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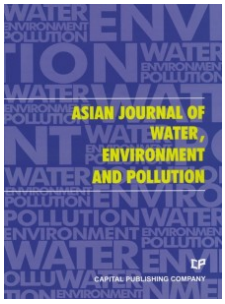

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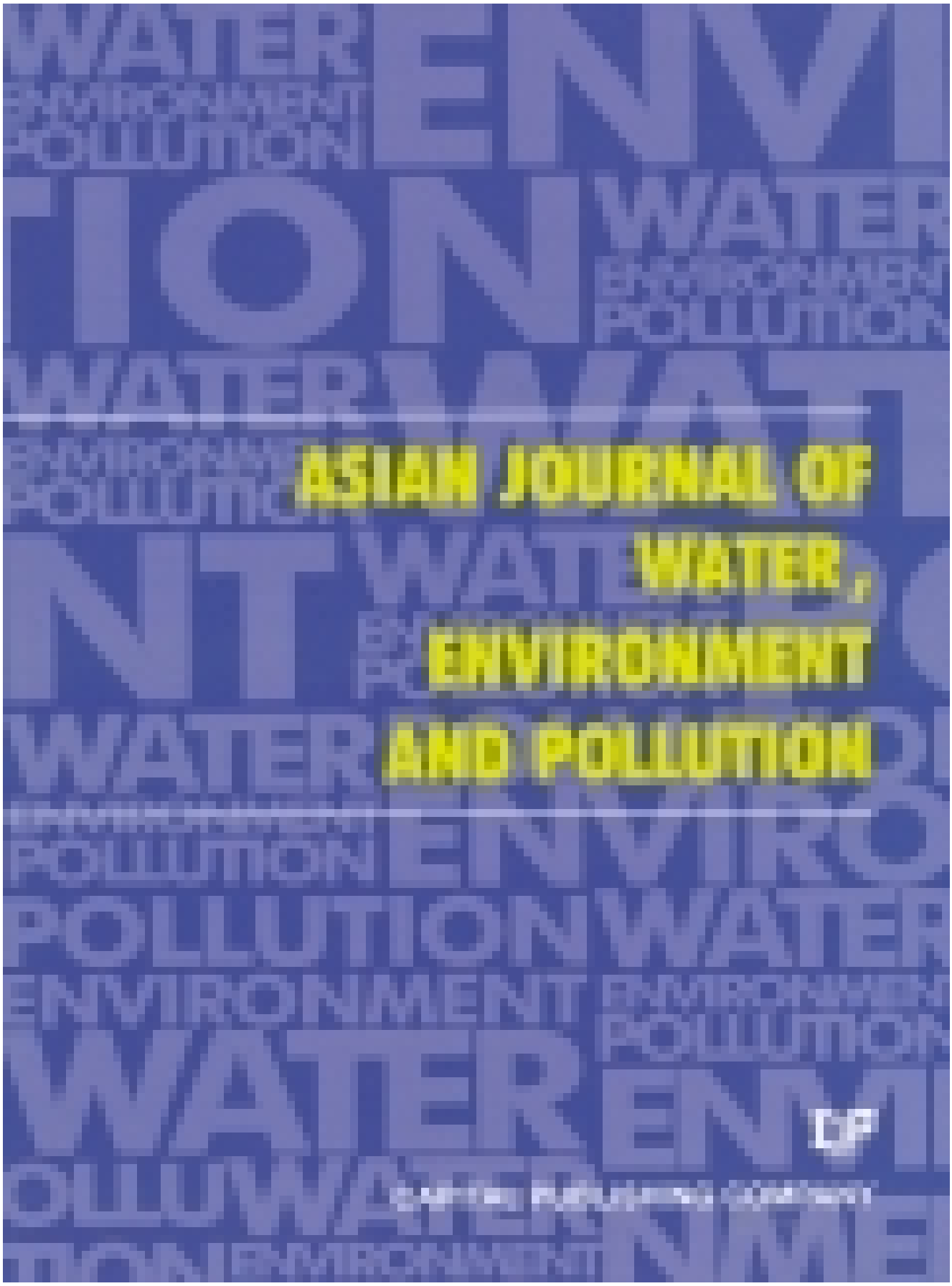

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Asia, as a whole region, faces severe stress on water availability, primarily due to high population density. Many regions of the continent face severe problems of water pollution on local as well as regional scale and these have to be tackled with a pan-Asian approach. However, the available literature on the subject is generally based on research done in Europe and North America. Therefore, there is an urgent and strong need for an Asian journal with its focus on the region and wherein the region specific problems are addressed in an intelligent manner.

In Asia, besides water, there are several other issues related to environment, such as; global warming and its impact; intense land/use and shifting pattern of agriculture; issues related to fertilizer applications and pesticide residues in soil and water; and solid and liquid waste management particularly in industrial and urban areas. Asia is also a region with intense mining activities whereby serious environmental problems related to land/use, loss of top soil, water pollution and acid mine drainage are faced by various communities.

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Article Type: Editorial

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. i-i, 2020

The Feasibility of Algae Treatment Treating Fecal Sludge Wastewater at Surabaya, Indonesia (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200027)

Authors: Farahdiba, Aulia Ulfah (https://content.iospress.com:443/search?q=author%3A%28%22Farahdiba%2C+Aulia+Ulfah%22%29) | Hidayah, Euis Nurul (https://content.iospress.com:443/search?q=author%3A%28%22Hidayah%2C+Euis+Nurul%22%29) | Zara, Djuni Wulan (https://content.iospress.com:443/search?q=author%3A%28%22Zara%2C+Djuni+Wulan%22%29) | Linh, Nguyen Thi Thuy (https://content.iospress.com:443/search?q=author%3A%28%22Linh%2C+Nguyen+Thi+Thuy%22%29)

Article Type: Research Article

Abstract: This research work was preliminary, carried out to determine the performance of algae in the fecal sludge wastewater treatment. This study was conducted with a batch scale, using an algae reactor to treat fecal wastewater with high organic and nutrient contents. Cultured algae using Chlorella sp. was spiked in domestic wastewater with five days detention period. Environment conditions such as pH, dissolved oxygen, light and temperature were monitored. It was seen that light intensities directly could affect the temperature of the bioreactor. The algae reactor was able to remove 20-50% of COD, 30-40% of nitrate and 50% of phosphate. ... Show more

Keywords: Algae, domestic wastewater, nutrient, organic substance

DOI: 10.3233/AJW200027

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 1-6, 2020

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Effect of Salinity on Osmoregulation and Histopathology in Gills of Tilapia (*Oreochromis niloticus*) (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200028)

Authors: Handayani, Kiki Syaputri (https://content.iospress.com:443/search?q=author%3A%28%22Handayani%2C+Kiki+Syaputri%22%29) | Soegianto, Agoes (https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29) | Chang, Ching-Fong (https://content.iospress.com:443/search?q=author%3A%28%22Chang%2C+Ching-Fong%22%29)

Article Type: Research Article

Abstract: Experiments on Nile tilapia Oreochromis niloticus were conducted to assess serum osmolalities, ions and histopathological effects induced in gill tissues of 7 days exposure to different salinities (0, 10, 15 and 20 ppt). These tissues were investigated by light microscope. Blood serum osmolality (SO), sodium (Na+), chloride (Cl−) and potassium (K+) concentrations were assessed after 7 days of exposure. Serum osmolality and ionic content of exposed fish appeared differently affected by salinity throughout 7 days compared to the controls. Osmolality and Na+ were increased at the two tested salinities (15 and 20 ppt), Cl− ... Show more

