

PubMed "effective microorganisms" Search

Display Settings: Abstract, 50 per page, Sorted by Recently Added

Filter your results: All (23)  
[Manage Filters](#)

## Results: 23

[J Environ Sci Health A Tox Hazard Subst Environ Eng. 2012;47\(1\):44-53.](#)

### 1. **Functions of effective microorganisms in bioremediation of the contaminated harbor sediments.**

[Ekpeghere KI](#), [Kim BH](#), [Son HS](#), [Whang KS](#), [Kim HS](#), [Koh SC](#).

Department of Environmental Engineering, Korea Maritime University, Busan, Republic of Korea.

#### Abstract

The aim of this study was to apply loess balls containing **effective microorganisms** (EM) to the remediation of contaminated harbor sediments, and to thereby elucidate the functions of EM in remediation. Changes in physicochemical, biochemical, and microbiological parameters were measured to monitor the remediation process at a laboratory scale. Treatment with high concentrations of EM stock culture and EM loess balls (4%), and a low concentration of EM loess balls (0.1%) that contained molasses (0.05%) contributed to more rapid removal of malodor. Acetic acid, propionic acid, valeric acid, caponic acid, and lactic acid were rapidly removed in the presence of molasses (0.05% w/w) as a carbon nutrient source, indicating enhanced EM activity by amendment with molasses. Fermentation of molasses by EM showed that more acetic acid was produced compared with other organic acids, and that the majority of organic acids were eventually converted to acetate via intermediate metabolites. Sediment bioremediation tests showed there was no significant difference in eubacterial density with the control and the treatments. However, the density of a *Lactobacillus* sp. in sediments treated with 0.1% and 4.0% EM loess balls was significantly higher than the control, which indicated the bioaugmentation effect of EM loess balls in the polluted sediments. Treatment with EM loess balls and an appropriate amount of molasses, or other nutrients, will facilitate the remediation of polluted marine sediments by malodor removal, via EM degradation or utilization of offensive organic acids. To our knowledge, this is the first study to remediate contaminated marine (harbor) sediments using EM loess balls and to understand EM function during the bioaugmentation process, both in terms of organic acid metabolism and the dynamics of the engineered microbial community.

PMID: 22217081 [PubMed - in process]



#### Publication Types

[Huan Jing Ke Xue. 2009 Dec;30\(12\):3614-8.](#)

### 2. **[Screening and denitrification characteristics of a heterotrophic nitrification-aerobic denitrifier bacteria].**

[Article in Chinese]

[Chen PZ](#), [Wang LG](#), [Wang YC](#), [Li J](#), [Ding W](#), [Ren TZ](#), [Li SP](#).

College of Life Science and Technology, Gansu Agricultural University, Lanzhou 730070, China. chenpeizhenpcz@sina.com

#### Abstract

A heterotrophic nitrification-aerobic denitrifier bacteria CPZ24 was isolated from the livestock wastewater by way of the limiting dilution combined with the chromogenic medium screening methods. This bacterium was Gram positive, rod. The colonies of the strain were orange-red. It was identified as *Rhodococcus* pyridinivorans according to its morphological and physiological properties and the analysis of its 16S rDNA gene. Studied on its function of heterotrophic nitrification and aerobic denitrification, the results show that all NH<sub>4</sub><sup>+</sup> -N is removed and the removal rate of TN is 98.70% in heterotrophic nitrification; the removal rate of NO<sub>3</sub><sup>-</sup> -N by this strain is 66.74% and the removal rate of TN is 64.27%. This high **effective microorganisms** with nitrogen removed is able to realize simultaneous nitrification and denitrification. It can perform the whole process of bacteria denitrification independently.

PMID: 20187396 [PubMed - indexed for MEDLINE]

#### Publication Types, MeSH Terms, Substances

[Pol J Vet Sci. 2009;12\(4\):519-22.](#)

### 3. **The influence of administering "effective microorganisms" to pullets on chosen haematological and biochemical blood indexes.**

[Sokol R](#), [Michalczyk M](#), [Spodniewska A](#), [Barski D](#).

Department of Parasitology and Invasiology, Faculty of Veterinary Medicine, University of Warmia and Mazury in Olsztyn, Oczapowskiego 13, 10-718 Olsztyn, Poland. sokol@uwm.edu.pl

**Abstract**

**"Effective Microorganisms"** (EM)--a mixture of lactic acid bacteria, photosynthetic bacteria, yeasts and fungi are used mainly in agriculture and organic waste treatment. Recently, they have also been added to water and feed for animals, as well as to processing their excrements into compost and to eliminate the stench. The objective of the present study was to assess the influence of a 14-day administration of an EM solution in drinking water to layer hens on chosen haematological and biochemical indexes. The research was carried out on 120 hens divided into two equal groups. The birds in the experimental group were given drinking water with dissolved EM (5% solution), and those in the control group--water without the preparation. On the 64th day of the aviculture, the hens were weighted and their blood was taken from the wing vein for haematological and biochemical examinations. Administering EM with water to hens did not influence significantly their body weight nor chosen haematological and biochemical indexes. A significant increase was found only in the number of platelets, the level of albumins, the content of total cholesterol and the LDH activity, however, a decrease in the ALT activity was observed.

PMID: 20169927 [PubMed - indexed for MEDLINE]

**MeSH Terms**

[J Food Sci.](#) 2008 Aug;73(6):S314-20.

