

**EVALUATION OF HERBICIDAL ACTIVITIES OF PLANT
ALLELOCHEMICAL, 2, 4-DI-TERT-BUTYLPHENOL FOR NATURAL
HERBICIDE DEVELOPMENT**

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**Thesis Submitted in Fulfillment of the Requirement for the
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DEDICATION

This thesis are dedicate to
my mother, Rohani Idris,
for heavenly look in your eyes and biggest comfort
my father, Wan Shafiin Ahmad
for raised me up the best you could
and
In the memory of Fatimah Wook.
You left fingerprints of love and compassion on my life.

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Herbicides are commonly used to control infestation of weeds. However, excessive use of single herbicide can cause the development of herbicide resistance in weeds, human health concern and pollution. This study aimed to evaluate herbicidal activity of 2,4-Di-tert-butylphenol (2,4-DTBP) and to determine tolerance level of selected crops species to 2,4-DTBP under laboratory and glasshouse conditions. Laboratory bioassay showed that leaf discs of *Leptochloa chinensis*, *Eleusine indica*, *Hedyotis verticillata* and *Asystasia gangetica* turned dark brown within two days after 2,4-DTBP treatment at 500 mg/L. Further evaluation revealed, post emergence application rate of 7 kg ai/ha caused the seedling growth inhibition of bioassay plants by 15-40 % only under glasshouse conditions, suggesting that 2,4-DTBP has poor post emergence herbicidal activity. In contrast, 2,4-DTBP was capable of suppressing germination, shoot and root growth of bioassay plants by 50 % at low concentrations ranged from 62.5 – 250 mg/L in pre

emergence application. Soil bioassay further confirmed pre emergence herbicidal activity of 2,4-DTBP where the seedling growth of *L. chinensis*, *E. indica* and *H. verticillata* were reduced by 50 – 80% at 2.5 kg ai/ha. *Asystasia gangetica*, was, however, tolerant to 2,4-DTBP treatment even applied at a higher rate of 5 kg ai/ha. Assessment of 2,4-DTBP persistence in soil indicated that 2,4-DTBP is degradable by soil microbes and its phytotoxicity was lower in sandy loam soil compared to silt loam soil. The phytotoxic activity on seedling growth of *E. indica* lost regardless of any soil types two days after application, meanwhile its phytotoxicity on seedling emergence was lost 4 days after treatment. Crop tolerance test revealed that *Zea mays* was tolerant to 2,4-DTBP treatment regardless of any growth stages tested. In contrast, root lengths of *Oryza sativa* and *Brassica rapa* were reduced by 10 - 15 % when the seeds were sown and the seedlings were transplanted, respectively, followed by direct treatment of 2,4-DTBP. However, the seedlings of crops became tolerant to 2,4-DTBP treatment at four days after sowing or transplant even at 5 kg ai/ha. This findings suggest that 2,4-DTBP has potential to be developed as novel pre emergence natural herbicide without injuring crop plants depending on growth stages and crop species.