Keywords: Tilapia, salinity, freshwater, osmolality, ions, immunohistochemistry

DOI: 10.3233/AJW200028

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 7-11, 2020

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Effect of Mercury on Growth of Several Microalgae (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200029)

Authors: Arsad, Sulastri (https://content.iospress.com:443/search?q=author%3A%28%22Arsad%2C+Sulastri%22%29) | Kholifah, Siti Nur (https://content.iospress.com:443/search?q=author%3A%28%22Kholifah%2C+Siti+Nur%22%29) | Prabawati, Estuningdyah (https://content.iospress.com:443/search?q=author%3A%28%22Prabawati%2C+Estuningdyah%22%29) | Sari, Luthfiana Aprilianita (https://content.iospress.com:443/search?q=author%3A%28%22Sari%2C+Luthfiana+Aprilianita%22%29) | Kadim, Miftahul Khair (https://content.iospress.com:443/search?q=author%3A%28%22Kadim%2C+Miftahul+Khair%22%29) | Kilawati, Yuni (https://content.iospress.com:443/search?q=author%3A%28%22Kilawati%2C+Yuni%22%29)

Article Type: Research Article

Abstract: This study aimed to analyse the effect of toxic heavy metal on microalgae growth. Several microalgae i.e cyanophyceae (Spirulina maxima), eustigmatophyceae (Nannochloropsis oculata), chlorophyceae (Chlorella vulgaris) and porphyridiophyceae (Porphyridium cruentum) were exposed to mercury with various concentrations (1, 3 and 5 mg. L−1). An experimental method was carried out in the laboratory scale with one control of microalgae culture without mercury exposure. The microalgae cultivated by using Walne medium with the initial cells were 10,000 cells.mL−1 for S. maxima and N. oculata respectively and 100,000 cells.mL−1 for C. vulgaris and ... Show more

Keywords: Heavy metal, microalgae, pollution, toxic

DOI: 10.3233/AJW200029

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 13-17, 2020

Price: EUR 27,50

Evaluation of Radioactivity in Surabaya Coastal Estuary Ecosystem with Spectrometry α, β, γ (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200030)

Authors: Siswanto, (https://content.iospress.com:443/search?q=author%3A%28%22Siswanto%2C+%22%29) | Taftazani, Agus (https://content.iospress.com:443/search?q=author%3A%28%22Taftazani%2C+Agus%22%29) | Prasetyo, Dedy (https://content.iospress.com:443/search?q=author%3A%28%22Prasetyo%2C+Dedy%22%29)

Article Type: Research Article

Abstract: Radioactivity levels have been measured in sediment samples, Echornia crassipes and Anadara granosa at the Surabaya river estuary. Measurement data were obtained by spectrophotometric method, which is a way of measuring and identifying radionuclides through observations of the spectrum emitted with detector material. The results of measurements and calculations that have been done show that the mean concentration of activity α, β, γ (gross) in water in the Morokrembangan estuary and Kenjeran river estuary is still below the threshold value of group C waters quality. Radionuclide identification results indicate the presence of natural radionuclides K 40 , Tl ... Show more

Keywords: Radioactivity, water quality, spectrophotometry α, β, γ

DOI: 10.3233/AJW200030

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 19-23, 2020

Price: EUR 27,50

Health Risk Analysis of Cd, Pb and Hg in Blood Mussel (*Anadara granosa*) from Demak, Central Java, Indonesia (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200031)

Authors: Yulianto, Bambang (https://content.iospress.com:443/search?q=author%3A%28%22Yulianto%2C+Bambang%22%29) | Andre Wijaya, Wahyu (https://content.iospress.com:443/search?q=author%3A%28%22Andre+Wijaya%2C+Wahyu%22%29) | Setyati, Wilis Ari (https://content.iospress.com:443/search?q=author%3A%28%22Setyati%2C+Wilis+Ari%22%29) | Sunaryo, (https://content.iospress.com:443/search?q=author%3A%28%22Sunaryo%2C+%22%29) | Santosa, Adi (https://content.iospress.com:443/search?q=author%3A%28%22Santosa%2C+Adi%22%29) | Putranto, Trisnadi W. C. (https://content.iospress.com:443/search?q=author%3A%28%22Putranto%2C+Trisnadi+W.+C.%22%29) | Soegianto, Agoes (https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29)

Article Type: Research Article

Abstract: The famous location of Wedung waters, Demak, Central Java, Indonesia, produces blood mussel, Anadara granosa . Anthropogenic activities can lead to contamination of heavy metals such as Pb, Cd and Hg to the living environment of A. granosa . This study was done to analyse heavy metals content in the

soft tissue of A. granosa and health risks arising to Wedung residents from consuming the mussels. Heavy metals were analysed using atomic absorption spectrometry (AAS). The result showed that Cd and Pb contents were found in A. granosa soft tissue in the range of 0.56 - 0.70 ... Show more

Keywords: Cd, Pb, Hg, health risk analysis

DOI: 10.3233/AJW200031

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 25-30, 2020

Price: EUR 27,50

☐ Visualization of the Microbial Community and Elemental Mapping of *Anadara granosa* Media Used in a Slow Sand Filter Using a SEM-EDS (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200032)

Authors: Ni'matuzahroh, (https://content.iospress.com:443/search?q=author%3A%28%22Ni%E2%80%99matuzahroh%2C+%22%29) | Fitriani, Nurina (https://content.iospress.com:443/search?q=author%3A%28%22Fitriani%2C+Nurina%22%29) | Soedjono, Eddy Setiadi (https://content.iospress.com:443/search?q=author%3A%28%22Soedjono%2C+Eddy+Setiadi%22%29) | Kuncoro, Eko Prasetyo (https://content.iospress.com:443/search?q=author%3A%28%22Kuncoro%2C+Eko+Prasetyo%22%29) | Radin Mohamed, Radin Maya Saphira (https://content.iospress.com:443/search?q=author%3A%28%22Radin+Mohamed%2C+Radin+Maya+Saphira%22%29) | O'Marga, Timothy Tjahja Nugraha (https://content.iospress.com:443/search?q=author%3A%28%22O%E2%80%99Marga%2C+Timothy+Tjahja+Nugraha%22%29)

Article Type: Research Article

Abstract: The removal of contaminants in slow sand filters occurs mainly in the biofilm above the filter media called schmutzdecke - a thin biological layer consisting of various microbial communities of algae, bacteria, diatoms and zooplankton. The layer formed ripens along with continuous straining and adsorption mechanism of impurities in raw water. Anadara granosa shell has been broadly used as an adsorbent to trap organic matter, turbid particles and heavy metal ion in raw wastewater. This research is aimed to visualise the microbial community grown on schmutzdecke in 2-weeks ripening period and maps the elemental characterisation of a grinded Anadara ... Show more

Keywords: Visualization, Schmutzdecke, slow sand filter, Anadara granosa shell

DOI: 10.3233/AJW200032

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 31-36, 2020

Price: EUR 27,50

☐ Consortium of *Marsilea crenata* and *Ludwigia adscendens* for Linear Alkylbenzene Sulfonate Detergent Phytoremediator (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200033)