4. **Changes in postharvest quality of Swiss chard grown using 3 organic preharvest treatments.**

[Daiss N](#), [Lobo MG](#), [Gonzalez M](#).

Instituto Canario de Investigaciones Agrarias, Tropical Fruits Dept., P.O. Box 60, 38200-La Laguna, Spain.

**Abstract**

Using storage conditions recommended for conventional chard (4 degrees C, 90% RH and 7 d), the chard treated with some organic preharvest treatments [**effective microorganisms**, a fermented mixture of **effective microorganisms** with organic matter (EM-Bokashi + EM), and an auxiliary soil product] lost considerable water (> 2%) and weight (> 25%). These results indicate that organic methods tested produce a vegetable that can not sustain its quality when commercialized through the conventional supply chain. Nevertheless, respiration, color, pH, and titratable acidity practically remained constant during conservation. Ascorbic acid content was constant in chard treated with the different preharvest treatments and collected at 8 wk after sowing (normal harvest). However, the ascorbic acid content of the control chard decreased 60% after 7 d of storage. This vitamin diminished (35%) in chard collected after 19 wk after sowing (late harvest) during the postharvest conservation. The greatest difference in chard quality was registered between sampling dates since chard collected during the late harvest had higher levels of dry matter, sugars, acids, proteins, and ascorbic acid than chard collected during the normal harvest.

PMID: 19241576 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms, Substances**

[J Environ Sci \(China\)](#). 2008;20(12):1514-8.

5. **Damage to DNA of effective microorganisms by heavy metals: impact on wastewater treatment.**

[Zhou S](#), [Wei C](#), [Liao C](#), [Wu H](#).

College of Environmental Science and Engineering, South China University of Technology, Guangzhou 510006, China. zhousheng1234@tom.com

**Abstract**

The research is to test the damage to DNA of **effective microorganisms** (EMs) by heavy metal ions As<sup>3+</sup>, Cd<sup>2+</sup>, Cr<sup>3+</sup>, Cu<sup>2+</sup>, Hg<sup>2+</sup>, Pb<sup>2+</sup>, and Zn<sup>2+</sup>, as well as the effects of EM bacteria on wastewater treatment capability when their DNA is damaged. The approach applied in this study is to test with COMET assay the damage of EM DNA in wastewater with different concentrations of heavy metal ions As<sup>3+</sup>, Cd<sup>2+</sup>, Cr<sup>3+</sup>, Cu<sup>2+</sup>, Hg<sup>2+</sup>, Pb<sup>2+</sup>, Zn<sup>2+</sup>, as well as the effects of EM treated with As<sup>3+</sup>, Cd<sup>2+</sup>, Cr<sup>3+</sup>, CU<sup>2+</sup>, Hg<sup>2+</sup>, Pb<sup>2+</sup>, and Zn<sup>2+</sup> on COD degrading capability in wastewater. The results showed that the damage of the DNA of EM were negatively correlated with their treatment capability and that EM bacteria maximum tolerant concentrations of these heavy metal ions was at 0.05 mg/L for As<sup>3+</sup>, 0.2 mg/L for Hg<sup>2+</sup>, 0.5 mg/L for Cd<sup>2+</sup>, Cr<sup>3+</sup>, and Cu<sup>2+</sup>, and 1 mg/L for Pb<sup>2+</sup> and Zn<sup>2+</sup>.

PMID: 19209641 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms, Substances**

[Biomed Pharmacother](#). 2009 Feb;63(2):114-9. Epub 2008 Apr 16.

6. **Modulation of experimental osteoporosis in rats by the antioxidant beverage effective microorganism-X (EM-X).**

[Ke B](#), [Xu Z](#), [Ling Y](#), [Qiu W](#), [Xu Y](#), [Higa T](#), [Aruoma OI](#).

EM Research Organization, 468 Kawasaki Uruma City, Okinawa 904-2203, Japan.

**Abstract**

Osteoporosis is a disease of aging associated with bone loss that often occurs without symptoms until microarchitectural deterioration becomes so significant that bone fracture occurs. The effective microorganism-X (EM-X) is an antioxidant beverage derived from ferment of unpolished rice, sea weeds and papaya with **effective microorganisms** of lactic acid bacteria, yeast and photosynthetic bacteria (containing minerals, alpha-tocopherol, lycopene, ubiquinone, saponin and flavonoids). The levels of serum estradiol (E(2)) and the bone density of the middle and epiphysis of femurs were assessed in order to determine the effect of EM-X on osteoporosis in ovariectomized rat (an animal model of postmenopausal osteoporosis). EM-X (1 ml/rat/day) was initially administered by gavage to rats which were then allowed to consume 10% (v/v) EM-X in water freely for 3 months. There was no statistical significance of E(2) level between sham operation group and control group, indicating that sham operation did not affect E(2) level. However, the E(2) levels in the ovariectomized rats tended to increase after treatment of EM-X for 3 months. The bone density of the middle and epiphysis of femur in both sham operation and ovariectomy group decreased with time. Rats receiving EM-X for 3 months after sham operation or ovariectomy had increased bone density of the middle of femur that was statistically significant ( $P < 0.01$  and  $P < 0.05$ ). The bone density of the epiphysis of femur in both sham operation and ovariectomy group were significantly increased, an outcome highly suggestive of the beneficial effects of EM-X on bone density of the middle and the epiphysis of femur in the rats with or without ovariectomy.

