Organophosphate

Title	**Concentration and spatial distribution of organophosphate esters in the soil-sediment profile of Kathmandu Valley, Nepal: Implication for risk assessment**
Author Name	Ishwar Chandra Yadav, Ningombam Linthoingambi Devi, Jun Li, Gan Zhang & Adrian Covacic
Journal Name	Science of The Total Environment
Year	2018
Volume and Issue	613-614
Pages	Pages 502-512
Abstracts	Despite the fact that soil and sediments, which act as a sink or potential source of organic pollutants, have been polluted with organophosphate esters (OPEs) around the globe, extremely constrained data is accessible on environmental concentration and fate of OPEs in solid matrices in whole of the South Asia particularly if there should be an occurrence in Nepal. In this study, surface soil (N = 19) and sediments samples (N = 20) were analyzed for eight different OPE in Kathmandu Valley during October 2014. The concentration of ∑ 8OPE measured in sediments samples was 12 times higher than soil and ranged 983–7460 ng/g dw (median 2210 ng/g dw) and 65–27,500 ng/g dw (186 ng/g dw), respectively. TMPP was most abundant in soil followed by TCIPP, TEHP and EHDPHP and ranged 17–25,300 ng/g dw (41.3 ng/g dw), 11.2–911 ng/g dw (31.7 ng/g dw), 8.52–858 ng/g dw (26.1 ng/g dw) and 10.2–114 ng/g dw (25.6 ng/g dw), respectively. TEHP was most prevalent in sediments followed by TMPP and EHDPHP and were in the range of 657–3020 ng/g dw (median 1140 ng/g dw), 267–2630 ng/g dw (median 815 g/g dw), 34–418 ng/g (median 131 ng/g dw), respectively. The sources of the high level of OPEs in soil was related to the end point use of consumer materials, traffic emission, and close proximity to commercial and industrial areas; while domestic sewage discharges and effluents from carpet industry were identified as the possible entry of OPE in sediments. Total organic carbon (TOC) and black carbon (BC) content in soil were moderately and positively correlated with ∑ 8OPE indicating more or less influence of soil organic carbon. The health risk assessment suggested dermal absorption of OPEs via soil is the primary pathway of human exposure to the general population. The significantly high-risk quotient (RQ) estimated for ∑ 8OPEs especially TMPP and TPHP suggested significant potential adverse risk for aquatic organisms.
Keywords	Nepal; Carpet effluent; Domestic sewage; Consumer materials; Bagmati River

Title	**Organophosphate pesticide in agricultural soils from the Yangtze River Delta of China: concentration, distribution, and risk assessment**
Author Name	Lili Pan, Jianteng Sun, Zhiheng Li, Yu Zhan, Shen Xu & Lizhong Zhu
Journal Name	Environmental Science and Pollution Research
Year	2018
Volume and Issue	25, 1
Pages	4–11
Abstracts	Organophosphorus pesticides (OPPs) are used worldwide and pose great risks to human health. However, information on their presence in agricultural soils at regional scale and the associated risks is limited. In this study, an extensive investigation on agricultural soils was conducted throughout the Yangtze River Delta (YRD) of China to reveal the status of OPP pollution. The total concentrations of the nine OPPs ranged from <3.0 to 521 ng g−1 dry weight, with a mean of 64.7 ng g−1 dry weight and a detection rate of 93 %. Dimethoate was found to be the primary compound, followed by methyl parathion and parathion. The highest concentrations of OPPs were found in Jiangsu province due to the intensive agricultural activities. The pollution of OPPs is also highly associated with the land use types. The lower concentrations of OPPs found in vegetable fields could be attributed to their easy photodegradation and hydrolysis in aerobic soils. There was no significant difference in microbial communities among the sample sites, indicating that OPPs in agricultural soils of the YRD region cause negligible effects on microbiota. The risks of OPPs in the soils to human health were further evaluated. The hazard indexes in all the soil samples were below 1, suggesting absence of non-cancer risks. This study provides valuable information for a better understanding of the pollution status of OPPs in agricultural soils and a scientific basis for soil quality assessments.
Keywords	Organophosphorus pesticide; Farmlands; Soil pollution; Microbial communities; Human health risks

