



Do plants release protease enzymes from their roots?

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Nitrogen (N) is an important macronutrient for plant life. Plants can uptake N in the form of ammonium, nitrate and amino acids. Proteins represent 40% of total soil N but it is not available to for plant use until it has been broken down into amino acids by protease enzymes. Therefore, the ability of plants to secrete proteases to hydrolyse proteins into amino acids would increase the availability of N to plants. In agricultural systems, a decrease in the reliance on inorganic N forms by plants would reduce the use of environmentally detrimental inorganic N fertilisers.

In a laboratory experiment, we investigated whether plant roots release protease enzymes. We also investigated whether protease release from roots were up- or downregulated by the presence of inorganic N. Four seedlings (*Zea mays* L., *Triticum aestivum*, *Brassica napus* L. and *Raphanus raphanistrum* L.) were grown in sterile, hydroponic conditions in an inorganic N nutrient solution or a zero N nutrient solution. Each week for one month, the nutrient solutions were analysed for proteolytic activity using a fluorescence aminopeptidase assay.

Our results show that after three weeks, protease activity was observed in the plant nutrient solutions. However, protease activity was not affected by the absence of N sources. In comparison to soil protease activity measurements from previous studies, plant protease activity is lower suggesting that microorganisms are the predominant source of proteases in soil. We conclude that plant roots do secrete proteases once a seedling has established as a passive process.