PMID: 18930627 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms, Substances**

[Pak J Biol Sci. 2008 Jul 1;11\(13\):1708-12.](#)

7. **Growth enhancement of effective microorganisms for bioremediation of crude oil contaminated waters.**

[Mukred AM](#), [Abd-Hamid A](#), [Hamzah A](#), [Yusoff WM](#).

School of Biosciences and Biotechnology, Faculty of Science and Technology, Universiti Kebangsaan Malaysia, UKM, 43600 Bangi, Selangor, Malaysia.

**Abstract**

The bioremediation of polluted groundwater, wastewater aeration pond and biopond sites was investigated using bacteria isolated from these sites located at the oil refinery Terengganu Malaysia. Out of 62 isolates, only 16 isolates from groundwater (8) and wastewater aeration pond (3) and biopond (5) were chosen based on growth medium containing 1% (v/v) Tapis crude oil. Only four isolates; *Acinetobacter faecalis*, *Staphylococcus* sp., *Pseudomonas putida* and *Neisseria elongata* showed percentage biodegradation of crude oil more than 50% after 5 days using Mineral Salts Medium (MSM). The effect of physical parameters (temperature, pH and agitation) on growth by all four strains showed a maximum growth in MSM medium with 1% Tapis crude oil at 37 degrees C with pH 7 and agitation of 130 rpm.

PMID: 18819623 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms, Substances**

[Prev Vet Med. 2009 Jan 1;88\(1\):15-23. Epub 2008 Aug 19.](#)

8. **A cross-sectional study of Salmonella in pre-slaughter pigs in a production compartment of northern Thailand.**

[Dorn-In S](#), [Fries R](#), [Padungtod P](#), [Kyule MN](#), [Baumann MP](#), [Srikitiakarn L](#), [Chantong W](#), [Sanguangiat A](#), [Zessin KH](#).

Veterinary Public Health Centre for Asia Pacific, Chiang Mai University, Thailand.

**Abstract**

A cross-sectional study was conducted to determine the prevalence of *Salmonella* and to associate management factors in fattening pigs in a production compartment of northern Thailand. A total of 194 fecal samples and 166 environmental samples were collected from 22 fattening pig herds for isolation and identification of *Salmonella*. An additional 427 serum samples were collected from the same herds to determine *Salmonella* antibodies using ELISA. A questionnaire was used to collect management factors likely to be associated with *Salmonella* identification. Prevalence of *Salmonella* in each sample and its confidence interval was adjusted for clustering by herds using linearization technique. A generalized estimating equation was used to determine the odds ratio and significance level for each management factor in a logistic regression model. *Salmonella* was found in all 22 study pig herds with a fecal sample prevalence of 63% (95%CI: 56-69%) and a serum sample prevalence of 72%. However, isolation results were not significantly different from ELISA results. The most isolated serotype was *Salmonella* Rissen (49%) followed by *Salmonella* Typhimurium (19%), *Salmonella* Stanley (12%) and *Salmonella* Weltevreden (4%) being significantly different in the different specimens collected ( $p=0.024$ ). The final logistic regression model with isolation results as outcome showed that medium herd size (OR=2.32,  $p=0.003$ ), quality certification according to the Department of Livestock Development standard (OR=1.88,  $p=0.000$ ), use of **effective microorganisms** (OR=1.51,  $p=0.022$ ), slurry waste management (OR=2.17,  $p=0.000$ ) and less number of pigs per pen (OR=1.12,

p=0.000) were significantly associated with positive Salmonella isolation; with positive ELISA results, however, only the use of **effective microorganisms** was significantly associated (OR=2.63, p=0.011).

PMID: 18715662 [PubMed - indexed for MEDLINE]



#### Publication Types, MeSH Terms, Substances

[Metab Eng.](#) 2008 Sep;10(5):267-75. Epub 2008 Jun 27.

#### 9. **Geobacter sulfurreducens strain engineered for increased rates of respiration.**

[Izallalen M](#), [Mahadevan R](#), [Burgard A](#), [Postier B](#), [Didonato R Jr](#), [Sun J](#), [Schilling CH](#), [Lovley DR](#).

Department of Microbiology, 203 Morrill Science IV-N, University of Massachusetts, Amherst, MA 01003, USA. imounir@microbio.umass.edu