Title	Effects of Organophosphate Herbicides on Biological Organisms in Soil Medium-A Mini Review
Author Name	Suleiman Usman, Abbakar Musa Kundiri, and Maximillien Nzamouhe
Journal Name	Journal of Ecology and Toxicology
Year	2017
Volume and Issue	1,1
Pages	Pages 102
Abstracts	Herbicides are toxic agrochemicals, which have being used to fight against the existence of weeds in the agricultural farms and gardens. To some extent, these herbicides are rampantly used by farmers without considering the long or short term effects in soil medium. The aim of this paper was to provide a synopsis review of the effects of some organophosphate herbicides to soil biological community. It is evident that most of these herbicides may cause the reduction of sensitive populations of certain groups of biota in soil medium. This paper reported that the effect of organophosphate herbicides on soil biota is considerable. For example, Paraquat and round-up treated soils has been noted to cause decrease in heterotrophic aerobic bacterial count (HAB) and fungal population. It is believe that in cases where these herbicides are used to treat soils, they are considered harmful to nematode, earthworms and other biological organisms. They suppress the biodiversity of soil microbes, hinder the decomposition of soil organic matter and altered plant biomass. They also obstruct the biological activities of soil biota, photosynthetic, biosynthetic reaction, cell growth/divisions and molecular composition of soil biota. Understanding these effects is vital for variety of agricultural purposes including ensuring healthy soil and crop yield conditions, water sanitation, environmental quality and human health developments.
Keywords	Herbicide; Soil; Biota

Title	The occurrence and removal of organophosphate ester flame retardants /plasticizers in a municipal

	wastewater treatment plant in the Pearl River Delta, China
Author Name	Xiangying Zeng, Zhiyang Liu, Lixiong He, Shuxia Cao, Han Song, Zhiqiang Yu, Guoying Sheng & Jiamo Fu
Journal Name	Journal of Environmental Science and Health, Part A
Year	2015
Volume and Issue	50
Pages	1291–1297
Abstracts	The occurrence, distribution and main removal pathway of seven widely used organophosphate esters (OPs) in a municipal wastewater treatment plant (WWTP) located in the Pearl River Delta were investigated. Their daily discharge load into the Pearl River via effluent was also estimated. All the target analytes were detected in wastewater, suspended particle and dewatered sludge,with trin-butyl phosphate (TBP) and tris(2-butoxyethyl) phosphate (TBEP) as the main components. The total concentrations of TBP and TBEP were 21271.8 ng Lj1 and 4349.4 ng Lj1, 3105.1 ng Lj1 and 494.5 ng Lj1influent wastewater and final ef fluent,respectively. These results indicated that non-chlorinated OPs were removed ef ficiently in the WWTP, while chlorinated OPs passed through the WWTP unchanged due to their resistance to current wastewater treatment technology. Approximate 91.4 g of non-chlorinated OPs and 23.4 g of chlorinated OPs per day were discharged into the Pearl River via ef fluent, 2.4 g of non-chlorinated OPs and 0.6 g of chlorinated OPs entered the environment following sludge disposal.
Keywords	Organophosphate ester; sludge; wastewater; removal

