ABSTRACTS

SIXTH INTERNATIONAL SYMPOSIUM ON MICROBIAL ECOLOGY (ISME-6)

BARCELONA, 6-11 SEPTEMBER

1992

ABSTRACTS

SIXTH INTERNATIONAL SYMPOSIUM ON MICROBIAL ECOLOGY (ISME-6)

BARCELONA, 6-11 SEPTEMBER

1992

CONTRIBUTED PAPERS

ORAL COMMUNICATIONS

C1-3-8

DETECTION AND VISUALISATION OF SINGLE CELLS OF *LUX*-MODIFIED MICROORGANISMS IN THE PLANT-SOIL ENVIRONMENT.

Silcock, Deborah J., Waterhouse, R. N., Rattray, E. A. S. and Killham, K. Dept. of Plant and Soil Science, The University of Aberdeen, Aberdeen, AB9 2UE, U.K.

To assess the fate of genetically modified microorganisms (GMM's) introduced into the environment, it is necessary to devise methods of GMM detection. Introduction of bioluminescence genes into microorganisms provides a marker system which enables detection of metabolically active cells of the marked strain amidst indigenous background microorganisms. The aim of this study was to develop an *in situ* detection system with single cell sensitivity, based on bioluminescence using a charge coupled device (CCD, a highly sensitive light detecting and quantifying device).

Bioluminescent constructs of *Pseudomonas syringae* pv. *phaseolicola* and *Enterobacter cloacae* were produced by plasmid insertion of *lux* genes. Late log phase cells were inoculated into a variety of habitats (soil, phylloplane and rhizosphere). Non-extractive detection of luminescent single cells against a background of non-luminescent indigenous microorganisms, was carried out by CCD-enhanced microscopy, using agar microculture slides. Using conventional light microscopy it was not possible to locate the GMM, although spatial characterisation was achieved from CCD derived dark field images. CCD-enhanced microscopy of single *lux* modified cells provides a valuable contribution to the techniques required for environmental monitoring of GMM's.

C1-3-9

PHYTOTOXIC MICROORGANISMS: ECOLOGICAL AND APPLICATIVE ASPECTS

Friedman, J., Chayen, S., Stern, D., Barazani, O. and Keller, P. Dept. of Botany, The George S. Wise Faculty of Life Sciences, Tel Aviv University, Tel Aviv, 69978, Israel.

In the vicinity of shrubs of Artemisia herba-alba or on Kurkar hills along the Mediterranean coast, in some specific sites, retardation of annuals was observed. Reduced yield in agricultural ecosystems which are not the result of plant disease, are known in Israel as well as in other parts of the world, particularly in areas where replanting of decidious orchards of the Rosaceae, or roses were taking place. Accumulating data support the view that among other factors, phytotoxic microorganisms are an important factor which interferes with retardation of growth. During the recent three years we have isolated from these sites bacteria and actinomycetes and developed quantitative methods to evaluate their phytotoxic intensity. All the measurements indicated that the phytotoxic intensity of bacterial and actinomycetes from areas where inhibition occured as well as from control sites were similar; nevertheless, compared with control sites, the density of the phytotoxic isolates in sites where inhibition occurs was significantly higher. When axenic seedlings of lettuce were innoculated with phytotoxic bacteria, inoculum density had a crucial adverse effect on growth.

C1-3-10

ENHANCING BIOCONTROL OF POSTHARVEST DISEASE OF APPLE BY MANIPULATING POPULATION OF AN ANTAGONIST.

Janisiewicz, W. J., United States Department of Agriculture, ARS, Appalachian Fruit Research Station, Kearneysville, WV 25430, USA

Control of blue-mold of apple (caused by Penicillium expansum) was achieved with antagonistic bacteria and yeast found among epiphytic populations of apple and pear. Disease reduction was comparable to fungicidal treatment. Economics will play a major role in the commercialization of this method of control. To make this method economically attractive, attempts were made to reduce the amount of the antagonist needed for effective biocontrol by stimulating population of the bacterial antagonist on fruit after application. Various carbon and nitrogen sources were screened for their effect on growth of the antagonist and the pathogen. Compounds which were most stimulatory to the antagonist but had little effect on the pathogen were used as an additive in the antagonist suspension. L-Proline and L-asparagine increased population of the antagonist on fruit by more than one order of magnitude during first 48 hours after application, and significantly enhanced biocontrol. The timing of population increase coincides with critical time for biocontrol. This approach may also be used in other biocontrol systems to enhance their effectiveness.

C1-3-11

STUDIES ON ECOLOGICAL AND PHYSIOLOGICAL CHARACTERISTICS OF YIELD INCREASING BACTERIA(YIB) IN RELATION TO PLANT HEALTH.

Ji,P., Mei, R. and Chen, B. Beijing Agricultural University, Beijing 100094, P.R. China.

Studies were carried out with eight *Bacillus* YIB strains currently used in Chinese agriculture for evaluating the colonizing capacity on and inside the plants, antibiosis against other microorganisms and ability of enzyme and vitamine production. Seeds of wheat, corn, rape and cabbage were inoculated with spontaneous antibiotic-resistant mutants of YIB at inoculum densities of 10^7-10^8 colony-forming units(cfu)/ml. All of the 8 strains tested colonized emerging roots and cotyledons or coleoptiles 24-48 hours after seed germination, and were recovered from inside the plants 3-4 days after root emergence. Populations of YIB in the roots multiplied rapidly within the first 6 weeks after seeding, reached 10^8 and 10^6 cfu/g root-respectively-on and inside the roots in the sixth to seventh week, and declined in the eighth week. Populations of 10^3-10^6 cfu/g leaf were recovered at 3 weeks following seeding. Of the 8 YIB strains, 2 exhibited antibiosis against 12 species of phytopathogenic fungi tested, 3 demonstrated to be superoxide dismutases(SOD) producers. And one or more vitamines, including B_1, B_2, B_6, B_{12}, were produced by all of the 8 strains tested. We conclude that colonization of YIB strains inside and outside plant organs may be of great importance in the relationship between YIB inoculation and plant response. Antibiotics, enzymes and vitamines also contributed to the mechamism of YIB and they may differ in strains.

ABSTRACTS

SIXTH INTERNATIONAL SYMPOSIUM ON MICROBIAL ECOLOGY

BARCELONA, 6-11 SEPTEMBER 1992

INTERNATIONAL COMMITTEE ON MICROBIAL ECOLOGY (ICOME)
SPANISH SOCIETY OF MICROBIOLOGY (SEM)
CATALAN SOCIETY FOR BIOLOGY (SCB)