Authors: Rachmadiarti, F. (https://content.iospress.com:443/search?q=author%3A%28%22Rachmadiarti%2C+F.%22%29) | Asri, M.T. (https://content.iospress.com:443/search?q=author%3A%28%22Asri%2C+M.T.%22%29) | Bashri, A. (https://content.iospress.com:443/search?q=author%3A%28%22Bashri%2C+A.%22%29) | Yuliani, (https://content.iospress.com:443/search?q=author%3A%28%22Yuliani%2C+%22%29) | Pratiwi, I.A. (https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+I.A.%22%29)

Article Type: Research Article

Abstract: Water clover (Marsilea crenata Presl.) and water primrose (Ludwigia adscendens L.) are plants grow in wetlands, polluted by inorganic or organic materials, including detergent. This study aims to evaluate the capability of M. crenata and L. adscendens individually or as a consortium to remediate linear alkylbenzene sulfonate (LAS) detergent-polluted water, and to measure the growth and chlorophyll content of these plants. M. crenata and L. adscendens were grown in a hydroponic system exposed to LAS at 0, 10, 20, and 30 ppm for 10 days. Concentration of LAS (as anionic detergent) in treated media ... Show more

Keywords: Phytoremediation, aquatic plants, Marsilea crenata, Salvinea molesta, detergent

DOI: 10.3233/AJW200033

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 37-41, 2020

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☐ Microalgae *Skeletonema costatum* for Cd and Cu Remediation (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200034)

Authors: Pratiwi, Dwi Candra (https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Dwi+Candra%22%29) | Pratiwi, Niken (https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Niken%22%29) | Yona, Defri (https://content.iospress.com:443/search?q=author%3A%28%22Yona%2C+Defri%22%29) | Sasmita, Respati Dwi (https://content.iospress.com:443/search?q=author%3A%28%22Sasmita%2C+Respati+Dwi%22%29) | Pratiwi, Intan Ayu (https://content.iospress.com:443/search?q=author%3A%28%22Pratiwi%2C+Intan+Ayu%22%29)

Article Type: Research Article

Abstract: Cadmium (Cd) and copper (Cu) are types of heavy metals that can have an adverse effect on the ecosystem. Even copper is an essential metal but in limited concentrations, however, it leads to a toxic effect on the environment when used in high concentrations. Bioremediation of these metals can be done using microalgae Skeletonema costatum . In this study, bioremediation tests of Cd and Cu were carried out on a laboratory scale using various concentrations, control, 0.7, 1.3 and 1.9 ppm, respectively. The metals exposure was carried out for 96 hours. During the test the microalgae population was monitored, and ... Show more

Keywords: Bioaccumulation, bioremediation, heavy metal, microalgae

DOI: 10.3233/AJW200034

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 43-48, 2020

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Effects of Cd, Zn and Cd+Zn Combination on Osmoregulation of Tilapia (*Oreochromis niloticus*) (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200035)

Authors: Putranto, Trisnadi Widyaleksono Catur (https://content.iospress.com:443/search?q=author%3A%28%22Putranto%2C+Trisnadi+Widyaleksono+Catur%22%29) | Shinta, Dewi (https://content.iospress.com:443/search?q=author%3A%28%22Shinta%2C+Dewi%22%29) | Affandi, Mochammad (https://content.iospress.com:443/search?q=author%3A%28%22Affandi%2C+Mochammad%22%29) | Soegianto, Agoes (https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29)

Article Type: Research Article

Abstract: The objectives of this study were to evaluate the effects of cadmium (Cd), zinc (Zn) and Cd+Zn combinations on serum osmolality and ions in Oreochromis niloticus . A total of 60 O. niloticus with five fi sh per tank and two tanks per group were used during this experiment. Group I was held in media without metal (as control) and other groups were exposed to 7.5 mg/L Zn, 15 mg/L Zn, 2.5 mg/L Cd, 7.5 mg/L Zn + 2.5 mg/L Cd and 15 mg/L Zn + 2.5 mg/L Cd for 7 days. The osmolalities of fish exposed to Cd, ... Show more

Keywords: Fish, cadmium, zinc, osmolality, ions, serum

DOI: 10.3233/AJW200035

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 49-53, 2020

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Ability of Mangrove Fungi in Biodegradation of Hexadecane (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200036)

Authors: Kuswytasari, Nengah Dwianita (https://content.iospress.com:443/search?q=author%3A%28%22Kuswytasari%2C+Nengah+Dwianita%22%29) | Elhaque, Riva Ariny (https://content.iospress.com:443/search?q=author%3A%28%22Elhaque%2C+Riva+Ariny%22%29) | Kurniawati, Alfia R (https://content.iospress.com:443/search?q=author%3A%28%22Kurniawati%2C+Alfia+R%22%29) | Alami, Nur Hidayatul (https://content.iospress.com:443/search?q=author%3A%28%22Alami%2C+Nur+Hidayatul%22%29) | Zulaika, Enny (https://content.iospress.com:443/search?q=author%3A%28%22Zulaika%2C+Enny%22%29) | Shovitri, Maya (https://content.iospress.com:443/search?q=author%3A%28%22Shovitri%2C+Maya%22%29) | Tri Puspaningsih, Ni Nyoman (https://content.iospress.com:443/search?q=author%3A%28%22Tri+Puspaningsih%2C+Ni+Nyoman%22%29) | Ni'matuzahroh, (https://content.iospress.com:443/search?q=author%3A%28%22Ni%E2%80%99matuzahroh%2C+%22%29)

Article Type: Research Article

Abstract: Oil pollution, especially in the marine environment, has become a serious environmental problem. Hexadecane (HXD) is a major alkane component and it is present in the aliphatic fragment of crude oil, which can be used by fungi as a sole carbon source. Biosurfactant which is produced by fungi facilitates HXD degradation. This study investigated the ability of mangrove fungi to be used as HXD and produce biosurfactant. The medium used to determine the ability of fungi to use hexadecane is MSM-HXD 2%, whereas Hua medium is used for determining the potential for producing biosurfactants. Biosurfactant production by fungi strains was ... Show more

Keywords: Biodegradation, fungi, hexadecane, mangrove

DOI: 10.3233/AJW200036

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 55-59, 2020

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Effect of Feed Supplement on Sperm Quality and Total Intestinal Bacteria of Fish Exposed by Cadmium (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200037)

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Article Type: Research Article

Abstract: In the ecological environment, cadmium, a heavy metal produced from human activities and industry toxic material, has polluted the water and affects the reproductive health of aquatic biota. Many fish farmers use water from the river for freshwater fish cultivation. This study examined the effects of supplementation feed (probiotics and vitamin C) on sperm quality and total bacteria in fish intestine, Oreochromis niloticus , after Cadmium (Cd) exposure. We found that probiotics did not seem to colonise fish intestine or change the overall amount of the intestinal microbiota. However, probiotic supplementation actually changed the total amount of bacteria in the ... Show more

Keywords: Fish, probiotic, sperm quality, intestinal bacteria, cadmium

DOI: 10.3233/AJW200037

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 61-64, 2020

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Effect of Media on Constructed Wetlands Performance with *Equisetum hyemale* (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200038)

