

Patiwat Sookgul 2014: Factors Affecting the Control of Barnyard Grass in Direct-Seeded Rice Fields. Master of Science (Agronomy), Major Field: Agronomy, Department of Agronomy. Thesis Advisor: Associate Professor Tosapon Pornprom, Ph.D. 79 pages.

To date, the situation of direct-seeded rice in paddy fields has been seriously affected by an epidemic of barnyard grass (*Echinochloa crus-galli* (L.) P. Beauv.). This weed causes grain yield losses of up to 70 - 90 percentage points. It is estimated that there are several environmental factors which have an influence on the seed germination and seedling growth of barnyard grass. The effect of these factors on the seed germination and seedling growth of barnyard grass has been evaluated in order to help understand the distribution of the weed, and to develop effective management strategies for use in direct-seeded rice fields. The present study was conducted with the aim of searching for the control of barnyard grass in direct-seeded rice fields. The factors which have an impact on the seed germination of barnyard grass include: a constant temperature; an alternating temperature; pH levels; burial depth; and the effects of flooding. A completely randomized design with four replications was used in the experiment. The seed germination of barnyard grass was recorded 15 and 30 days after seed sowing (DAS). The results indicated that the seeds were able to germinate at a constant temperature in the range of 15-35°C, and reached a maximum seed germination of 91%, at 25°C. The highest germination percentage of seeds was 86% for those seeds placed in an alternating temperature of 25/ 20°C (day/ night). The highest germination percentage of seeds when pH levels were at 4 and 7 was 86% and 87%, respectively. Germination, however, decreased when an increase in pH value occurred. The effect of the seed sowing depth on seedling emergence of barnyard grass was 53% when the seeds were placed on the soil surface (0 cm). Furthermore, the seeds of barnyard grass were able to survive and emerge at a rate of 61% under flood conditions. With regard to the evaluation of the effectiveness of herbicides in controlling barnyard grass, experimental treatments were arranged in randomized complete block design with four replications of fourteen treatments. The application of butachlor 1,050 g a.i./ ha (1 DAS), pretilachlor 900 g a.i./ ha (1 DAS), and cyhalofop-butyl 100 g a.i./ ha (10 DAS), produced an excellent outcome in terms of weed control, with no phytotoxic effect on growth and crop yields. This result indicates that barnyard grass seeds can germinate in various environmental conditions, but that the germination percentage varied under different environments. Therefore, a properly managed environment can create conditions which are unsuitable for the seed germination and seedling emergence of barnyard grass, and so decrease or eliminate the threat that it poses to direct-seeded rice fields. In terms of herbicide use, further investigations are needed in order to calculate the proper dosage, and the timing of application, so as to establish weed control techniques which produce no phytotoxic effect on growth and crop yields, and to prevent the occurrence of herbicide-resistant barnyard grass.

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