입제와 수화제 형태의 생물농약을 2년 동안 오이·고추 등 여러 가지 농작물에 시험살포한 결과, 잿빛곰팡이병, 흰가루병, 잘록병 등 방제가 어려운 다수의 병원성 곰팡이균에 뛰어난 방제효과를 나타내었다.

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무공해 무독성 생물농약 코팅종자개발 및 상품화

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농작물 병원성 진균과 사람의 병원성 진균에 대해 항진균 활성을 나타내는 미생물들을 새롭게 분리, 탐색하여 독특한 형태의 제제화 기법을 이용하여 환경친화형 다기능적 미생물 살균제 원제를 개발한 후, 독창적인 제제화 기법을 이용하여 세계 최초로 배추 무사마귀병에 뛰어난 방제효과를 나타내는 종자 코팅제(종자코팅형 생물농약)를 개발, 상품화하는데 성공하였다. 본 연구로 개발된 무공해 무독성 생물농약 코팅종자는 기존의 종자소독과 같이 별도의 처리과정이 필요 없으며, 파종시 작물의 근권에 미생물이 정착하여 각종 병해를 일으키는 병원균의 침입을 억제하는 기능이 있는 것으로 나타났다. 따라서 본 발명은 병방제에 필요한 인력 및 비용을 절감할 수 있는 획기적인 발명이라 사료된다.

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팔당호에서 Aggregates에 부착한 세균군집구조의 변화

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팔당호에서 Fluorescent in situ hybridization(FISH) 방법을 이용하여 aggregates에 부착한 세균군집의 변화를 조사하였다. 조사대상은 Eubacteria에 속하는 세균과 Class Proteobacteria에 속하는 세균중 α-, β-, γ-group과 *Cytophaga-Flavobacterium* group이었고, 환경요인의 변화를 파악하고자 영양염류와 엽록소 a를 측정 하였다. Aggregate와 물시료의 조사항목을 비교하면, TN의 경우 5~15배, TP는 81~140배, 엽록소 a는 49~66배로 aggregate가 높게 나타났으며, 총세균수 역시 물시료에서 전체적으로 $1.0 \sim 2.0 \times 10^6$ cells · $m\ell^{-1}$ 였고, aggregates 부착세균에서 $0.2 \sim 3.6 \times 10^8$ cells · $m\ell^{-1}$ 의 범위로 물시료보다는 aggregates에 부착한 세균의 밀도가 높았다. 또 수심별로는 5 m trap 보다 20 m trap 에서 더 많은 수가 측정되었다. 총세균수에 대한 세균군집구조의 비율은 부유세균의 경우 α-group이 4.5~8.3%, β-group이 2.2~8.0%, γ-group이 2.1~7.4%, *Cytophaga-Flavobacterium* group이 2.1~6.1%, Other group은 0.1~2.5로 매우 낮았으나 aggregates에 부착한 세균의 군집구조는 α-, β-, γ-group과 *Cytophaga-Flavobacterium* group이 아닌 Other group이 약 10.2~32.1%로 우점하는 경향을 보였다. 이처럼 팔당호에서 aggregates에 부착한 세균의 군집구조는 부유세균과 비교해볼 때 독특한 군집구조를 나타내었다.

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Degradation of Benzene and Toluene and Characteristics of Microbial Community in Various Conditions of Soil Microcosm.

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Biological treatment of benzene and toluene contaminated of soil was investigated in laboratory microcosm of 16 different types for degrading benzene and toluene by indigenous bacteria. At the experimental conditions of the microcosms fast degrading benzene and toluene, moisture contents were 30% and 60% in a soil gap and content of powdered- activated carbon (PCA) for adhesion of benzene and toluene-degrading bacteria was 1% in total soil mass. At the conclusion of the shifted bacterial community, the number of benzene and toluene-degrading bacteria of indigenous bacteria considerably increased in microcosm condition of rapidly degraded benzene and toluene in comparison with microcosm condition of slow degraded benzene and toluene throughout a period of 10 days (approximately 85%~95% of total culturable bacteria). Species of benzene and toluene degrading bacteria in microcosm changed from species of Gram negative bacteria before soil exposed to benzene and toluene to species of Gram positive bacteria after soil exposed to benzene and toluene.

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Denitrification in Carbon-Limited Real Wastewater using Pure- and Co-Culture of Bacteria from Activated Sludge

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We selected two completely denitrifying bacteria, N6 and N23, and one partially denitrifying bacterium, R13, among culturable bacteria from control activated sludge in carbon-limited real wastewater by PCR with nirS gene primer and chemical test with the Griess Ilosvary reagent and zinc powder. The nitrate uptake ability of the pure-culture of three selected strains in carbon-limited real wastewater was excellent compared to control activated sludge and to control strain, Pseudomonas aeruginosa ATCC 10145, respectively. The nitrite removing ability of the pure-culture of two dissimilatory denitrifying strains was also remarkably good, respectively. The maximum denitrifying capacity of a pure-culture among selected strains in carbon-limited real wastewater was over 170-fold of that of control activated sludge. We investigated the nitrate uptake and the nitrite removing ability of the combination co-culture of the selected strains in carbon-limited real wastewater. As opposite as we expected, the nitrite removing ability of a combination co-culture of selected strains was almost disappeared in the same condition. In addition, the denitrifying capacity of control activated sludge modified their dominant population to the selected powerful denitrifying bacteria, N6, in continuous reactor was also as poor as like that of control activated sludge. This result suggests that the denitrifying capacity of an activated sludge depends on proper distribution of bacteria to environment.

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Analysis of Bacterial Community in Activated Sludge Amended with 1-Chloro-4-Nitrobenzene by Terminal-Restriction Fragment Length Polymorphism

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The changes of bacterial community structure in activated sludge were monitored