Authors: Wahyudianto, Febri Eko (https://content.iospress.com:443/search?q=author%3A%28%22Wahyudianto%2C+Febri+Eko%22%29) | Imron, Muhammad Fauzul (https://content.iospress.com:443/search?q=author%3A%28%22Imron%2C+Muhammad+Fauzul%22%29) | Oktavitri, Nur Indradewi (https://content.iospress.com:443/search?q=author%3A%28%22Oktavitri%2C+Nur+Indradewi%22%29) | Nisa' AlFikry, Salsabilla Choirun (https://content.iospress.com:443/search?q=author%3A%28%22Nisa%E2%80%99+AlFikry%2C+Salsabilla+Choirun%22%29) | Rahmatullah, Lintang Tubagus (https://content.iospress.com:443/search?q=author%3A%28%22Rahmatullah%2C+Lintang+Tubagus%22%29) | Rahman, Danar Arifka (https://content.iospress.com:443/search?q=author%3A%28%22Rahman%2C+Danar+Arifka%22%29)

Article Type: Research Article

Abstract: The objective of this study is to find the effect of the media on constructed wetlands capacity with Equisetum hyemale to remove chemical oxygen demand (COD) and phosphate (PO4 3-) in laundry wastewater. Four reactors of constructed wetlands made of the plastic container were used. Three units of reactors used different media that had different diameter media for each, which were sand (SM), expanded clay (CM) and gravel (GM) while the fourth reactor was used without using the media as a control. The environmental parameters and performance of constructed wetlands were monitored every day until the fifth day ... Show more

Keywords: Constructed wetlands, sand media, gravel media, expanded clay media

DOI: 10.3233/AJW200038

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 65-69, 2020

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☐ Heavy Metals (Cd, Pb, Cu, Zn) in Green Mussel (*Perna viridis*) and Health Risk Analysis on Residents of Semarang Coastal Waters, Central Java, Indonesia (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200039)

Authors: Yulianto, Bambang (https://content.iospress.com:443/search?q=author%3A%28%22Yulianto%2C+Bambang%22%29) | Radjasa, Ocky Karna (https://content.iospress.com:443/search?q=author%3A%28%22Radjasa%2C+Ocky+Karna%22%29) | Soegianto, Agoes (https://content.iospress.com:443/search?q=author%3A%28%22Soegianto%2C+Agoes%22%29)

Article Type: Research Article

Abstract: Increasing environmental metal concentrations are usually attributed to the impact of urbanisation. This study emphasises on the metal contamination in green mussel (Perna viridis) from the coastal urban area. The field survey was carried out to evaluate the concentration of metals, i.e., Cd, Pb, Cu and Zn in green mussel captured from Semarang coastal waters, Central Java, Indonesia. Green mussels are the important species that are consumed by the local people as a source of animal protein. Therefore, keeping the mussels away from a wide range of contaminants, including heavy metals, has become an essential factor for people's health. ... Show more

Keywords: Green mussel, Perna viridis, heavy metal, pollution, Hazard Quotient, Hazard Index

DOI: 10.3233/AJW200039

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 71-76, 2020

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☐ Characterization and Lipase Production of *Micrococcus* sp. L69 Isolated from Palm Oil-contaminated Soil (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200040)

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Article Type: Research Article

Abstract: This research aims to characterise and study the lipase production of Micrococcus sp. L69 isolated from palm oil-contaminated soil. Lipase production was carried out by cultivating the bacteria in the medium containing vegetable oils. The lipase activity was determined by spectrophotometric method toward p -nitrophenyl palmitate as a substrate. The results of this research showed that the bacteria isolate L69 was a unique lipolytic bacteria. Based on sequence of 16S rRNA gene, the bacteria had low similarity level (≤ 93%) to sequences data listed in GenBank. Olive oil and coconut oil are good carbon sources for bacterial growth and ... Show more

Keywords: Lipase, Micrococcus, palm oil-contaminated soil

DOI: 10.3233/AJW200040

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Price: EUR 27,50

☐ Effect of Water Quality on Community Structure of Bivalve at Segoro Tambak Estuary, Sidoarjo, East Java, Indonesia (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200041)

Authors: Hutami, Widya Wahyu (https://content.iospress.com:443/search?q=author%3A%28%22Hutami%2C+Widya+Wahyu%22%29) | Sari, Luthfiana Aprilianita (https://content.iospress.com:443/search?q=author%3A%28%22Sari%2C+Luthfiana+Aprilianita%22%29) | Masithah, Endang Dewi (https://content.iospress.com:443/search?q=author%3A%28%22Masithah%2C+Endang+Dewi%22%29) | Sahidu, Adriana Monica (https://content.iospress.com:443/search?q=author%3A%28%22Sahidu%2C+Adriana+Monica%22%29) | Pursetyo, Kustiawan Tri (https://content.iospress.com:443/search?q=author%3A%28%22Pursetyo%2C+Kustiawan+Tri%22%29)

Article Type: Research Article

Abstract: Identification of water quality is an important factor because water supports the community structure of an organism. Bivalves are one of bioindicators in aquatic ecosystems in Segoro Tambak Estuary, which receive wastewater from landfill waste disposal. The bivalve community structure needs to be evaluated because the environmental changes that occur in waters can lead to structural changes of the bivalve community. The sampling was conducted in January – March, 2018. The water quality and environmental parameters observed were dissolved oxygen (DO), biochemical oxygen demand (BOD), temperature, salinity, current speed and wind speed. The bivalve community structure can be seen from ... Show more

Keywords: Water quality, community structure, bivalve, East Java

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Article Type: Research Article

Abstract: During the period 2016-2018, field experiments were conducted in the Scientific Training center of Bashkir State Agrarian university. The aim of the experiments was to study the effect of introducing calculated doses of mineral fertilizers on the expected sugar sorghum fresh-yield in the southern forest-steppe zone of the Republic of Bashkortostan. The purpose of the research work is to determine the amount of mineral fertilizers applied to get the expected sugar sorghum fresh yield. During the research work, it was revealed that doses of mineral fertilizers applied for sugar sorghum growing should be defined taking into account the expected fresh ... Show more

Keywords: Characteristics of sorghum varieties, sugar sorghum, sorghum durra, sorghum-sudangrass hybrids, soil treatment, application of fertilizers, efficiency

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Hydrogeochemical Evolution and Quality Assessments of Streams Water in the Bhagirathi Basin, Garhwal Himalaya, Uttarakhand (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200043)

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Abstract: Hydrogeochemical studies were carried out to assess the quality and evolutions of the streams in the Bhagirathi basin during high and low flow of water in the given environment. The hydrochemical characteristics of the streams water indicated that silicate and mixed type of weathering dominated in the Bhagirathi watersheds. The stream's water chemistry is mostly influenced by deeper sources of water through joints and fissures in the stream watersheds. A comparison between ion concentrations in the samples suggested that few samples have high sodium and fluoride exceeding the permissible limits. Based on dissolved ions in stream water, the water quality ... Show more

Keywords: Hydrochemical, Bhagirathi river basin, water quality index, Kelly ratio, base ion exchange index

DOI: 10.3233/AJW200043

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Investigation of Variability of Some Gaseous and Particulate Pollutants over Delhi, Northern India (28°40'N, 76°50'E) (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw200044)

Authors: Sharma, Ram Chhavi (https://content.iospress.com:443/search?q=author%3A%28%22Sharma%2C+Ram+Chhavi%22%29)

