Entry No. IRRC-0155

Category	: International Rice Research Conference
Select Theme	: Climate change and environmental sustainability
Endorsement email	:
Keyword 1	: Carbon and nitrogen cycles
Keyword 2	: Environmental sustainability
Keyword 3	:
Title of Entry	: Extracellular ammonium accumulation by nitrate ammonifying bacilli from paddy soils
Presenting author	: P. C. Latha
Presenting author email	: lathapc@gmail.com
Co author 1	: Bandeppa
Co author 2	: M.B.B Prasad Babu
Co author 3	: B. Sreedevi
Co author 4	: C. Chandrakala
Co author 5	: K.V. Prasad Babu
Co author 6	: G.Rajani
Co author 7	:
Co author 8	:
Co author 9	:
Co author 10	:
Co author 11	:
Co author 12	:
Co author 13	:
Co author 14	:
Affiliation presenting author	: ICAR-Indian Institute of Rice Research, Hyderabad, India
Affiliation 1	:
Affiliation 2	:

Affiliation 3	:
Affiliation 4	:
Affiliation 5	:
Affiliation 6	:
Affiliation 7	:
Affiliation 8	:
Affiliation 9	:
Affiliation 10	:
Affiliation 11	:
Affiliation 12	:
Affiliation 13	:
Affiliation 14	:
Select only one type of presentation	: 15 minute oral presentation
Abstract	: Nitrate ammonification or Dissimilatory Nitrate Reduction to Ammonium (DNRA) is a microbial nitrogen transformation pathway that reduces nitrate to ammonium via nitrite, and in the soil ecosystem, the bacteria possessing DNRA competes with denitrifying bacteria for soil nitrate. The processes have distinctively different effects in soil, with DNRA leading to nitrogen retention as ammonium in soil while denitrification contributes to soil nitrogen losses in the form of N2 and N2O. The process is one of the least characterized nitrogen cycle pathways but is currently garnering increased scientific interest because of its consequences on bioavailable ammonium, crop production and environment. In this study, bacilli which are ubiquitous in paddy soils because of their capacity for aerobic and facultative anaerobic metabolism have been isolated and studied for their ability for nitrate ammonification. Bacillus thuringiensis, B. brevis, B. cereus, B subtilis, B. amyloliquefaciens and B. sonorensis isolates when grown in inorganic media containing nitrate, accumulated ammonium (0.27– 0.89 µg/ml), in the culture with B. subtilis showing highest ammonium accumulation. The nitrite reductase activity of different bacilli was determined using a whole cell bioassay by measuring the disappearance of nitrite over time and accumulation of ammonium. The nitrite reduction potential of the unique nitrite reductase enzyme responsible for DNRA ranged from 98.39 to 114.36 µM NO2 reduced min-1 and the bacterial capacity for reduction was in the following order: B. brevis > B. cereus > B. sonorensis > B. subtilis > B. amyloliquifaciens. Species specific differences in nitrite reducing efficiencies were exhibited by bacilli in reducing nitrite to ammonium (0.24 -1.28 µg NH4-N produced/h). The accumulation of nitrogen as ammonium followed a different trend viz., B. brevis > B. subtilis > B. sonorensis > B. cereus > B. amyloliquifaciens demonstrating that not all the nitrite was reduced to ammonium. The bacilli were also characterized for nrfA gene which encodes for nitrite reductase and the presence of the gene is being reconfirmed. Soil based efficiency of the isolates in improving ammonium content in soils is being assessed with a goal to develop cultural management practices that can alleviate nitrogen losses and increase nitrogen use efficiency.

Read Less»

Uploaded Files »

No files found.