

以密閉式藻類毒性試驗評估除草劑之毒性

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摘要

本研究以藻類 (*Pseudokirchneriella subcapitata*) 利用 BOD 瓶進行一密閉式之毒性試驗，評估除草劑之毒性，以探討除草劑對於非目標性生物可能造成的危害。本實驗主要使用三種反應終點，包含溶氧變化量及利用藻類細胞密度變化量計算所得到的最終產量及生長率。

使用除草劑是根據 HRAC 所作的分類中，在三大不同作用機制下所含的 10 項化學上的相異結構分類選出的。

實驗的結果指出，以抑制光合作用系統 II 的除草劑毒性大多較高，但少數幾個的毒性卻低於干擾細胞分裂型的除草劑。此外，抑制生長素類型的除草劑，在毒性上明顯是最低。在物種的敏感度比較上，本研究比水蚤、魚類皆要來得敏感許多；和一般批次式的藻類試驗相比，密閉式條件下得到的結果也表現出較高的敏感性，顯示密閉式藻類毒性試驗法能有效測試出具有揮發性除草劑的毒性，改善了以往批次式方法在此方面的缺點。

本研究以應用平均中斷值 (cut-off value) 作為選擇 NOEC 或 EC₁₀ 的客觀參考點，結果顯示 NOEC 比 EC₁₀ 提值生物更嚴謹的保護標準。

Toxicity assessment of herbicides using a closed-system algal test

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ABSTRACT

The work reported here was done to examine the effect of herbicides by using a close-system BOD bottle test and to assess the phytotoxicity on nontarget organisms such as algae (*Pseudokirchneriella subcapitata*) .

The toxic test was ended based on DO, final yield and growth rate methods. The cell density difference was used to calculate the final yield and growth rate. 20 herbicides in 10 different chemical structure classes embracing 3 different modes of action according to Herbicide Resistance Action Committee were tested.

Experimental results indicated that the acute toxicity of the photosynthesis-inhibiting II herbicides were higher, but few of them were lower than those of the cell division inhibitor. However, the like auxenic-type herbicides are very weakly phytotoxic to algae, their acute toxicities were the lowest. When compare with other species, BOD bottle test shows a higher sensitivity than algae, fish or water fleas toxicity test. Furthermore, this experience reveals that by using a closed-system on algal toxicity test can enhance the sensitivity on testing volatile pesticides, and prove the default on Batch tests. In addition, a cut-off value approach is proposed to determine whether NOEC or EC₁₀ should be chosen for estimating low toxic effects.

The results indicate that NOEC offers better protection to test organisms than EC₁₀.