Article Type: Research Article

Abstract: Air pollution has become a serious concern these days as the pollutants added in the air have a great impact on human health and ecological environment. The pollutants like particulate matter that have a diameter less than 2.5 micrometer (PM2.5), nitrogen dioxide (NO2), ozone (O3) and sulphur dioxide (SO2) are mainly responsible for causing respiratory problems, asthma and heart and lung disorder. In the present study, data collected by the Central Pollution Control Board (CPCB) Delhi at Netaji Subhash Chander Institute of Technology (NSIT) location, Dwarka, Delhi, Northern India for airborne particulate and gaseous pollutants PM2.5 ... Show more

Keywords: Air pollution, pollutants, health, meteorological variables, regression analysis

DOI: 10.3233/AJW200044

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 101-109, 2020

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Environment News Futures (https://content.iospress.com:443/articles/asian-journal-of-water-environment-and-pollution/ajw201732)

Article Type: News

Citation: Asian Journal of Water, Environment and Pollution (https://content.iospress.com:443/journals/asian-journal-of-water-environment-and-pollution), vol. 17, no. 3, pp. 111-116, 2020

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8

H Index

Scope

Asia, as a whole region, faces severe stress on water availability, primarily due to high population density. Many regions of the continent face severe problems of water pollution on local as well as regional scale and these have to be tackled with a pan-Asian approach. However, the available literature on the subject is generally based on research done in Europe and North America. Therefore, there is an urgent and strong need for an Asian journal with its focus on the region and wherein the region specific problems are addressed in an intelligent manner. In Asia, besides water, there are several other issues related to environment, such as; global warming and its impact; intense land/use and shifting pattern of agriculture; issues related to fertilizer applications and pesticide residues in soil and water; and solid and liquid waste management particularly in industrial and urban areas. Asia is also a region with intense mining activities whereby serious environmental problems related to land/use, loss of top soil, water pollution and acid mine drainage are faced by various communities. Essentially, Asians are confronted with environmental problems on many fronts. Many pressing issues in the region interlink various aspects of environmental problems faced by population in this densely habited region in the world. Pollution is one such serious issue for many countries since there are many transnational water bodies that spread the pollutants across the entire region. Water, environment and pollution together constitute a three axial problem that all concerned people in the region would like to focus on.

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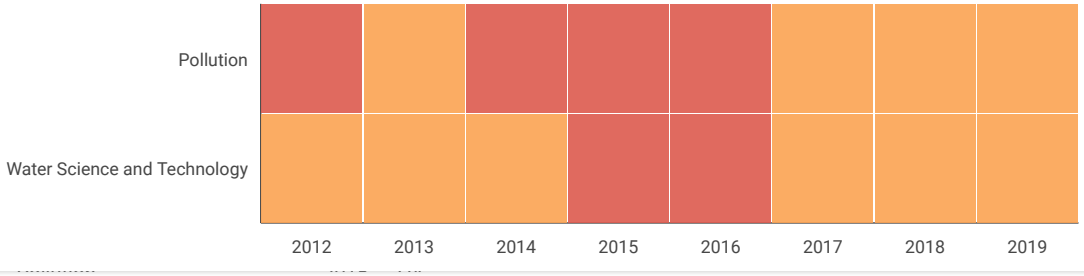

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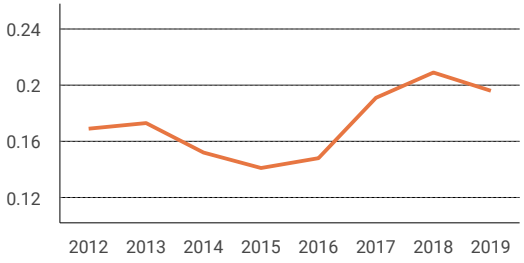

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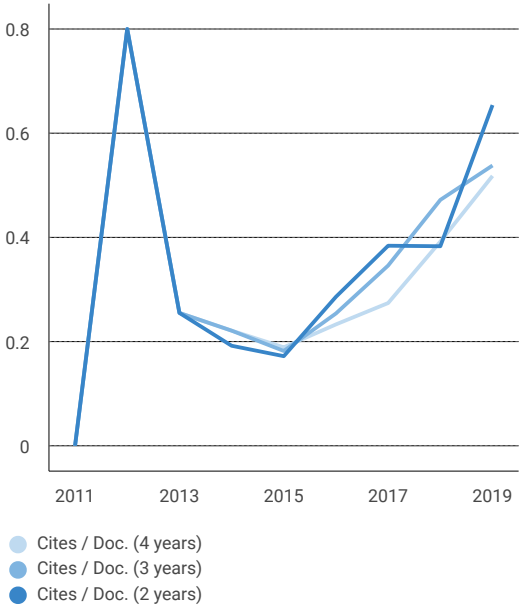

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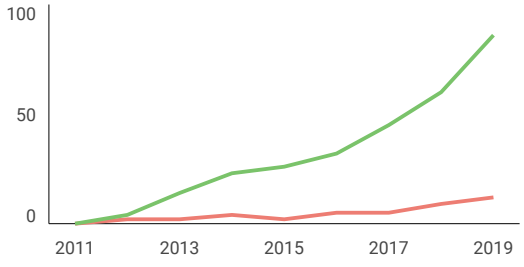

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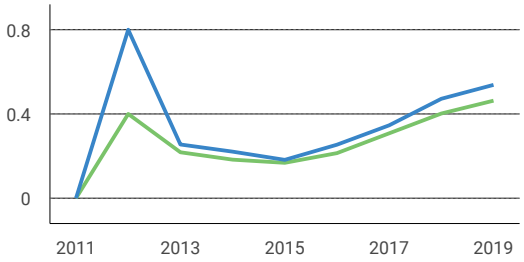

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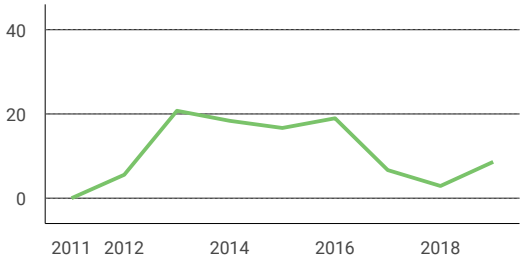

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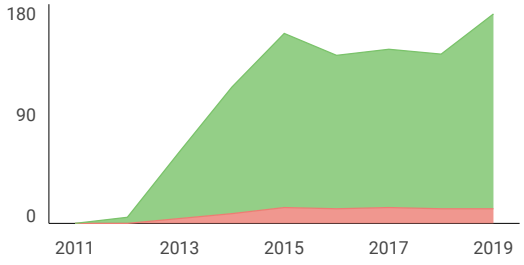

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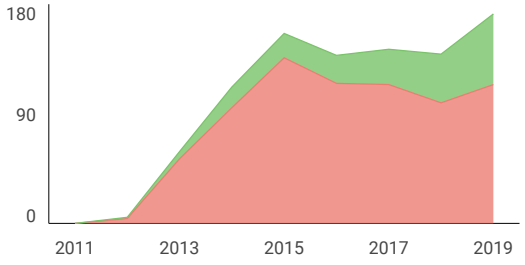

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Asian Journal of Water, Environment and Pollution, Vol. 17, No. 3 (2020), pp. 55-59.
DOI 10.3233/AJW200036