#### Abstract

*Geobacter* species are among the most **effective microorganisms** known for the bioremediation of radioactive and toxic metals in contaminated subsurface environments and for converting organic compounds to electricity in microbial fuel cells. However, faster rates of electron transfer could aid in optimizing these processes. Therefore, the Optknock strain design methodology was applied in an iterative manner to the constraint-based, in silico model of *Geobacter sulfurreducens* to identify gene deletions predicted to increase respiration rates. The common factor in the Optknock predictions was that each resulted in a predicted increase in the cellular ATP demand, either by creating ATP-consuming futile cycles or decreasing the availability of reducing equivalents and inorganic phosphate for ATP biosynthesis. The in silico model predicted that increasing the ATP demand would result in higher fluxes of acetate through the TCA cycle and higher rates of NADPH oxidation coupled with decreases in flux in reactions that funnel acetate toward biosynthetic pathways. A strain of *G. sulfurreducens* was constructed in which the hydrolytic, F(1) portion of the membrane-bound F(0)F(1) (H(+))-ATP synthase complex was expressed when IPTG was added to the medium. Induction of the ATP drain decreased the ATP content of the cell by more than half. The cells with the ATP drain had higher rates of respiration, slower growth rates, and a lower cell yield. Genome-wide analysis of gene transcript levels indicated that when the higher rate of respiration was induced transcript levels were higher for genes involved in energy metabolism, especially in those encoding TCA cycle enzymes, subunits of the NADH dehydrogenase, and proteins involved in electron acceptor reduction. This was accompanied by lower transcript levels for genes encoding proteins involved in amino acid biosynthesis, cell growth, and motility. Several changes in gene expression that involve processes not included in the in silico model were also detected, including increased expression of a number of redox-active proteins, such as c-type cytochromes and a putative multicopper outer-surface protein. The results demonstrate that it is possible to genetically engineer increased respiration rates in *G. sulfurreducens* in accordance with predictions from in silico metabolic modeling. To our knowledge, this is the first report of metabolic engineering to increase the respiratory rate of a microorganism.

PMID: 18644460 [PubMed - indexed for MEDLINE]



#### Publication Types, MeSH Terms, Substances

[Molecules.](#) 2008 May 13;13(5):1135-47.

#### 10. **Hormone and microorganism treatments in the cultivation of saffron (*Crocus sativus* L.) plants.**

[Aytekin A](#), [Acikgoz AO](#).

Zonguldak Karaelmas University, Bartin Forestry Faculty, 74100 - Bartin, Turkey. alperaytekin@hotmail.com

#### Abstract

The difficult cultivation of the saffron plant (*Crocus Sativus* L.) make the spice of the same name made from its dried stigmas very valuable. It is estimated that some 75,000 blossoms or 225,000 hand-picked stigmas are required to make a single pound of saffron, which explains why it is the world's most expensive spice. The aim of this study was to identify ways of increasing the fertility and production of saffron. For this purpose, the treatment of saffron bulbs with a synthetic growth hormone--a mixture of Polystimulins A6 and K--and two different microorganism based materials--biohumus or vermicompost and **Effective Microorganisms** (EM)--in four different ways (hormone alone, biohumus alone, EM alone and EM+biohumus) was investigated to determine whether these treatments have any statistically meaningful effects on corms and stigmas. It has been shown that EM + biohumus was the most effective choice for improved saffron cultivation.

PMID: 18560333 [PubMed - indexed for MEDLINE]

#### MeSH Terms, Substances

[Int J Mol Med. 2007 Oct;20\(4\):631-5.](#)

11. **Effective microorganism fermentation extract (EM-X) attenuates airway hyperreactivity and inflammation through selective inhibition of the TH2 response independently of antioxidant activity.**

[Do JS](#), [Seo HJ](#), [Hwang JK](#), [Kim JH](#), [Nam SY](#).

Department of Biological Science, Jeonju University, Jeonju 560-759, Korea.

**Abstract**

The effective microorganism fermentation extract (EM-X) is an antioxidant cocktail derived from the fermentation of plant material with **effective microorganisms**, and its clinical application is being increasingly scrutinized. In the current study, the antiasthmatic effect of EM-X was investigated using a mouse model. Inhalation of EM-X during OVA challenge resulted in a significant reduction in airway hyperreactivity (AHR) and airway recruitment of leukocytes including eosinophils. However, the level of 8-isoprostane in bronchoalveolar lavage fluid (BALF), a marker of oxidative stress in asthmatic patients, was unaltered by EM-X inhalation. Instead, ELISA data showed that levels of IL-4, IL-5 and IL-13 in BALF or lung tissues were significantly lower in EM-X-inhaling mice than in the control mice, but not the IFN-gamma level. A considerably lower amount of Ag-specific IgE and IgG1 was detected in the serum of EM-X-inhaling mice than in the serum of the controls, whereas their IgG2a secretion was similar. In addition, Ag-specific ex vivo IL-4, IL-5 and IL-13 production of draining lymph node cells was markedly diminished by EM-X inhalation, but not IFN-gamma. These data clearly show that inhaled EM-X suppresses type 2 helper T (TH2), but not type 1 helper T (TH1), response. In conclusion, inhalation of EM-X attenuates AHR and airway inflammation which results from selective inhibition of the TH2 response to allergen, but independently of antioxidant activity. Our data also suggest that EM-X may be effectively applied for control of allergic asthma.

PMID: 17786297 [PubMed - indexed for MEDLINE]



**MeSH Terms, Substances**

[Huan Jing Ke Xue. 2006 Jun;27\(6\):1155-61.](#)

12. **[Biodegradation of oil field wastewater in biological aerated filter (BAF) by immobilization].**

[Article in Chinese]

[Zhao X](#), [Wang YM](#), [Ye ZF](#), [Ni JR](#).