Title	**Removal of organophosphate esters from municipal**

	secondary effluent by ozone and UV/H_2O_2 treatments
Author Name	Xiangjuan Yuan , Silvia Lacorte , Joyce Cristale, Renato F. Dantas, Carme Sans, Santiago Esplugas, Zhimin Qiang
Journal Name	Separation and Purification Technology
Year	2015
Volume and Issue	156,3
Pages	1028–1034
Abstracts	Organophosphate esters (OPEs) have emerged as a new class of contaminants due to their massive use as flame retardants and plasticizers. These contaminants are toxic to aquatic organisms and some of them are not biodegradable in wastewater treatment plants. This study investigated the degradation kinetics of eight typical OPEs during ozone and UV/H_2O_2 treatments in Milli-Q water, humic acid (HA) solution, and municipal secondary effluent. The studied OPEs included three chlorinated: tris(2-chloroethyl) phosphate (TCEP), tris(chloropropyl) phosphate (TCPP) and tris(dichloropropyl) phosphate (TDCP); two aromatic: triphenyl phosphate (TPhP) and tricresyl phosphate (TCrP); and three aliphatic: tri-n-butyl phosphate (TnBP), tris(2-butoxyethyl) phosphate (TBEP), and tris(2-ethylhexyl) phosphate (TEHP). Results indicate that the degradation of target OPEs conformed to the pseudo-first-order kinetics and UV/H_2O_2 was more effective than ozone for their elimination by comparing the overall removal efficiencies and energy consumptions. Two aromatic and two aliphatic OPEs (i.e., TPhP, TCrP, TnBP and TBEP) were effectively degraded by ozone and UV/H2O2 in the test water matrices, while all chlorinated and one aliphatic OPEs (i.e., TCEP, TCPP, TDCP and TEHP) were found to be recalcitrant to oxidation. Moreover, the presence of HA significantly enhanced the degradation of reactive OPEs in ozone treatment.
Keywords	Organophosphate esters (OPEs); Municipal secondary effluent; Advanced treatment; Ozone; UV/H_2O_2

Title	**Plant growth promoting rhizobacteria: an effective tool to remediate residual organophosphate pesticide methyl parathion, widely used in indian agriculture**
Author Name	Yadav Pratibha and Sundari S.Krishna
Journal Name	Journal of Environmental Research And Development
Year	2015
Volume and Issue	9,4
Pages	1138-1149
Abstracts	Organophosphate pesticides (OPP) are applied globally and are considered to be relatively safer alternatives to the first generation pesticides dominated by organochlorines. OPP are also more amenable to degradation. However, bioaccumulation of highly toxic organophosphates (Ops) has been observed which may be due to sorption of OPs to soil particles, making it unavailable for microbial metabolism. As a result several acute and chronic toxicity effects (Neurological effects) were reported in connection with OPP. The primary route of entry of these chemicals to food chain is through food crops grown in chemically overburdened agricultural soils. Hence it's important to address this problem by constructing a bioremediation method for in-situ remediation of OPP in agricultural soils without causing any harm to plants. Our study focuses on remediation of OPP methyl parathion using rhizobacteria (namely RB1, RB2, RB3 and RB4) that also have properties of plant growth promotion. Primary screening was done to check the limits of tolerance in test isolates to a range of OPP (100 - 600ppm). Isolate RB1 showed best tolerance to OPP with a 11% growth increment at 500ppm of OPP. Isolates to utilize OPP as principle carbon and/ or nitrogen source, in vitro experiments were conducted by sequential exclusion of carbon and nitrogen salts in the medium and provision of OPP in their place. Amongst the four isolates studied, RB1 was found to be best utiliser of methyl parathion as both carbon and nitrogen source followed by RB4, whereas RB3 showed best response towards utilization of methyl parathion as nitrogen source.Further enzyme assays were conducted to test the presence of enzymes responsible for OPP degradation i.e., estrase and OPhydrolase (OPH). Isolates RB1 and RB4 showed maximum enzyme activity even at a OPP concentration of 300ppm. Additionally biochemical tests were performed to identify such properties that would increase OPP bioavailability and thus promote degradation of OPP .These assays comprised of: emulsification assay, assay for biofilm formation and biosurfactant assay to which isolates RB1, RB2 and RB3 gave strong positive results. Subsequently, in vitro plant bio assay was performed to check ability of these isolates for promoting growth of Mung bean (Vigna radiata) when challenged with increasing concentrations of OPP (100 – 500ppm) in the medium. Upon inoculation with test isolates,positive growth increment was observed in radical length and an increase in percentage germination, leaf count, seed vigour and total biomass in seedlings. Thus from our study it is evident that rhizobacteria can be effectively used both for remediation of OPP and promote plant growth.
Keywords	Pesticide remediation; Esterase; OP hydrolase; Rhizobacteria; Biofilm

