

以密閉式藻類毒性試驗評估 A、B 類除草劑之毒性

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摘要

本研究以月芽藻 (*Pseudokirchneriella subcapitata*) 當作試驗物種，利用 BOD 瓶進行密閉式藻類毒性試驗，來評估除草劑之毒性。實驗中選用的除草劑乃是根據 HRAC 的分類法，挑出 A、B 兩類不同作用機制的除草劑。本實驗使用三種反應終點，包括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生物量及生長率。

實驗結果發現，cyclosulfamuron 的毒性最強，最低的則是 clodinafop-propargyl，兩者之間的 EC50 值相差可達到 1,000 倍以上。就反應終點而言，A 類除草劑對溶氧變化量較敏感，B 類除草劑對最終生物量較敏感，兩類除草劑對生長率皆不敏感。

將除草劑最敏感的 NOEC 與環境中的除草劑濃度作比較，fluazifop-p-butyl、bensulfuron-methyl、metsulfuron-methyl 及 primisulfuron-methyl 是對水體生物具有危害性的除草劑，這些除草劑現今仍然被廣泛地使用，建議農業單位與環保部門應該對這些除草劑作更深入的研究，並且能在主要使用的區域進行濃度監測的調查，確保除草劑被安全地使用，也不會並環境及生物造成負擔。

Toxicity assessment of herbicides of two different modes of action by a closed-system algal test

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ABSTRACT

In aquatic ecosystems, algae population plays a important role as a primary producer. Once surface waters are contaminated by chemicals, like herbicides, often cause negative effects to algae populations. The major objective of this study is to assess the toxicity of herbicides to algae (*Pseudokirchneriella subcapitata*) by close-system algal toxicity tests.

Twenty herbicides were divided in two groups based on their modes of action (ACCase and ALS inhibition) by Herbicide Resistance Action Committee (HRAC). The toxicity tests were conducted with an exposure period of 48 hours. Three response endpoints were considered: production of dissolved oxygen (Δ DO), final yield, and growth rate.

Results indicate that cyclosulfamuron is the most toxic herbicide and clodinafop-propargyl is the least one. According to EC50 values, cyclosulfamuron demonstrated a much higher toxicity than clodinafop-propargyl by more than 1,000-fold. Among the three response endpoints, ACCase inhibitors are more sensitive to Δ DO and ALS inhibitors are more sensitive to final yield. On the other hand, growth rate is always the least sensitive endpoint.

Comparison between algae and other aquatic species shows that *L. gibba* is more suitable for assessing the toxicity of the two groups of herbicides. However, the application of our close-system BOD bottle tests offers a variety of benefits including savings of cost and time.