The Key Laboratory of Water and Sediment Sciences, Ministry of Education, Department of Environmental Engineering, Peking University, Beijing, China. zhaoxin@iee.pku.edu.cn

**Abstract**

A special kind of carrier was used to immobilize **effective microorganisms** B350M in a biological aerated filter (BAF) react system for treatment of oil field wastewater, which is of salinity > 0.5%, lack of N and P, and contains low organic matter. Through the biodegradation system operated for 142d, the react system can achieve average degradation efficiency 90.5%, 74.4%, 85.6%, 100% for oil, TOC, COD and H<sub>2</sub>S, when HRT was 4h and COD volumetric load was 1.07 kg/(m<sup>3</sup> x d). GC-MS results show that the organic substance in wastewater contain 27 different kind substances, a majority (23) of alkane and a minority (4) of aromatic substances. C<sub>14</sub>H<sub>30</sub> to C<sub>28</sub>H<sub>58</sub> in influent could be decomposed into small molecular substance efficiently, especially the C<sub>18</sub>H<sub>38</sub> to C<sub>28</sub>H<sub>58</sub>, and also polycyclic aromatic hydrocarbons (PAHs) such as Phenanthrene. The react system had a good diversity, because the carriers provide agreeable air and water condition for microorganisms, to resist high salinity and toxic pollutant. Filamentous microorganisms were observed in a great deal and will not cause foaming and bulking in BAF reactor by immobilization.

PMID: 16921953 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms, Substances**

[Ying Yong Sheng Tai Xue Bao. 2005 Oct;16\(10\):1903-8.](#)

13. **[Effects of returning maize straw into field on dynamic change of soil microbial biomass C, N and P under different promoted decay condition].**

[Article in Chinese]

[Zhang D](#), [Han Z](#), [Li D](#), [Liu W](#), [Gao S](#), [Hou D](#), [Chang L](#).

Department of Agronomy, Hebei Normal University of Science and Technology, Changli 066600, China. zdxzjj@163.com

**Abstract**

A 2-year field experiment of wheat-maize rotation was conducted on a cinnamon soil of east Hebei Province to study the effects of returning maize straw into field on the dynamics of soil microbial biomass C, N and P, and their relationships with soil nutrients and enzyme activities. The results showed that under the condition of returning maize straw combined with applying chemical fertilizer to adjust straw C/N, the application of **effective microorganisms** could increase soil microbial biomass C, N and P in each crop growth period, advance their peak time, and better regulate soil nutrient supply, compared with no application of **effective**

**microorganisms.** Soil microbial biomass had a significantly positive correlation with soil enzyme activities, but its correlation with soil hydrolysable N and available P was strongly affected by crop growth and fertilization system.

PMID: 16422512 [PubMed - indexed for MEDLINE]

**Publication Types, MeSH Terms, Substances**

[Appl Microbiol Biotechnol.](#) 2005 Nov;69(2):229-35. Epub 2005 Nov 12.

14. **A novel membrane bioreactor enhanced by effective microorganisms for the treatment of domestic wastewater.**

[Jin M](#), [Wang XW](#), [Gong TS](#), [Gu CQ](#), [Zhang B](#), [Shen ZQ](#), [Li JW](#).

Institute of Environment and Health, Tianjin, People's Republic of China. junwenli@eyou.com

**Abstract**

The activated sludge membrane bioreactor (MBR) has been shown to have some advantages for the processing and reclamation of domestic wastewater. We hypothesized that certain microorganisms, chosen for their abilities to decompose the chemical components of raw sewage, would, when coupled with the MBR, significantly improve the stability and efficiency of this system. We selected environmental bacterial strains which oxidize ammonia and nitrites and produce protease, amylase, and cellulase for the development and testing of a novel biologically enhanced MBR (eMBR). We compared the eMBR with the activated sludge MBR. With the eMBR, the average values of effluent quality were: chemical oxygen demand (COD), 40 mg/l (average efficiency of removal 90.0%); and NH(4) (+)-N, 0.66 mg/l (average efficiency of removal 99.4%). Effluent qualities met the standard and were stable during the entire 90 days of this study. For the activated sludge MBR, the COD removal rate was 91.7%, and the NH(4) (+)-N removal (94.8%) was less than that of the eMBR. Start-up time for the eMBR was only 24-48 h, much shorter than the 7-8 days required to initiate function of the standard MBR. The biomass concentrations of total heterotrophic bacteria and autotrophic bacteria in the eMBR did not fluctuate significantly during the course of the study. Various kinds of microorganisms will establish an ecological balance in the reactor. Compared with the activated sludge MBR, the eMBR not only produced an excellent and stable quality of effluent but also resulted in a shorter time to start-up and significantly improved the efficiency of NH(4) (+)-N removal.

PMID: 16151803 [PubMed - indexed for MEDLINE]



**Publication Types, MeSH Terms, Substances**

[Environ Toxicol Pharmacol.](#) 2005 Sep;20(2):313-20.

15. **Evaluation of the toxicity and safety of the antioxidant beverage effective microorganisms-X (EM-X) in animal models.**

[Ke B](#), [Liang YF](#), [Zhong ZX](#), [Higa T](#), [Aruoma OI](#).

EM Research Organization, 468 Kawasaki Uruma City Okinawa 904-2203, Japan.