Title	**Evaluation of Alternatives to Carbamate and Organophosphate Insecticides Against Thrips and Tomato Spotted Wilt Virus in Peanut Production**
Author Name	K. Marasigan, M. Toews, R. Kemerait Jr, M. R. Abney, A. Culbreath, R. Srinivasan
Journal Name	Journal of Economic Entomology
Year	2015
Volume and Issue	Volume 3
Pages	113-124
Abstracts	Thrips are important pests of peanut. They cause severe feeding injuries on peanut foliage in the early season. They also transmit Tomato spotted wilt virus (TSWV), which causes spotted wilt disease. At-plant insecticides and cultivars that exhibit field resistance to TSWV are often used to manage thrips and spotted wilt disease. Historically, peanut growers used the broad-spectrum insecticides aldicarb (IRAC class 1A; Temik) and phorate (IRAC class 1B; Thimet) for managing thrips and thereby reducing TSWV transmission. Aldicarb has not been produced since 2011 and its usage in peanut will be legally phased out in 2018; therefore, identification of alternative chemistries is critical for thrips and spotted wilt management. Here, eight alternative insecticides, with known thrips activity, were evaluated in field trials conducted from 2011 through 2013. In addition, different application methods of alternatives were also evaluated. Imidacloprid (Admire Pro), thiamethoxam (Actara), spinetoram (Radiant), and cyantraniliprole (Exirel) were as effective as aldicarb and phorate in suppressing thrips, but none of the insecticides significantly suppressed spotted wilt incidence. Nevertheless, greenhouse assays demonstrated that the same alternative insecticides were effective in suppressing thrips feeding and reducing TSWV transmission. Spotted wilt incidence in the greenhouse was more severe (~80%) than in the field (5–25%). In general, field resistance to TSWV in cultivars only marginally influenced spotted wilt incidence. Results suggest that effective management of thrips using alternative insecticides and subsequent feeding reduction could improve yields under low to moderate virus pressure.
Keywords	tobacco thrips; spotted wilt; vector and disease management

Title	**Ecotoxicity of two organophosphate pesticides chlorpyrifos and dichlorvos on non-targeting cyanobacteria Microcystis wesenbergii**
Author Name	Kai-Feng Sun, Xiang-Rong Xu, Shun-Shan Duan, You-Shao Wang, Hao Cheng, Zai-Wang Zhang, Guang-Jie Zhou, Yi-Guo Hong
Journal Name	Ecotoxicology
Year	2015
Volume and Issue	24
Pages	1498-1507
Abstracts	Organophosphate pesticides (OPs), as a replacement for the organochlorine pesticides, are generally considered non-toxic to plants and algae. Chlorpyrifos and dichlorvos are two OPs used for pest control all over the world. In this study, the dose–response of cyanobacteria Microcystis wesenbergii on OPs exposure and the stimulating effect of OPs with and without phosphorus source were investigated. The results showed that high concentrations of chlorpyrifos and dichlorvos caused significant decrease of chlorophyll a content. The median inhibitory concentrations (EC50) of chlorpyrifos and dichlorvos at 96 h were 15.40 and 261.16l mol L-1, respectively. Growth of M. wesenbergii under low concentration of OPs (ranged from 1/10,000 to 1/20 EC50), was increased by 35.85 % (chlorpyrifos) and 41.83 % (dichlorvos) at 120 h, respectively. Correspondingly, the highest enhancement on the maximum quantum yield (Fv/Fm) was 4.20 % (24 h) and 9.70 % (48 h), respectively. Chlorophyll fluorescence kinetics, known as O–J–I–P transients, showed significant enhancements in the O–J, J–I, and I–P transients under low concentrations of dichlorvosat 144 h, while enhancements of chlorophyll fluorescence kinetics induced by low concentrations of chlorpyrifos were only observed in the J–I transient at 144 h. Significant decreases of chlorophyll content, Fv/Fm and O–J–I–P transients with OPs as sole phosphorus source were found when they were compared with inorganic phosphate treatments. The results demonstrated an evidently hormetic dose–response of M. wesenbergii to both chlorpyrifos and dichlorvos, where high dose (far beyond environmental concentrations) exposure caused growth inhibition and low dose exposure induced enhancement on physiological processes. The stimulating effect of two OPs on growth of M. wesenbergii was negligible under phosphate limitation.
Keywords	Chlorophyll fluorescence; Hormesis; Chlorpyrifos; Dichlorvos; M. wesenbergi