Carbofurans

Title	Influence of phorate and carbofuran insecticides on nitrogen availability and their residues in soil and rice
Author Name	VS Borkar, NB Gokhale, NH Khobragade, SS More and RV Dhopavkar
Journal Name	International Journal of Chemical Studies
Year	2018
Volume and Issue	6,1
Pages	Pages 09-14
Abstracts	An experiment was conducted in with two insecticides, phorate and carbofuran at rates of 10.0 and 16.5 kg ha^{-1} respectively, to investigate its effect on the availability of nitrogen in rhizosphere soils of rice (Oryzasativa L., variety IR-50). Application of the insecticides stimulated the availability of nitrogen in the rhizosphere soils, and the stimulation was more pronounced with phorate as compared to carbofuran. The residue of Carbofuron and phorate was detected below maximum residue limit of 0.1 mg kg^{-1} in grain after harvest.
Keywords	Carbofuran insecticides; nitrogen availability; soil and rice

Title	Biochemical changes in rice plant due to application of carbofuran
Author Name	A Nayak, PK Mahapatra and KS Behera
Journal Name	Journal of Entomology and Zoology Studies
Year	2017
Volume and Issue	5,2
Pages	1177-1180
Abstracts	Carbofuran is a widely used insecticide for the control of a number of major rice-pests and caused a resurgence of rice leaf folder. An investigation was undertaken to study the effect of carbofuran application on different biochemical activities of the rice plant. Results indicated that gross weight of all the plant tissues (root, stem, and leaf) observed were more 21 days after treatment of carbofuran and highly pronounced in stem followed by leaf at 28 days after treatment. The average gross weight of the whole plant on 28 days after treatment was 55.7 gm in the untreated control compared with 122.8 gm in the treated plants. As regards soluble amino acids and chlorophyll, an increase of both the parameters in treated plants compared to the control plants was observed from 14 days after application of carbofuran. The difference in chlorophyll content was more on 14 days after treatment 3.55 and 5.40 mg/gm of fresh tissue in control and treated plants, respectively; whereas the difference in total soluble amino acid content was more on 28 days after treatment. The activity of acid phosphatase was more only in the root and leaf in treated plants than in control.
Keywords	Carbofuran; rice plant; biochemical analysis; acid phosphatase

Title	**Fungal bioaugmentation of two rice husk-based biomixtures for the removal of carbofuran in on-farm biopurification systems**
Author Name	Kattia Madrigal-Zúñiga, Karla Ruiz-Hidalgo, Juan Salvador Chin-Pampillo, Mario Masís-Mora, Víctor Castro-Gutiérre, Carlos E. Rodríguez-Rodríguez
Journal Name	Biology and Fertility of Soils
Year	2016
Volume and Issue	52,2
Pages	Pages 243-250
Abstracts	The ligninolytic fungus Trametes versicolor was employed in the bioaugmentation of compost- (GCS) and peat-based (GTS) biomixtures for the removal of the insecticide-nematicide carbofuran (CFN). Among several lignocellulosic substrates, fungal colonization was best supported in rice husk, and this pre-colonized substrate was used to prepare the biomixtures. Estimated half-lives for CFN were 3.4 and 8.1 days in the GTS and GCS biomixtures, respectively. The CFN transformation products 3-hydroxycarbofuran and 3-ketocarbofuran were detected at the moment of CFN application, but their concentration continuously decreased to complete removal in both biomixtures. Mineralization of 14C-radiolabeled CFN was faster in GTS (k = 0.00248 day−1) than in GCS (k = 0.00188 day−1). Complete elimination of the toxicity in the matrices was demonstrated after 48 days. Overall data suggest that the bioaugmentation improved the performance of the GTS rather than the GCS biomixture.
Keywords	Biopurification system; Bioaugmentation; Degradation; Pesticides; Fungi Toxicity

