RootTracker shows an inverse relationship between root growth and nitrous oxide emissions

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Nitrous oxide (N_2O) is a greenhouse gas that is three hundred times more potent than carbon dioxide. The majority of N_2O emissions worldwide are the result of excess soil nitrogen being metabolized by microbes. It has been hypothesized that crops with better nitrogen uptake efficiency and greater root production will reduce excess soil nitrogen therefore reducing N_2O emissions. To test this hypothesis, a pilot study was performed in 2021 using four commercial corn hybrids to compare weekly N_2O emissions to root growth dynamics collected using RootTracker ™ technology. RootTracker ™ collects in-field root growth over time which allowed for the identification of specific periods of reduced N_2O emissions that corelate with increased root growth. This research was expanded in 2022 using six commercial corn hybrids and four soybean cultivars. In both studies, an inverse relationship between greater root growth and reduced N_2O emissions was observed independent of the crop. It was also observed that soil environment directly impacts N_2O emissions and root growth. These studies showed for the first time a correlation between increased root growth and reduced N_2O emissions and suggested a genetic by environment interaction. Beginning Fall 2022, HFT is expanding on this research in partnership with several Midwest universities to perform greenhouse experiments with the goal of defining the genetic relationship between root growth and N_2O emissions. Using the RootTracker ™ in a controlled environment will allow for the characterization of N_2O emissions across different genetic backgrounds while minimizing the environmental variance.