Ability of Mangrove Fungi in Biodegradation of Hexadecane

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Abstract: Oil pollution, especially in the marine environment, has become a serious environmental problem. Hexadecane (HXD) is a major alkane component and it is present in the aliphatic fragment of crude oil, which can be used by fungi as a sole carbon source. Biosurfactant which is produced by fungi facilitates HXD degradation. This study investigated the ability of mangrove fungi to be used as HXD and produce biosurfactant. The medium used to determine the ability of fungi to use hexadecane is MSM-HXD 2%, whereas Hua medium is used for determining the potential for producing biosurfactants. Biosurfactant production by fungi strains was indicated by oil displacement test, the reduction in surface tension and emulsion index. The results showed that 13 out of 16 species of fungi can use HXD as a sole carbon source. *Inonotus radiatus* LM 3020 is observed to be the most capable isolate to use HXD with a growth ratio of 6.0, and can produce biosurfactant with a positive oil displacement test (ODT) value whose minimum surface tension was 54.01 dyne/cm but the emulsion index was found to be zero.

Key words: Biodegradation, fungi, hexadecane, mangrove.

Introduction

Marine oil pollution has become a serious environmental problem. Hydrocarbons (mainly crude oil, diesel and fuel) are a group of pollutants that are difficult to degrade, non-polar, and have low solubility in water. Fungi can be used as an alternative to overcome hydrocarbon pollution. Many fungi have been known to degrade hydrocarbons. Hexadecane (HXD) is an alkane hydrocarbon with the chemical formula $C_{16}H_{34}$ and is a major alkane component present in the aliphatic fragment of crude oil. HXD can be used as a carbon source by fungi. HXD is often used in many microbial experiments to study the use of hydrocarbons as a carbon source (Dashti et al., 2008; Shiri et al., 2015). It is also used as an indicator of hydrocarbon-degrading potential (Barreto et al., 2010).

Previous research has succeeded in isolating and identifying fungi from mangrove, Wonorejo, Surabaya, Indonesia (Table 1). Isolation is carried out on the soil (Kuswytasari et al., 2011) contaminated by polyethylene and wood (Meiliawati and Kuswytasari, 2013). Some

*Corresponding Author

of the researchers have found hydrocarbons degrading fungi from soil, such as *Aspergillus niger* (Al-Hawash et al., 2018), *Aspergillus fumigatus, Fusarium solani* and *Penicillium funiculosum* (Al-Jawhari et al., 2014). Hydrocarbons are the main material of plastics (Sarker et al., 2011), so fungi that can degrade plastics can degrade hydrocarbons too. Fungi can also degrade lignin and cellulose present in wood. The ability of fungi to produce nonspecific enzymes in degrading cellulose and lignin demonstrates their ability to degrade compounds with high molecular weight, complex and recalcitrant, including aromatic structures (Potin et al., 2004).

The ability of fungi to degrade hydrocarbons can be seen from its ability to grow on a medium containing HXD (Schoefs et al., 2004). The use of HXD is aided by the presence of biosurfactant, a self-assembling amphiphile molecule. Biosurfactants are an important factor in the use of alkanes or hydrocarbons as a carbon source by microorganisms (Mahjoubi et al., 2013). This research aims to study the growth and the ability of mangrove fungi in using HXD and producing biosurfactant.

Material and Methods

The isolates were obtained from Microbiology and Biotechnology Laboratory, Department of Biology FSAD ITS (Table 1). The isolates were cultured on Potato Dextrose Agar medium.

The growth assay was conducted by comparing the growth rates of fungal strains, as colony diameter, on MSM-HXD medium and control Petri dishes (Al-Jawhari, 2014). MSM contains $Na_2HPO_4.2H_2O$, 3 g/L; KH_2PO_4, 3 g/L; NaCl, 0.5 g/L; NH_4Cl 1 g/L; $MgSO_4.7H_2O$, 0.5 g/L; 0.007 % yeast extract; 0.003% bacto-peptone; 2 % agar and micronutrien $CaCl_2$ 1 mg/L; $FeCl_3.2H_2O$ 1 mg/L (Maddela et al., 2015). The pH of the medium was adjusted to 7.

Sixteen fungi isolates were screened for their biosurfactant activity on a modified Hua's medium (4% glucose as carbon source, 0.4% $NaNO_3$, 0.02% KH_2PO_4, 0.02% $MgSO_4.7H_2O$, 0.1% Yeast extract) (Thaniyavarn et al., 2008) and incubated at 30˚C and 200 rpm for 7 days. The culture was harvested by centrifugation at 8,000 rpm for 20 min. The cell-free broth of each strain was measured the biosurfactant activity by the oil displacement test (Soeb et al., 2015), surface tension activity (Lecomte Du Nouy, 1919) and emulsification measurement.

Results and Discussion

Growth Curve of Mangrove Fungi

The growth curves of mangrove fungi on medium with and without hexadecane can be seen in Figure 1. It can be observed that the growth increases during 7 days and is still in the logarithmic phase. Growth patterns in soil fungi showed the same growth patterns in both mediums, except *Trametes polyzona* LM 1020 (Figure 1.1a, 1.1b and 1.2a, 1.2b). On wood fungi, different growth patterns were found in *Inonotus radiatus* LM 3020 (Figure 1.3a and 1.3b). It shows that LM 3020 prefers HXD as a source of growth nutrition.

Isolates that could not grow on both mediums occurred in *Paecilomyces* sp. LM 1031. It could not use peptone, yeast extract or HXD as its nutritional source.

Table 1: Fungal species from mangrove Wonorejo, Surabaya, Indonesia

Code (LM)	*Species*	*Code (LM)*	*Species*
From Soil		**From Wood**	
1003	*Asperrgillus niger*	3001	*Climacodon septentrionalis*
1015	*Chaetomium* sp.	3003	*Climacodon septentrionalis*
1013	*Perenniporia* sp.	3013	*Inonotus hispidus*
1020	*Trametes polyzona*	3020	*Inonotus radiatus*
1021	*Aspergillus terreus*	3023	*Cochliobolus verruculosa*
1025	*Penicillium* sp.	**From Contaminated Soil**	
1031	*Paecilomyces* sp.	1102	*Aspergillus fumigatus*
1041	*Mycelia sterilia*	1105	*Aspergillus terreus*
		1107	*Leptosphaerulina chartarum*