Title	**Ecotoxicological analysis during the removal of carbofuran in fungal bioaugmented matrices**
Author Name	Karla Ruíz-Hidalgo,Mario Masís-Mora,Edison Barbieri, Elizabeth Carazo-Rojas, Carlos E. Rodríguez-Rodríguez
Journal Name	Chemosphere
Year	2016
Volume and Issue	144
Pages	864-871
Abstracts	Biomixtures are used for the removal of pesticides from agricultural wastewater. As biomixtures employ high content of lignocellulosic substrates, their bioaugmentation with ligninolytic fungi represents a novel approach for their enhancement. Nonetheless, the decrease in the concentration of the pesticide may result in sublethal concentrations that still affect ecosystems. Two matrices, a microcosm of rice husk (lignocellulosic substrate) bioaugmented with the fungus Trametes versicolor and a biomixture that contained fungally colonized rice husk were used in the degradation of the insecticide/nematicide carbofuran (CFN). Elutriates simulating lixiviates from these matrices were used to assay the ecotoxicological effects at sublethal level over Daphnia magna (Straus) and the fish Oreochromis aureus (Steindachner) and Oncorhynchus mykiss (Walbaum). Elutriates obtained after 30 d of treatment in the rice husk microcosms at dilutions over 2.5% increased the offspring of D. magna as a trade-off stress response, and produced mortality of neonates at dilutions over 5%. Elutriates (dilution 1:200) obtained during a 30 d period did not produce alterations on the oxygen consumption and ammonium excretion of O. mykiss, however these physiological parameters were affected in O. aureus at every time point of treatment, irrespective of the decrease in CFN concentration. When the fungally colonized rice husk was used to prepare a biomixture, where more accelerated degradation is expected, similar alterations on the responses by O. aureus were achieved. Results suggest that despite the good removal of the pesticide, it is necessary to optimize biomixtures to minimize their residual toxicity and potential chronic effects on aquatic life.
Keywords	Carbofuran; Degradation; Physiological responses in fish; Chronic toxicity; Biopurification system; Bioaugmentation

Title	**Optimization of a Fungally Bioaugmented Biomixture for Carbofuran Removal in On-Farm Biopurification Systems**
Author Name	Karla Ruiz-Hidalgo, Juan Salvador Chin-Pampillo, Mario Masís-Mora, Elizabeth Carazo-Rojas & Carlos E. Rodríguez-Rodríguez
Journal Name	Water Air Soil Pollutants
Year	2016
Volume and Issue	227,3
Pages	864-871
Abstracts	Biomixtures comprise the active part of biopurification systems (BPS) for the removal of pesticide-containing wastewater from agricultural origin. Considering that biomixtures contain an important amount of lignocellulosic substrates, their bioaugmentation with degrading ligninolytic fungi represents apromising way to improve BPS. The fungus Trametes versicolor was employed for the bioaugmentation of rice husk-compost-soil (GCS) biomixtures in order to optimize the removal of the highly toxic insecticide/nematicide carbofuran (CFN). Composition ofbiomixtures has not been optimized before, and usually,a volumetric composition of 50:25:25 (lignocellulosicsubstrate:humic component:soil) is employed.Optimization of the biomixture composition was per-formed with a central composite design, using the vol-umetric content of rice husk (pre-colonized by thefungus) and the volumetric ratio compost/soil as designvariables. Performance of biomixtures was comprehen-sively assayed considering CFN removal, the produc-tion of toxic transformation products (3-hydroxycarbofuran/3-ketocarbofuran), the ability tomineralize [14C]carbofuran, and the residual toxicity inthe matrix. According to the models, the optimal volu-metric composition of the GCS biomixture is 30:43:27,which maximizes removal and mineralization rate, andminimizes the accumulation of transformation products.Results support the value of assessing new biomixtureformulations according to the target pesticide in order toobtain their optimal performance, before their use in BPS.
Keywords	Biopurification system; Pesticides; Bioaugmentation; Fungi; Toxicity; Degradation

Title	**Monitoring and dietary exposure assessment of pesticide residues in cowpea (*Vigna unguiculata L. Walp*) in Hainan, China**
Author Name	Yun Duan , Ni Guan, Pingping Li, Jianguo Li, Jinhui Luo
Journal Name	Food Control
Year	2016
Volume and Issue	59
Pages	250-255
Abstracts	To monitor pesticide residues in cowpea and assess the potential public health risk, 433 fresh cowpea samples from Hainan province (2012 and 2013) were collected and the presence of 20 organophosphoate, carbamate and pyrethroid was determined. A screening analysis consisting of a dietary exposure assessment of pesticide residue was performed using a deterministic approach-point estimate of exposure. The results indicated the most important residues were triazophos, carbofuran, isocarbophos, phoxim and omethoate. The estimated daily intakes (EDIs) of those pesticides were 72.89%, 27.45%, 12.35%, 12.19% and 9.15% of Acceptable Daily Intake (ADI) respectively. Then a probabilistic approach applied on the residues of concern demonstrated that exposure from triazophos exceeded the ADI at P99.9. A relative potency factors method was employed to ascertain that exposure to triazophos is a cause for concern.
Keywords	Pesticide residue; Vigan unguiculata L. Walp; Exposure assessment