of filter-press cake was added. Three plants were grown until they were thinned down to only one plant per pot. Five treatments were applied: 1, Untreated soil + 1-percent filter-press cake; 2, sterilized soil + 1-percent filter-press cake; 3, sand + 1-percent filter-press cake; 4, sterilized soil; and 5, unsterilized soil. The plants were watered daily with the same amount of water.

RESULTS

The results obtained with each treatment are shown in table 1. The plants were harvested on February 3, after being measured and weighed without the roots.

The tomato plants grown in the sterilized soil + 1-percent filter-press cake significantly weighed more at the 1-percent level than those in any of the other treatments. The plants receiving this treatment were the first to bloom (table 2).

The plants grown in sand + 1-percent filter-press cake were better at the 1-percent level than those grown in the untreated soil alone, and at the 5-percent level than those grown in the untreated soil + 1-percent filter-press cake.

CONCLUSIONS

Tomato plants grown in sterilized soil + 1-percent filter-press cake significantly weighed more than those grown in the sterilized soil alone and were also the first to bloom. While the effect of filter-press cake on the plants grown in unsterilized sand + 1-percent filter-press cake, as compared with those grown in sand alone, might be ascribed to the nutrients in the filter-press cake, it seemed the effects reported for filter-press cake on plants are disproportionate to the quantity of nitrogen and phosphorus contained. Possibly another factor may be responsible, as those grown in the sterilized soil + 1-percent of filter-press cake completely blossomed at the end of the experiment while no plant flowered when grown in the sterilized soil alone.

Nevertheless, the plants grown in the untreated soil + 1-percent filter-press cake were low in weight, and all, except one plant, failed to flower throughout the experiment. If there is some growth substance in filter-press cake, perhaps the micro-organisms counteracted the effect of the filter-press cake on yield in this treatment, or the micro-organisms in the soil may have counteracted some other effect of some other substance beneficial in the development of the plant. This is still to be determined.

TABLE 1.—*Effect of filter-press cake on tomato plants grown on sterilized vs. unsterilized soil and sand, respectively*

Treatment	Average height	Average weight
	Inches	Grams
Sterilized soil + 1-percent filter-press cake	21	31
Unsterilized soil + 1-percent filter-press cake	17	17
Unsterilized sand + 1-percent filter-press cake	21	25
Sterilized soil	18	20
Sterilized sand	11	10

TABLE 2.—*Effect of manuring with 1-percent filter-press cake on date of flowering of tomato plants¹*

Untreated soil	Sterilized soil	Untreated soil + 1-percent filter-press cake	Sterilized soil + 1-percent filter-press cake	Sand + 1-percent filter-press cake
—	—	—	Started to bloom by Feb. 1	—
—	2 plants started to bloom	1 plant in bloom	All 10 plants in bloom	All 10 plants in bloom

¹ Plants were transplanted to pots on Dec. 11 and final data taken, including harvest, on Feb. 3.

SUMMARY

Beneficial effects were secured by the application of 1-percent filter-press cake to tomato plants, shown by increases in both weight of plant and improved date of flowering. This effect increased when sterilized soil was used together with 1-percent filter-press cake, as against soil which was not sterilized + 1-percent filter-press cake.

RESUMEN

Las plantas de tomate desarrolladas en tierra y a las cuales se les aplicó 1 por ciento de cachaza resultaron superiores en peso y florecieron más que las que se desarrollaron sin cachaza.

Este efecto sobre las plantas fue más significativo cuando se usó tierra esterilizada con 1 por ciento de cachaza, que cuando se usó tierra sin esterilizar con 1 por ciento de cachaza.

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