

**PHYTOTOXIC ACTIVITY OF SUNFLOWER LEAF
EXTRACTS IN COMBINATION WITH PRETILACHLOR
ON BARNYARDGRASS (*Echinochloa crus-galli*) IN
DIRECT-SEEDED RICE**

DILIPKUMAR MASILAMANY

**MASTER OF SCIENCE
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Phytotoxic activity of sunflower leaf extracts in combination with pretilachlor on barnyardgrass (*Echinochloa crus-galli*) in direct-seeded rice / Dilipkumar Masilamany.

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COMBINATION WITH PRETILACHLOR ON BARNYARDGRASS
(*Echinochloa crus-galli*) IN DIRECT-SEEDED RICE**

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**Thesis Submitted in Fulfillment of the Requirement for the
Degree of Master of Science in the Faculty of Agro-technology and Food Science
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Abstract of thesis presented to the Senate of University Malaysia Terengganu in fulfillment of the requirement for the degree of Master of Science.

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COMBINATION WITH PRETILACHLOR ON BARNYARDGRASS
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DILIPKUMAR MASILAMANY

June 2011

Chairperson : Associate Professor Chuah Tse Seng, Ph.D.

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Faculty : Agrotechnology and Food Science

The increasing use of synthetic chemicals for pest control in rice has become overwhelming economical border; and more important, it could pose a serious threat of the public health and of the environment. In addition, the extensive use of synthetic herbicides has been the cause for the evolution of herbicide-resistant barnyardgrass (*Echinochloa crus-galli*) worldwide. This weed species is the most competitive weed in rice after the weedy rice (*Oryza sativa*). Thus, this study was conducted to examine the combination effects of aqueous sunflower (*Helianthus annuus* L.) leaf extracts with lower rate of pretilachlor on barnyardgrass emergence and growth. Barnyardgrass seeds were subjected to mixtures of sunflower leaf extracts and pretilachlor by employing Additive Dose Model (ADM). The results of ADM analysis indicated synergism with the $\Sigma TU_{50:50}$ of 0.614 under laboratory conditions. Mixture of sunflower leaf extracts and pretilachlor at a ratio of 70:30 was selected for subsequent experiment to examine phytotoxicity of this mixture in Marang and Seberang soil series under glasshouse conditions. Interestingly, the ED₉₅ values (rate that causes 95% inhibition) of pretilachlor for emergence and shoot fresh weight of barnyardgrass were reduced by 79 and 82%, respectively, when being mixed with sunflower leaf extracts in Marang series. In contrast, antagonism of barnyardgrass shoot fresh weight reductions occurred when pretilachlor was combined with sunflower leaf extracts in Seberang series. Rice seedlings at 4 and 8 days after sowing (DAS) were found to be tolerant to this mixture treatment. However, root growth of rice seedlings were inhibited at 0 and 2 DAS. These results suggest that sunflower leaf extracts have potential to reduce rate of pretilachlor for inhibiting emergence and growth of barnyardgrass without injuring rice seedlings in rice fields depending on soil series and growth stage of rice.

Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai memenuhi keperluan untuk ijazah Master Sains.

**AKTIVITI FITOTOKSIK BAGI KOMBINASI EKSTRAK DAUN BUNGA
MATAHARI DAN PRETILAKLOR TERHADAP PADI BURUNG
(*Echinochloa crus-galli*) DALAM TANAMAN PADI TABUR TERUS**

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Peningkatan penggunaan racun kimia bagi kawalan perosak dalam tanaman padi telah meningkatkan masalah ekonomi dan ancaman serius terhadap kesihatan awam dan alam sekitar. Tambahan pula, penggunaan racun herba sintetik secara meluas telah mengakibatkan evolusi kerintangan padi burung (*Echinochloa crus-galli*) terhadap racun herba di seluruh dunia. Spesies rumpai ini merupakan rumpai yang paling kuat bersaing dengan tanaman padi selepas padi angin (*Oryza sativa*). Maka, kajian ini dijalankan untuk menguji kesan kombinasi ekstrak berair daun bunga matahari (*Helianthus annuus* L.) dengan pretilaklor pada kadar yang rendah ke atas kemunculan dan pertumbuhan padi burung. Biji benih padi burung diuji dengan campuran ekstrak daun bunga matahari dan pretilaklor dengan menggunakan Model Dos Aditif (MDA). Keputusan analisis MDA menunjukkan sinergisma dengan nilai $\Sigma TU_{50:50}$, 0.614 dalam keadaan makmal. Kombinasi ekstrak daun bunga matahari dan pretilaklor pada nisbah 70:30 dipilih untuk eksperimen seterusnya bagi menguji aktiviti fitotoksik campuran ini dalam siri tanah Seberang dan Marang dalam keadaan rumah kaca. Yang menariknya, nilai ED_{95} (kadar yang menyebabkan 95% perencatan) untuk pretilaklor bagi kemunculan dan berat basah dedaun padi burung dikurangkan sebanyak 79 dan 82%, masing-masing, apabila dicampurkan dengan ekstrak daun bunga matahari dalam siri tanah Marang. Sebaliknya, antagonisma terhadap berat basah dedaun padi burung berlaku apabila pretilaklor dicampur dengan ekstrak daun bunga matahari dalam siri tanah Seberang. Anak pokok padi pada umur 4 dan 8 hari selepas ditabur adalah bertoleransi pada campuran ini. Hasil kajian ini menunjukkan bahawa ekstrak daun bunga matahari mempunyai potensi mengurangkan kadar pretilaklor bagi merencat kemunculan dan pertumbuhan padi burung tanpa mencederakan tumbuhan padi di sawah. Keberkesanan aktiviti fitotoksik campuran ini adalah bergantung kepada umur padi dan siri tanah yang digunakan.