

Toxicity of Herbicide, Diuron 480g/l SC to Cultivated Rice (*Oryza sativa* L.)

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Abstract

A study was conducted to examine the phytotoxicity of pre-tillage application of Diuron on cultivated rice (*Oryza sativa* L.) crop in order to educate the farmer community in the use of the herbicide. Pot experiments were conducted in a completely randomized design (CRD) with three replicates during the *Yala* season (March-September) in 2015 at the Rice Research and Development Institute (RRDI) at Batalagoda in Sri Lanka. Rice variety Bg300 (three-months age class) was used in this study. Pots (30 cm height x 30 cm diameter) were filled with top soil collected from a paddy field up to the height 28 cm. Diuron was applied using a 16L of knapsack sprayer at the rate of 1800 L/ha to 50% of the pots on the same day while the rest of the pots was treated with water as the control. Thereafter, the experiment was divided into six separate sets (S1-S6) as described below. In each set, three pots each from herbicide-treated and the control were sown with 100 seeds of un-soaked seed paddy at different dates after herbicide treatment; such as, on the same day of herbicide treatment and the first day of the 2nd, 4th, 6th, and 10th week after herbicide treatment. Seed paddy was not pre-soaked to assess the impact of the herbicide treatments on seed germination. All pots were watered until the soil saturation. Germination was tested using the initial number of emerging seedlings, and the seedling counts were taken at weekly intervals until four weeks after sowing (WAS). The percentage seedling survival in herbicide-treated pots was calculated. Data were analyzed performing ANOVA using SAS package. Results revealed that seed germination was not affected by the herbicide treatments. However, in all experimental sets, the percentage seedling survival in the Diuron-treated plots decreased rapidly with time compared to the respective control. In all sets, seedling mortality was observed since 1 WAS with 100% mortality recorded at 2-4 WAS, suggesting the high phytotoxicity of the herbicide to initial growth of rice plants. The phytotoxicity of the herbicide was strongly evident even at 12 WAS. Diuron 480g/L SC at the rate of 1800L/ha, which is recommended as pre-emergence weed control for other field crops is toxic to rice plant. The evidence of seedling mortality reported after 12 weeks after Diuron application reveals that the herbicide persisted in the soil even after 12 weeks from the application. Therefore, Diuron cannot be recommended as a pre-tillage herbicide in paddy cultivation at the rates tested in this study.

Keywords: Herbicide, Phyto-toxicity, Seedling mortality, Seed germination

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