

植物保护—研究进展

硫丹残留及其微生物降解研究进展

竺利红

浙江省农业科学院植物保护与微生物所

摘要:

硫丹是一种广泛应用的有机氯杀虫剂,其残留已造成了严重的环境污染,威胁着人类和动物的健康。笔者简述硫丹的毒性、应用概况及引起的残留现状,并分析引起硫丹残留的主要原因。利用微生物降解土壤中残留的农药是一种非常有效的方法。回顾国内外利用微生物降解硫丹的研究进展,包括降解菌种类和作用机理。为使硫丹降解菌真正实现应用,指出今后应加强高效降解菌的筛选、工程菌的构建、降解菌在污染土壤环境中的微生物生态学等方面的研究。

关键词: 微生物降解

Advance on Endosulfan Residue and its Microbial Degradation

Abstract:

Endosulfan, a chlorinated pesticide of the cyclodiene group, is used extensively for the protection of cotton, tea and sugarcane crops. Endosulfan residue has led to the contamination of soil and water environments. It is also a serious threat to human and animal health. The toxicity, application situation and residue of endosulfan were introduced briefly. The residue causes were analyzed too. The degradation of pesticides in soil by microorganism was an effective method. The types of microorganism which degraded endosulfan, the mechanism of degradation were summarized in this paper. To realize a practical application of endosulfan-degrading microorganisms on fields, isolation of highly efficient degrading microorganisms, construction of genetically engineered microorganisms, environmental microbial ecosystem of degrading microorganisms should be enhanced.

Keywords: microbial degradation

收稿日期 2011-01-04 修回日期 2011-02-23 网络版发布日期 2011-07-27

DOI:

基金项目:

硫丹农药残留降解微生物的筛选及其定殖研究

通讯作者: 竺利红

作者简介:

作者Email: karen2002@126.com

参考文献:

- [1] Sutherland T D, Horne I, Lacey M J, et al. Enrichment of an endosulfan - degrading mixed bacterial culture[J]. Applied and Environmental Microbiology, 2000, 66 (28): 22-28.
- [2] Kumar K, Devi S S, Krishnamurthi K, et al. Enrichment and isolation of endosulfan degrading and detoxifying bacteria[J]. Chemosphere, 2007, 68 (3): 17-22.
- [3] 李富根, 张文君, 王以燕. 硫丹的使用风险和管理动态[J]. 农药, 2009, 48(7):542-544.
- [4] 张百臻. 长期使用硫丹可能对人身健康和生态环境造成严重危害[J]. 农药科学与管理, 2002, 23(5): 35.
- [5] 孙平, 熊建利, 朱文文. 环境雌激素硫丹对根田鼠 (Microtus oeconomus) 生殖毒性效应[J]. 生物学通报, 2010, 45(2): 43-45.
- [6] Bajpayee M, Pandey A K, Zaidi S, et al. DNA damage and mutagenicity induced by endosulfan and its metabolites[J]. Environmental and Molecular Mutagenesis, 2006, 47(9): 682-692.