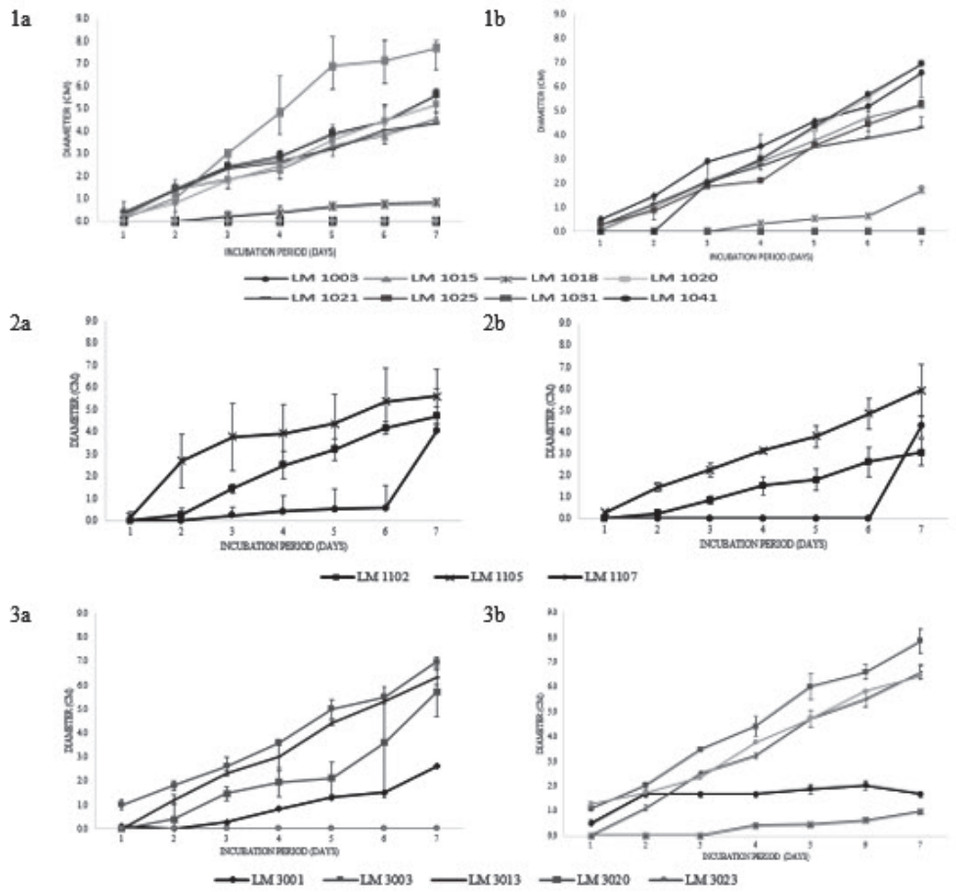

Figure 1: Growth curves of mangrove fungi from soil (1), contaminated soil (2), and wood (3). Fungi were cultured in the MSM-HXD (a) and MSM (b) for 7 days. The data were presented as the mean of three independent experiments.

While *Mycelia sterilia* LM 1041 and *Cochliobolus verruculosa* LM 3023 did not grow only on MSM-HXD medium, but grew on MSM medium. This illustrates that LM 1041 and LM 3023 are inhibited by the presence of HXD.

Fungal growth in each medium is unique. The growth of fungi colonies is greatly influenced by nutrients found in the medium. The composition of the medium can trigger or inhibit the growth of fungi. The growth of fungi in the MSM-HXD medium does not necessarily indicate that the fungi can use HXD as a carbon and energy source because the MSM medium itself contains yeast extract and peptone, which can trigger the growth of the fungal colony.

The Ability of the Fungi to Use HXD

Fungal growth ratio is the percentage value of the ratio among the growth of fungal isolates on MSM-HXD medium with MSM medium. The value of the ratio will indicate the ability of fungi using HXD as an energy and carbon source. The ability of fungi to use HXD in this research are presented in Figure 2. A ratio of 0 indicates that the fungi cannot use HXD as its carbon and energy source. The ratio < 1 indicates that the fungus that grows on the medium uses nutrients derived from the basic medium; in this case, MSM contains peptone and yeast extract. Whereas a ratio of > 1 indicates the ability of fungi to use HXD for energy sources and carbon sources for growth.

Almost all isolates showed an increase in the growth ratio from the first day to a certain day, then the ratio was seen to decrease (Figure 2a, 2b and 2c). According to Grund et al. (1975), HXD use is triggered by its presence in the medium because the genes that regulate it are inducible.

The growth ratio of *Chaetomium* sp. LM 1015 showed a faster growth on medium containing HXD on the first day of incubation and then decreased (Figure 2a). This illustrates that HXD can trigger early growth. This is supported by Meng et al. (2018), which state that

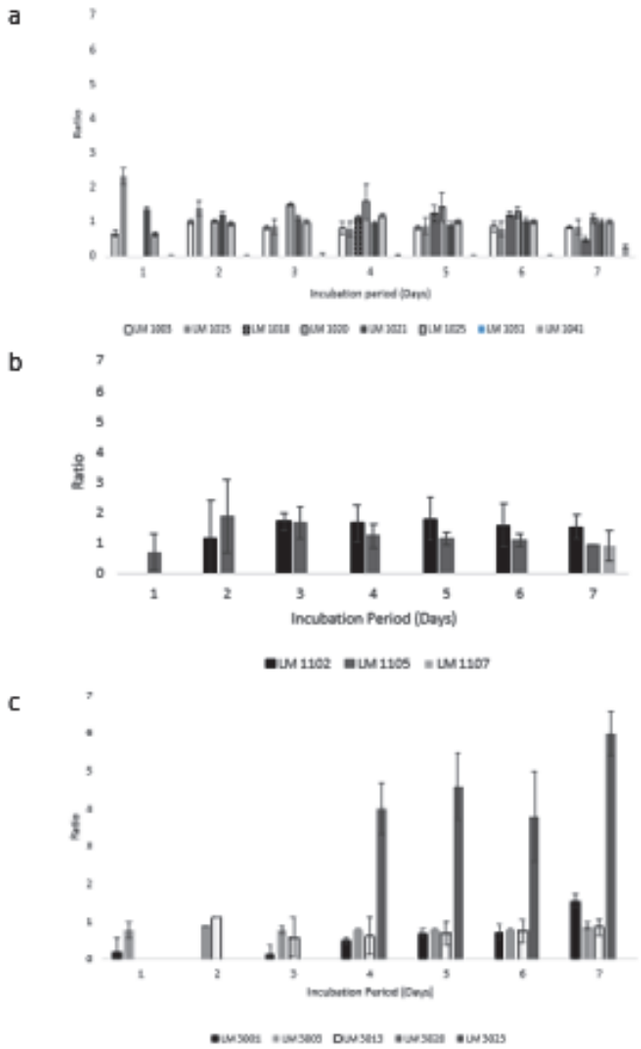

Figure 2: Growth ratio of fungi from (a) soil, (b) contaminated soil and (c) wood. Experiments were conducted in triplicate.

extracellular alkane hydroxylase, an enzyme that plays a role in alkane degradation, was induced in a higher degree in the early incubation time.

Biosurfactant Producer

On the 7th day, a continuous potential test was performed on the isolates with a ratio value > 1 for producing biosurfactants. The result of the test in producing biosurfactant on modified's Hua media containing glucose (Thaniyavarn et al., 2008), showed that all isolates cannot form clear zones in oil displacement tests, but all tested fungi can reduce surface tension (Table 2). Every isolate was able to reduce the surface tension of medium down to 60.33 dyne/cm until 54.01 dyne/cm.

Surface tension can decrease with biosurfactant production. Hakanpaa et al. (2004) stated that biosurfactants are small proteins that play a role in reducing the surface tension of the medium and help the aerial-growth of fungi. Besides, Meng et al. (2018) stated that one-way cells use hydrocarbons is to form aggregates that are supported by the production of biosurfactants.

Production of more biosurfactant leads to lower the surface tension. In addition to a reduction in surface tension, biosurfactants also affect the activity of enzymes that play a role in the use of hexadecane.