**Abstract**

The acute and chronic toxicity tests and the mutagenic test of the extracts from the fermentation of plants with **effective microorganisms** (EM-X) were performed in the mouse and the rat. In acute toxicity test, mice were orally treated three times per day with 20-fold of concentrated EM-X for 7 days. For chronic toxicity test, the rats were orally treated with original EM-X once a day for 90 days at the dosages of 180, 120 or 60ml/kg. At the levels tested EM-X did not lead to significant changes in food consumption, body weight, behaviors and stools. Hematological assays on red blood, white blood cell, hemoglobin, platelets, lymphocyte, granulocyte, middle cell and coagulation time and the biochemical assays on aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, blood urea nitrogen, total protein, albumin, glucose, total bilirubin, creatinine and total cholesterol did not show abnormal changes. The histological inspection of principal organs of the heart, liver, spleen, lung and kidney did not show significant pathological changes. The delaying toxic reactions were detected 2 weeks after administration of EM-X was stopped. The mutagenic test showed that EM-X did not cause mutagenesis and tests of micronucleus of bone marrow cell and sperm shape abnormality upon EM-X were negative. The maximal tolerance dose of EM-X was calculated to be 1800ml/kg BW in the mouse and rat. Thus, oral administration of EM-X does not present acute and chronic toxicity and mutagenic effects in the animals.

PMID: 21783606 [PubMed - in process]



[Bioresour Technol.](#) 2006 May;97(8):967-72. Epub 2005 Jul 14.

16. **Effects of integrated use of organic and inorganic nutrient sources with effective microorganisms (EM) on seed cotton yield in Pakistan.**



[Khaliq A](#), [Abbasi MK](#), [Hussain T](#).

University of Azad Jammu and Kashmir, Department of Agronomy & Soil Science Faculty of Agriculture, Rawalakot Azad Jammu and Kashmir, Pakistan.

### Abstract

A field experiment was conducted to determine the effects of integrated use of organic and inorganic nutrient sources with **effective microorganisms** on growth and yield of cotton. Treatments included: control; organic materials (OM); **effective microorganisms** (EM); OM+EM; mineral NPK (170:85:60 kg); 1/2 mineral NPK+EM; 1/2 mineral NPK+OM+EM and mineral NPK+OM+EM. OM and EM alone did not increase the yield and yield attributing components significantly but integrated use of both resulted in a 44% increase over control. Application of NPK in combination with OM and EM resulted in the highest seed cotton yield (2470 kg ha<sup>-1</sup>). Integrated use of OM+EM with 1/2 mineral NPK yielded 2091 kg ha<sup>-1</sup>, similar to the yield (2165 kg ha<sup>-1</sup>) obtained from full recommended NPK, indicating that this combination can substitute for 85 kg N ha<sup>-1</sup>. Combination of both N sources with EM also increased the concentrations of NPK in plants. Economic analysis suggested the use of 1/2 mineral NPK with EM+OM saves the mineral N fertilizer by almost 50% compared to a system with only mineral NPK application. This study indicated that application of EM increased the efficiency of both organic and mineral nutrient sources but alone was ineffective in increasing yield.

PMID: 16023343 [PubMed - indexed for MEDLINE]



### Publication Types, MeSH Terms, Substances

[Environ Technol.](#) 2005 Mar;26(3):303-12.

#### 17. [A simple biofilter for treatment of pig slurry in Malaysia.](#)

[Sommer SG](#), [Mathanpaal G](#), [Dass GT](#).

Danish Institute of Agricultural Sciences, Department of Agricultural Engineering, Research Centre Bygholm, PO Box 536, DK-8700 Horsens, Denmark.

### Abstract

On commercial pig production farms in South East (SE) Asia, the liquid effluent is often discharged into rivers. The discharge is a hazard to the environment and to the health of people using water from the river either for consumption or for irrigation. Therefore, a simple percolation biofilter for treatment of the liquid effluent was developed. Pig slurry was treated in test-biofilters packed with different biomass for the purpose of selecting the most efficient material, thereafter the efficiency of the biofilter was examined at farm scale with demo biofilters using the most efficient material. The effect of using "**Effective Microorganisms**" (EM) added to slurry that was treated with biofilter material mixed with Glenor KR+ was examined. Slurry treatment in the test-biofilters indicated that rice straw was better than coconut husks, wood shavings, rattan strips and oil palm fronds in reducing BOD. Addition of EM and Glenor KR+ to slurry and biofilter material, respectively, had no effect on the temperature of the biofilter material or on the concentrations of organic and inorganic components of the treated slurry. The BOD of slurry treated in test biofilters is reduced to between 80 and 637 mg O<sub>2</sub> l<sup>-1</sup> and in the demo biofilter to between 3094 and 3376 mg O<sub>2</sub> l<sup>-1</sup>. The concentration of BOD in the effluent is related to the BOD in the slurry being treated and the BOD concentration in slurry treated in test biofilters was lower than BOD of slurry treated in demo biofilters. The demo biofilter can reduce BOD to between 52 and 56% of the original value, and TSS, COD (chemical oxygen demand) and ammonium (NH<sub>4</sub><sup>+</sup>) to 41-55% of the original slurry. The treated effluent could not meet the standards for discharge to rivers. The composted biofilter material has a high content of nitrogen and phosphorus; consequently, the fertilizer value of the compost is high. The investments costs were 123 US dollar per SPP which has to be reduced if this method should be a treatment option in practise.

PMID: 15881027 [PubMed - indexed for MEDLINE]



### Publication Types, MeSH Terms, Substances

[J Pharm Pharmacol.](#) 2004 May;56(5):649-54.

#### 18. [The antioxidant drink effective microorganism-X \(EM-X\) pre-treatment attenuates the loss of nigrostriatal dopaminergic neurons in 6-hydroxydopamine-lesion rat model of Parkinson's disease.](#)

[Datla KP](#), [Bennett RD](#), [Zbarsky V](#), [Ke B](#), [Liang YF](#), [Higa T](#), [Bahorun T](#), [Aruoma OI](#), [Dexter DT](#).

