

WORKING IN THE TRENCHES

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Contact: Linda McCandless, llm3@cornell.edu, 315-787-2417

by Dave Chicoine and John Zakour

GENEVA, NY: Cornell University soil scientists are taking to the trenches in agricultural research at the New York State Agricultural Experiment Station in Geneva, NY.

Rixana Petzoldt and Cindy Huftalen, who both work for Gary Harman, professor in the horticulture sciences and plant Pathology departments, are studying the effects of the biological fungicide, *Trichoderma harzianum*, on field corn. They have discovered that T-22-treated seeds substantially increase sub-soil surface rooting.

T-22 was developed in Harman's lab in the 1980s using protoplast fusion. It is one of several products based on *T. harzianum* that is manufactured and sold nationally and internationally by BioWorks, Inc., in Geneva. The product is registered with the US Environmental Protection Agency as a biological fungicide.

T-22 colonizes the roots of the corn plant over the entire root length for the life of at least annual crops and enhances root development and growth. However, its ability to increase sub-surface roots had not been known.

This summer, Petzoldt and Huftalen determined the ability of T-22 to increase sub-surfacing rooting. T-22 Planter Box was used to treat corn seed in the study. In early September, after the corn was mature, trenches were cut using a backhoe and grids were created by strings so the numbers of roots intersecting the soil profile could be enumerated. Petzoldt and Huftalen placed map pins at the site of root intersection, photographed each square, and counted the numbers of pin heads in each square.



Suggested caption: Rixana Petzoldt (left) and Cindy Huftalen (right) mark soil-root intersections as part of a study by a Cornell team to determine the effects of T-22 treatments on sub-surface rooting in corn. CREDIT: NYSAES/Cornell

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The results of the study were conclusive. The numbers of roots in the upper 25 cm of soil was similar to the control plots for this tall (6 ft. tall) corn, but, in depths from 26 to 75 cm below the soil surface, there were about twice as many roots on corn plants that grew from T-22-treated seeds as without.

This greater deep rooting (in younger plants, an improvement in surface rooting can also be seen) has some important advantages for corn and other crops. Growers, especially in Ohio, noticed that wheat and corn treated with T-22 had greater tolerance to drought conditions than corn without T-22. Last year, Harman, Petzoldt and Huftalen determined that T-22 very substantially increases nitrogen fertilizer use efficiency; among other findings it appears that the total amount of N fertilizer can be reduced by 30 to 50 lb/acre in the presence of T-22 without reducing yields. If this is so, T-22 can reduce farmers' costs and also provide a method of reducing contamination of water supplies by nitrate. For farmers who use manure as a nitrogen source, excess phosphorus that can be washed from soil into water is becoming a substantial concern. Since manure is frequently added to provide optimal nitrogen fertilizer, the quantity of manure may be reduced and the level of phosphorus contamination reduced. In addition, the enhanced root development also appears to confer an advantage to plants grown in compacted soils.

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