扩展功能

本文信息

- Supporting info
- PDF(519KB)
- [HTML全文]
- 参考文献[PDF]
- 参考文献

服务与反馈

- 把本文推荐给朋友
- 加入我的书架
- 加入引用管理器
- 引用本文
- Email Alert
- 文章反馈
- 浏览反馈信息

本文关键词相关文章

- 微生物降解

本文作者相关文章

- 竺利红

PubMed

- Article by Du,L.H

- [7] 张漾, 周显青. 硫丹对小鼠红细胞免疫功能的影响[J]. 动物学杂志, 2010, 1: 50-58.
- [8] 李文. 硫丹降解菌的筛选、鉴定及降解机理研究[D]. 泰安: 山东农业大学, 2008: 1-81.
- [9] S. Hussain, M. Arshad, B. Shaharoon, et al. Concentration dependent growth/non-growth linked kinetics of endosulfan biodegradation by *Pseudomonas aeruginosa*[J]. *World Journal of Microbiology and Biotechnology*. 2009, 25(5):853-858.
- [10] Gi-Seok Kwon, Ho-Yong Sohn, Kee-Sun Shin. Biodegradation of the organochlorine insecticide, endosulfan, and the toxic metabolite, endosulfan sulfate, by *Klebsiella oxytoca* KE-8 [J]. *Applied Microbiology and Biotechnology*, 2005, 67: 845-850.
- [11] S. Hussain, M. Arshad, M. Saleem. Biodegradation of α - and β -endosulfan by soil bacteria[J]. *Biodegradation*, 2007, 18(6):731-740.
- [12] I. Mukherjee, A. Mittal. Bioremediation of Endosulfan Using *Aspergillus terreus* and *Cladosporium oxysporum*[J]. *Bulletin of Environmental Contamination and Toxicology*, 2005, 75:1034 -1040.
- [13] D. Hernandez-Rodríguez, J.E. Sanchez, M.G. Nieto. Degradation of endosulfan during substrate preparation and cultivation of *Pleurotus pulmonarius*[J]. *World Journal of Microbiology and Biotechnology*, 2006, 22:753-760.
- [14] Y K Kim, S H Kim, S C Choi. Kinetics of endosulfan degradation by *Phanerochaete chrysosporium* [J]. *Biotechnology Letters*, 2001,23: 163-166.
- [15] S. Hussain, M. Arshad, M. Saleem. Screening of soil fungi for in vitro degradation of endosulfan [J]. *World Journal of Microbiology and Biotechnology*, 2007,23(7): 939-945.
- [16] M Arshad, S Hussain, M Saleem. Optimization of environmental parameters for biodegradation of alpha and beta endosulfan in soil slurry by *Pseudomonas aeruginosa*[J]. *Journal of Applied Microbiology*, 2008, 104(2):364 -370.
- [17] T D Sutherland, I Horne, Harcourt. Isolation and characterization of a *Mycobacterium* strain that metabolizes the insecticide endosulfan[J]. *Journal of Applied Microbiology*, 2002, 93(3):380-389.
- [18] Supriya G, Dileep K S. Biodegradation of α and β endosulfan in broth medium and soil microcosm by bacterial strain *Bordetella* sp. B9[J]. *Biodegradation*, 2009, 20:199-207.
- [19] 李文, 彭香, 张京顺. 硫丹降解菌的筛选及降解性能研究[J]. *山东农业科学*, 2009, 1: 67-70.
- [20] Kullman S W, Matsumura F. Metabolic pathways utilized by *Phanerochaete chrysosporium* for degradation of the cyclodiene pesticide endosulfan[J]. *Journal of Applied Microbiology*, 1996, 62:593-600.
- [21] Sutherland T D, Horne I, Lacey M J, et al. Enrichment of an endosulfandegrading mixed bacterial culture[J]. *Journal of Applied Microbiology*, 2000, 66:2822-2828.
- [22] Rao D M R, Murty A S. Persistence of endosulfan in soils[J]. *Journal of Agricultural and Food Chemistry*, 1980, 28:1099-1101.
- [23] Kwon G S, Kim J E, Kim T K, et al. *Klebsiella pneumoniae* KE-1 degrades endosulfan without formation of the toxic metabolite, endosulfan sulfate[J]. *FEMS Microbiology Letters*, 2002, 215(2):255-259.
- [24] Siddique T, Benedict C O, Muhammad A, et al. Biodegradation kinetics of endosulfan by *Fusarium ventricosum* and a *Pandora* sp. [J]. *Journal of Agricultural and Food Chemistry*, 2003,51:8015-8019
- [25] Kumar K, Devi S S, Krishnamurthi K, et al. Enrichment and isolation of endosulfan degrading and detoxifying bacteria[J]. *Chemosphere*, 2007, 68(3):479-488.
- [26] Cotham W E, Bidleman T F. Degradation of malathion, endosulfan and fenvalerate in seawater and seawater/sediment microcosms[J]. *Journal of Agricultural and Food Chemistry*, 1989,37:824 -828.
- [27] Kumar M, Philip L. Enrichment and isolation of a mixed bacterial culture for complete mineralization of endosulfan[J]. *Journal of Environmental Science and Health, Part B*, 2006,41:81-96.

本刊中的类似文章