EFFECT OF ELEVATED TEMPERATURE ON WEED SEED GERMINATION IN PADDY SOIL SEED BANK

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Abstract: A pot experiment was conducted employing CRD to study how weed seeds are germinated in paddy soil seed bank under elevated temperatures in 2015/16 maha season. Pots were filled with top soils up to 12cm and kept at 04 different temperatures namely 27°C, 30°C, 35°C and 40°C in a controlled growth chamber. Relative humidity of the growth chamber was maintained at 80%. Seedling counts were recorded at 10 days intervals up to one month. Results revealed that Counts of Seedling Germinated (CSG) of all types of weeds (Grasses, Sedges and Broadleaves) showed a significant increment at elevated temperature of 35°C. The CSG of sedges was not significantly increased at 35°C. But the CSG of grasses and broadleaves types of weeds showed a significant increment at elevated temperature of 35°C. Beyond 35°C CSG showed a significant decline in all types of weeds. Elevated temperature up to 35°C causes significant increment in count of seedling germinated and beyond 35°C it causes significant decline in count of seedling germinated in tested paddy soils under 80% RH level. There is a potential of increasing populations of weed species like *Echinochloa crus-galli*, *Leptochloa chinensis*, *Lindernia rotundifolia* and *Monochoria vaginalis* in rice growing fields under elevated temperatures.

Keywords: Elevated Temperature, Germination, Soil Seed-Bank

Introduction

The temperature and light are the most important environmental factors that promote the seed germination in the soil when water is available (K. C. Gairola et al., 2011). For most of the plants, if the light and water are available, the temperature of the soil determines the fraction of the germinated seeds and the rate of the germination (K. C. Gairola et al., 2011). The germination of the seeds is a complex process where several reactions and individual factors are involved, every process affected by the temperature (K. C. Gairola et al., 2011). The temperature affects the germination and the state of dormancy of the seeds and the seasonal changes of the dormancy state of the seeds of some species is directly related to the seasonal temperature changes. Some species can present the seeds with the light requirement for the germination at one temperature and in another, the light insensitivity (K. C. Gairola et al., 2011). Seed germination is affected by the ecological conditions prevailing in the habitat; it depends on several environmental conditions such as light, temperature, moisture germination media (K. C. Gairola et al., 2011). It is well known that seed of certain species have different temperature responses according to variety and provenances and also reasonable to believe that these responses are adaptive success or failure of a population in a particular environment depends on the way of its germination responses fit in to the ecological conditions of the habitat (K. C. Gairola et al., 2011). Thus in most of the seeds, the rate of germination are strongly governed by temperature (K. C. Gairola et al., 2011). In order to study the weed seeds germination with elevated temperatures this study was conducted.

Materials and Methods

A pot experiment was conducted within a growth chamber at Rice Research and Development Institute, Batalagoda during *maha2015/2016* season. Soil was collected from a paddy field and mixed well. Black coloured plastic pots having the height of 15cm and inner mouth diameter of 15cm were filled with the soil up to 12cm and kept at 04 different temperatures namely 27⁰C (room temperature), 30⁰C, 35⁰C and 40⁰C in a controlled growth chamber for 10days. Relative humidity of the growth chamber was maintained at 80%. Seedling counts were recorded. Data were analysed adopting ANOVA using SAS software package. Counts data were square root transformed and checked for the normality prior to analysis.

Results and Discussion

Figure 01. Count of Seedlings Germinated (CSG) under different temperatures

As shown in figure 01 CSG of all 03 types of weeds showed an increment at elevated temperature of 35⁰C. The CSG of sedges was not significantly increased at 35⁰C. But the CSG of grasses and broadleaves types of weeds showed a significant increment at elevated temperature of 35⁰C. Beyond 35⁰C CSG showed a significant decline in all 03 types of weeds. Gairola et al. (2011) reported that Speed of germination was recorded highest at 35⁰C (8.40±0.44) and lowest at 22⁰C (0.11±0.10). Different species showed different patterns of germination. *Ludwigia octovalvis* seedling counts were decreasing with increasing temperatures. *Echinochloa crus-galli* seedling counts were increasing with increasing temperatures. Seedling counts of *Leptochloa chinensi*, *Lindernia rotundifolia* and *Monochoria vaginalis* were increasing with increasing temperature up to 35⁰C and decreased beyond 35⁰C. Seedling counts of *Cyperus deformis* were decreasing with increasing temperature up to 30⁰C and then increasing with increasing temperatures. It is concluded that different weed species behave differently with increasing temperatures.

Conclusion

It is concluded that different weed species behave differently with increasing temperatures. Elevated temperature up to 35°C causes significant increment in count of seedling germinated and beyond 35°C it causes significant decline in count of seedling germinated in tested paddy soils under 80% RH level. There is a potential of increasing populations of weed species like *Echinochloa crus-galli*, *Leptochloa chinensi*, *Lindernia rotundifolia* and *Monochoria vaginalis* in rice growing fields under elevated temperatures.

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