Department of Neuroinflammation, Faculty of Medicine, Imperial College London, Charing Cross Hospital Campus, Fulham Palace Road, London W6 8RF, UK.

### Abstract

There is continued interest in the assessment and potential use of antioxidants as neuroprotective agents in diseases associated with increased oxidative stress, such as Parkinson's disease. The neuroprotective effect of a natural antioxidant drink, EM-X (a ferment derivative of unpolished rice, papaya and seaweeds with

**effective microorganisms**), was investigated using the 6-hydroxydopamine (6-OHDA)-lesion rat model of Parkinson's disease. The nigrostriatal dopaminergic neurons were unilaterally lesioned with 6-OHDA (8 microg) in rats that were treated with a 10-times diluted EM-X drink (dilEM-X), standard EM-X drink (stdEM-X) or tap water for 4 days. Seven days post lesion, the integrity (no. of tyrosine hydroxylase positive cells (TH+ cells) in the substantia nigra pars compacta (SNpc)) and functionality (dopamine and its metabolites DOPAC and HVA content in the striata) of nigrostriatal dopaminergic neurons were assessed. In the vehicle-treated rats, infusion of 8 microg of 6-OHDA significantly reduced the number of TH+ cells in the SNpc as well as the levels of dopamine, DOPAC and HVA in the striata on the lesion side. The loss of TH+ cells, dopamine and HVA, but not the DOPAC levels, was significantly attenuated by stdEM-X pretreatment, but not by the dilEM-X pretreatment. There were no significant changes in the TH+ cells, or in the monoamine levels with the EM-X pretreatment per se, except for a small but significant fall in the levels of dopamine with the stdEM-X. The evidence presented supports the potential neuroprotective effects of stdEM-X drink, although its effect on dopamine levels needs further investigation.

PMID: 15142343 [PubMed - indexed for MEDLINE]

#### Publication Types, MeSH Terms, Substances

[Ying Yong Sheng Tai Xue Bao](#). 2003 Jan;14(1):101-4.

19. **[Using chlorella and effective microorganisms to optimize aquatic ecological structure and to regulate water quality].**

[Article in Chinese]

Han S, Zhang Z, Yu L.

Center of Special Aquatic Products Research and Development, Jiangsu Academy of Agricultural Sciences, Nanjing 210014, China. shqunh66@yahoo.com.cn

#### Abstract

To optimize aquatic ecological structure and to regulate water quality, *Chlorella vulgaris* and effective microorganism were added to Exopalaemon carinicauda pond and fishponds. The results showed that after adding *Chlorella vulgaris* to the shrimp pond and fishpond, *Chlorella vulgaris* turned into a dominant species, and its amount was 16.92 and 4.76 times of CK. The zooplankton biomass reached to 4.32 mg.L<sup>-1</sup> and 2.84 mg.L<sup>-1</sup>, increasing by 19.3% and 2.5%, compared with CK, respectively. Rhodospirillaceae, photosynthetic bacteria and yeast saccharomycete in the ponds could obviously change the composition, number, ratio, and biomass of the plankton (phytoplankton and zooplankton), and adjust aquatic chemical environment. The treatment of "Saccharomycete + Nitrifying bacteria" decreased the concentrations of NH<sub>4</sub><sup>+</sup> obviously, which was only 44% of CK. The BOD and COD in shrimp ponds were only 56.5% and 38.4% of CK. The treatment could increase the dissolved oxygen and primary production in the pond.

PMID: 12722449 [PubMed - indexed for MEDLINE]

#### Publication Types, MeSH Terms

[Free Radic Res](#). 2003 Jan;37(1):91-7.

20. **The antioxidant cocktail, effective microorganism X (EM-X), protects retinal neurons in rats against N-methyl-D-aspartate excitotoxicity in vivo.**

Aruoma OI, Moncaster JA, Walsh DT, Gentleman SM, Ke B, Liang YF, Higa T, Jen LS.

Department of Neuroinflammation, Division of Neuroscience and Psychological Medicine, Faculty of Medicine, Imperial College of Science, Technology and Medicine, Charing Cross Hospital Campus, Fulham Palace Road, London W6 8RF, UK. o.aruoma@c.ic.ac.uk

#### Abstract

Injection of the glutamate agonist N-methyl-D-aspartate (NMDA) into the vitreous body of rats resulted in severe degeneration of neurons in the retina, with a loss of 81% of ganglion cells and 43% of non-ganglion cells. The cocktail EM-X is a novel antioxidant drink derived from ferment of unpolished rice, papaya and seaweeds with **effective microorganisms** (EM-X). In animals treated with an intraperitoneal injection of EM-X, the loss of ganglion cells was reduced to 55% and that of non-ganglion cells to 34% when compared to untreated NMDA-injected retinas. Cell degeneration resulting from NMDA excitotoxicity, is thought to be mediated via oxidative stress mechanisms. The neuroprotective effect of the EM-X in this system is therefore likely to be due, at least in part, to its flavonoids, saponins, vitamin E and ascorbic content.

PMID: 12653222 [PubMed - indexed for MEDLINE]

#### Publication Types, MeSH Terms, Substances

[Toxicol Lett](#). 2002 Oct 5;135(3):209-17.