Table 2: Potential biosurfactant production from mangrove fungi isolates that can use hexadecane

Isolate	*ODT*[a]	*Mm ST*[b] *(Dyne/cm)*	*E24(%)*[c]
LM 1020	+	56.86±1.88	2.2
LM 1021	+	54.01±5.56	0.9
LM 1025	+	60.33±0.20	0.62
LM 1102	+	54.51±0.27	–
LM 3001	–	54.97±0.27	–
LM 3020	+	54.01±0.29	–

Besides, the possibility of a negative emulsion index is due to the high pH of the medium. The emulsifier was only active below pH 7. There was a very pronounced loss of activity between pH 6.5 and 7. At pH values greater than 9 or less than 3, the emulsion index was halved and no emulsion formed above pH 11.

Conclusion

Not all mangrove fungi can use hexadecane (HXD) as a source of nutrition and energy. HXD can trigger and inhibit the growth of fungi. All tested mangrove fungi can reduce the surface tension by producing biosurfactants, but not all biosurfactants are emulsifiers. *Inonotus radiatus* LM 3020 is most suitable to be used with HXD for a growth ratio of 6.0 and can produce biosurfactant with a positive ODT value, minimum surface tension 54.01±0.29 dyne/cm; but the emulsion index was found to be zero.

References

Al-Hawash, A.B., Zhang, J., Li, S., Liu, J., Ghalib, H.B. and X. Zhang (2018). Biodegradation of n-hexadecane by Aspergillus sp. RFC-1 and its mechanism. *Ecotoxicology and Environmental Safety*, **164:** 398-408. Doi:10.1016/j.ecoenv.2018.08.049.

Al-Jawhari, I.F.H. (2014). Ability of some soil fungi in biodegradation of petroleum hydrocarbon. *Journal of Applied & Environmental Microbiology*, **2(2):** 46-52.

Barreto, R.V.G., Hissa, D.C., Paes, F.A., Grangeiro, T.B., Nascimento, R.F., Rebelo, L.M., Craveiro, A.A. and V.M.M. Melo (2010). New approach for petroleum hydrocarbon degradation using bacterial spores entrapped in chitosan beads. *Bioresource Technology*, **101:** 2121-2125. Doi: 10.1016/j.biotech.2009.11.004.

Cooper, D.G. and B.G. Goldenberg (1987). Surface-active agents from two Bacillus species. *Applied and Environmental Microbiology*, **53(2):** 224-229.

Dashti, N., Al-Awadhi, H., Khanafer, M., Abdelghany, S. and S. Radwan (2008). Potential of hexadecane-utilizing soil-microorganisms for growth on hexadecanol, hexadecanal and hexadecanoic acid as sole sources of carbon and energy. *Chemosphere*, **70:** 475-479. Doi:10.1016/j.chemosphere.2007.06.052.

Grund, A., Shapiro, J., Fennelwald, M., Bacha, P., Leahy, J., Markbreiter, K., Nieder, M. and M. Toepfer (1975). Regulation of alkane oxidation in *Pseudomonas putida*. *Journal of Bacteriology*, **123(2):** 546-556.

Hakanpaa, J., Paananen, A., Askolin, A., Nakari-Setala, T., Parkkinen, T., Penttila, M., Linder, M.B. and J. Rouvinen (2004). Atomic resolution structure of the HFBII hydrophobin, a self-assembling amphiphile. *Journal of Biological Chemistry*, **279:** 534-539. Doi: 10.1074/jbc.M309650200.

Kuswytasari, N.D., Shovitri, M. and R.D. Andriyadi (2011). Soil mold diversity along the coastal Wonorejo Surabaya. Proceeding of the International Conferences on Mathematics and Sciences.

Lecomte du Nouy, P. (1919). A new apparatus for measuring surface tension. *The Journal of General Physiology*, 521.

Maddela, N.R., Scalvenzi, L., Perez, M., Montero, C. and J.M. Gooty (2015). Efficiency of indigenous filamentous fungi for bioremediation of petroleum hydrocarbons in medium and soil: Laboratory study from Ecuador. *Bulletin Environmental Contamination and Toxicology* **95:** 385-394.

Mahjoubi, M., Jaouani, A., Guesmi, A., Amor, S.B., Jouini, A., Cherif, H., Najjari, A., Boudabous, A and A. Cherif (2013). Hydrocarbonoclastic bacteria isolated from petroleum contaminated sites in Tunisia: Isolation, identification and characterization of the biotechnological potential. *New Biotechnology*, **30(6):** 723-733. http://dx.doi.org/10.1016/j.nbt.2013.03.004.

Meiliawati, D. and N.D. Kuswytasari (2013). Isolasi dan Identifikasi Jamur Kayu Lignolitik dari Vegetasi Mangrove Wonorejo. *Jurnal Sains dan Seni Pomits*, **2(1):** 2337-3520 (in Indonesian language).

Meng, L., Li, H., Bao, M. and P. Sun (2017). Metobolic pathway for a new strain *Pseudomonas synxantha* LSH-7: From chemotaxis to uptake of n-hexadecane. *Scientific Report*, **7:** 39068: 1-13.

Nie, Y., Chi, C.-Q., Fang, H., Liang, J., Lu, S., Lai, G., Tang, Y. and X. Wu (2014). Diverse alkane hydroxylase genes in microorganisms and environments. *Scientific Reports*, **4:** 4968.

Potin, O., Veignie, E. and C. Rafin (2004). Biodegradation of polycyclic aromatic hydrocarbons (PAHs) by Cladosporium sphaerospermum isolated from an aged PAH contaminated soil. *FEMS Microbiology Ecology*, **51:** 71-78.

Sarker, M., Rashid, M.M. and M. Mola (2011). Waste plastic conversion into hydrocarbon fuel materials. *Journal of Environmental Science and Engineering*, **5:** 603-609.

Schoefs, O., Perrier, M. and R. Samson (2004). Estimation of contaminant depletion in unsaturated soils using a reduced-order biodegradation model and carbon dioxide measurement. *Appl. Micobiol. Biotechnol.* **64:** 53-61. DOI 10.1007/s00253-003-1423-3.

Shiri, Z., Kermanshahi, R.K., Soudi, M.R. and D. Farajzadeh (2015). Isolation and characterization of an n-hexadecane degrading Acinetobacter baumannii KSS1060 from petrochemical wastewater treatment plant. *Int. J. Environ. Sci. Technol.*, **12:** 455-464. DOI 10.1007/s13762-014-0702-0.

Soeb, E., Ahmed, N., Akhter, J., Badar, U., Siddiqui, K., Ansari, F.A., Waqar, M., Imtiaz, S., Akhtar, N., Shaikh, Q.A., Baig, R., Butt, S., Khan, S., Khan, S., Hussain, S., Ahmed, B. and M.A. Ansari (2015). Screening and characterization of biosurfactan-producing bacteria isolated from the Arabian sea coast of Karachi. *Turkish Journal of Biology*, **39:** 210-216. Doi:10.3906/biy-1405-63.

Thaniyavarn, J., Chianguthai, T., Sangvanich, P., Roongsawang, N., Washio, K., Morikawa, M. and S. Thaniyavarn (2014). Production of sophorolipid biosurfactan by Pichia anomala. *Bioscience, Biotechnology, and Biochemistry* **72(8):** 2061-2068. DOI: 10.1271/bbb.80166.