

## Bacterial community responses to Soil-injected liquid ammonium nutrition and effect of temperature on barley (*Hordeum vulgare* L.) grain yield formation



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## BACTERIAL COMMUNITY RESPONSES TO SOIL-INJECTED LIQUID AMMONIUM NUTRITION AND EFFECT OF TEMPERATURE ON BARLEY (*HORDEUM VULGARE* L.) GRAIN YIELD FORMATION



Cuvillier Verlag Feb 2008, 2008. Taschenbuch. Book Condition: Neu. 208x144x15 mm. Neuware - Injection of concentrated liquid ammonium nutrition into soil is an agricultural practice aimed at mitigating nitrogen losses. In Germany, it is referred to as controlled uptake long term ammonium nutrition (CULTAN) technique. In many soils, nitrate is mobile because as an anion, it is not bound to negatively charged surfaces of clay minerals or organic soil compounds. In contrast to phosphate, it is not specifically adsorbed. Nitrate fertilization may thus result in leaching and presents a potential environmental hazard. Ammonium ions, on the other hand, may be unspecifically bound to negatively charged surfaces or even fixed in inter-layers of 2:1 clay minerals. Following the injection of concentrated liquid ammonium into soil, ammonium is the predominant N nutrition form suggesting its stability in soil. After 30 days, though ammonium persisted in the soil, its concentration had drastically decreased. Unspecifically bound ammonium may be exchanged and readily oxidized to nitrate by nitrifying bacteria. Bacterial community occurrence within the perceived toxic ammonium injection-zones facilitated transformation of ammonium to nitrate. This resulted into a rapid reduction of ammonium due to microbial as well as crop uptake. Along side the reductions in ammonium concentrations, nitrate concentrations increased rapidly as the season progressed. The incorporation of nitrification inhibitor (Nitrapyrin(r)) improved the stability of injected liquid ammonium by suppressing the nitrification process. However, the inhibitor did not express any direct effect on ammonium concentration reductions. It suppressed the transformation of ammonium into nitrate. Non-incorporation of the inhibitor caused the formation of high concentrations of nitrate. The transformation of ammonium to nitrate under CULTAN fertilization suggests that the technique offers mixed nitrogen nutrition contrary to earlier assumptions that it supplies predominantly ammonium. The nitrogen switch from predominant ammonium to mixed nitrogen through the availability of...



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