21. **Assessment of the ability of the antioxidant cocktail-derived from fermentation of plants with effective microorganisms (EM-X) to modulate oxidative damage in the kidney and liver of rats in vivo: studies upon the profile of poly- and mono-unsaturated fatty acids.**

Aruoma OI, Deiana M, Rosa A, Casu V, Piga R, Peccaqini S, Dessi MA, Ke B, Liang YF, Higa T.



Division of Neuroscience and Psychological Medicine, Department of Neuroinflammation, Faculty of Medicine, Imperial College of Science, Technology and Medicine, Charing Cross Hospital Campus, Fulham Palace Road, London W6 8RF, UK.  
o.aruoma@ic.ac.uk

### Abstract

The antioxidant cocktail EM-X derived from ferment of unpolished rice, papaya and sea weeds with **effective microorganisms** (EM) of lactic acid bacteria, yeast, and photosynthetic bacteria is widely available in South-East Asia. Oral administration of a EM-X to rats for 7 days inhibited the ferric-nitrosyltri-acetic acid (Fe-NTA)-dependent oxidation of fatty acids with protections directed towards docosahexanoic, arachidonic, docosapentanoic acids, oleic, linoleic and eicosadienoic acids in the liver and kidney. But only the protections of oxidation to docosahexanoic, arachidonic acid in the kidney were statistically significant. Treatment of rats with EM-X prior to the intraperitoneal administration of Fe-NTA led to a reduction in the overall levels of conjugated dienes (CD) measured in the kidney by 27% and in the liver by 19% suggesting inhibition of lipid peroxidation in these organs. The levels of glutathione and alpha-tocopherol were largely unaffected suggesting that the protection by the regular strength of EM-X was confined to the inhibition of lipid peroxidation in vivo, a point dependent on the concentrations of bioactive flavonoids.

PMID: 12270679 [PubMed - indexed for MEDLINE]



### Publication Types, MeSH Terms, Substances

Biochem Biophys Res Commun. 2002 Sep 6;296(5):1148-51.

22. **The antioxidant cocktail effective microorganism X (EM-X) inhibits oxidant-induced interleukin-8 release and the peroxidation of phospholipids in vitro.**

Deiana M, Dessi MA, Ke B, Liang YF, Higa T, Gilmour PS, Jen LS, Rahman I, Aruoma OI.

Dipartimento di Biologia Sperimentale, Sez. Patologia Sperimentale, Università degli Studi di Cagliari, Cittadella Universitaria SS 554, 09042 Monserrato, Cagliari, Italy.

### Abstract

The antioxidant beverage EM-X is derived from the ferment of unpolished rice, papaya, and sea-weeds with **effective microorganisms**. Oxidative stress enhances the expression of proinflammatory genes, causing the release of the chemokine interleukin-8 (IL-8), which mediates a multitude of inflammatory events. Human alveolar epithelial cells (A549) were treated with H<sub>2</sub>O<sub>2</sub> (100 microM) or TNF-alpha (10ng/ml) alone or with the addition of EM-X (100 microl/ml), incubated for 20h, and the release of IL-8, measured using ELISA. EM-X inhibited the release of IL-8 at the transcriptional level in A549 cells. EM-X also decreased the iron/ascorbate dependent peroxidation of ox-brain phospholipids in a concentration dependent manner. A TEAC value of 0.10+/-0.05mM was obtained for EM-X, indicating antioxidant potential. We suggest that the anti-inflammatory and antioxidant properties of EM-X are dependent on the flavonoid contents of the beverage.

PMID: 12207893 [PubMed - indexed for MEDLINE]



### MeSH Terms, Substances

Chemosphere. 2001 Jul;44(1):1-8.

23. **Biological control of leachate from municipal landfills.**

Ding A, Zhang Z, Fu J, Cheng L.

State Key Laboratory of Organic Geochemistry, Guangzhou Institute of Geochemistry, Chinese Academy of Sciences, Guangdong Province, People's Republic of China. aizh\_ding@hotmail.com

### Abstract

Landfilling is still a popular way for municipal solid waste (MSW) treatment. Leachate generated from landfills is becoming a great threat to the surroundings as it contains high concentrations of toxic substances. How to control leachate migration and to protect environmental pollution is now a concern for many environmentalists. In this work, eight **effective microorganisms** (EMs) were isolated from wastewater, sludge and soil samples by enrichment culturing techniques and used for leachate migration control in columns and pilot experiments. The preliminary experiments reveal that the EMs could remove 25% and 40% of chemical oxygen demand (COD) from leachate in fine sand and sabulous clay columns, respectively. An aquifer system was designed to simulate in-situ control for leachate migration with EMs. The EMs were injected into the simulated aquifer and formed a permeable biological barrier. The experimental results show that the barrier removed 95% of COD and approximately 100% inorganic nitrogen, that is, nitrate-N plus nitrite-N plus ammonia-N, from the migrating leachate. CO<sub>2</sub> production, redox potential and microbial number were monitored simultaneously in the aquifer during the experiment to assess the EMs' activities and the effect of the bio-barrier. The data indicate that the EMs isolated in this work had high activities and were effective for organic and nitrogenous contaminant removal throughout the experiment.

PMID: 11419753 [PubMed - indexed for MEDLINE]



**Publication Types, MeSH Terms, Substances**