

2019-2020 Fragipan Remediation

Lloyd Murdock—Department of Plant & Soil Sciences

University of Kentucky, Research & Education Center, Princeton, KY 42445

PH: (859) 562-1328; Email: lmurdock@uky.edu

The research on the fragipan has made excellent progress. There are two plants, potentially 4 compounds and possibly other materials that have been found to be effective in breaking apart the fragipan. They are annual ryegrass, festulolium, potassium chloride, potassium sulfate, sodium fluoride, sodium nitrate and possibly leonardite humate.

Annual ryegrass was chosen as the central focus of the greenhouse and field research due to its notable advantages. Annual ryegrass roots apparently contain exudates that have a degrading effect on the fragipan. The deep root penetration degrades the fragipan and it also increases soil porosity and enrichment of organic compounds in the fragipan undergoing degradation.

The average yield increase in 2019 of corn and soybeans from six field trials ranged from 0.5% to 20% for an annual ryegrass cover crop compared to no-tillage alone. The average yearly increase of corn grown after an annual ryegrass cover crop on a fragipan soil in southern Illinois is 3.7 bushel per acre per year over a 15-year period. The increase is accumulative resulting in an increase of 55 bushels per acre the 15th year.

It appears that it might be possible to increase yields of corn and soybeans by 25% on the fragipan soils over many years by using an annual ryegrass cover crop. We also expect to improve the yields of wheat. A 25% increase would result in \$500,000,000 in increased returns to Kentucky producers per year or \$5,000,000,000 over a 10-year period on the 1.5 million acres of croppable fragipan soils in Kentucky. This does not include any increase that would be realized in forage production from the deeper soil.

