

UNIVERSITI TEKNOLOGI MARA

**ALLELOPATHIC
POTENTIAL OF CASSAVA
(*Manihot esculenta* var. Kuning)
AGAINST
SELECTED
WEEDS IN
AEROBIC
RICE
(*Oryza sativa* L.)**

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MSc

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Aerobic rice production systems require less water than conventional systems. However, rapid growth of weeds is the major constraint in aerobic rice due to the lack of standing water that could prevent the growth of weeds. As the result, weed control in aerobic rice is highly dependent upon synthetic herbicide. Nevertheless, excessive use of herbicide could lead to herbicide resistance in weed, human health and environmental concern. Hence, this study aimed to evaluate the allelopathic potential of cassava plant on the germination and seedling growth of selected weeds in aerobic rice and to identify allelochemical compounds which were responsible for the inhibitory effects. Laboratory bioassay revealed the degree of phytotoxicity of different vegetative parts of cassava aqueous extracts can be classified in the order of decreasing inhibition as follows: leaf > stem > tuber > tuber peel. The leaf aqueous extract at 0.5% (w/v) concentration completely inhibited the germination and seedling growth of the *Ageratum conyzoides* L. (broadleaf), *Eleusine indica* L. (grass), and *Cyperus distans* L. (sedge) without affecting aerobic rice. In greenhouse experiment, the degree of inhibitory effect of cassava residues followed the order of decreasing inhibition: tuber peel > tuber > leaf > stem. Although the tuber peel was the most phytotoxic part, the leaf residue was the only vegetative part that gave no inhibitory effect on aerobic rice. The leaf residues at 8 t ha⁻¹ reduced the seedling emergence and shoot growth of *A. conyzoides* and *C. distans* by 85-100% whereas stimulation was evident on *E. indica*. Fractionation of the aqueous leaf extract was subsequently carried out and the degree of phytotoxic activity of different solvents of fractions can be classified in the following order of decreasing inhibition: ethyl acetate > methanolic > hexane > aqueous. Seven potential allelochemicals with herbicidal activity including coniferol, transferuldehyde, luteolin, gigantol, anemonin, β -carboline, and procyanidin A2 were identified from the ethyl acetate and methanolic extracts of cassava leaf. These findings suggest that the cassava leaf has potential use for weed control in aerobic rice and might be developed as the source of natural herbicide.

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