Pak. J. Weed Sci. Res., 18: 435-439, Special Issue, October, 2012

RE-GROWTH FROM STEM SEGMENTS BURIED INTO PUDDLED SOIL IN HYDROLEA ZEYLANICA VAHL., A TROUBLESOME WEED IN THE PHILIPPINES

H. Morita[1], E.C. Martin[2] and N. Kabaki[3]

ABSTRACT

Re-growth ability from a node of stem segment of Hydrolea zeylanica buried into puddled soil was determined at the Philippine Rice Research Institute, Nueva Ecija in August 2008. Re-growth of the shoot was not observed from the segment with one node buried into 2 and 5 cm depth under both conditions drained and flooded with 5 cm of surface water. The segments placed on the soil surface (0cm) reproduced new shoots and both the rate of re-growth and growth of new shoots were greater in the segments under flooded than drained condition. The result suggests that burying stems by careful puddling may reduce the infestation of H. zeylanica, spreading rapidly as a troublesome perennial weed in rice fields in Luzon Island of the Philippines.

Key words: *Hydrolea zeylanica,* puddling, re-growth, rice weed, the Philippines.

INTRODUCTION

Invasive weed species such as yellow sawah lettuce (*Limnocharis flava*) and Hydrolea (*Hydrolea zeylanica*) have been recognized as new troublesome weeds spreading in the paddy fields of central and northern Luzon Island of the Philippines. Hydrolea is distributed in the tropics from India to the Philippines, growing 20-100 cm in height, in lowland rice fields as well as in marshes of ponds and banks (Harada *et al*., 1996). Though germination behavior and growth and development pattern from seeds have been reported (Fabro *et al.,* 2005), biological traits on vegetative propagation is not clarified for Hydrolea because the life form of the species has been described both as annual (Pancho and Obien, 1995) and perennial (Soerjani *et al*., 1987; Harada *et al*., 1996). In order to evaluate the vegetative propagation in Hydrolea, re-growth from stem segment was investigated.

MATERIALS AND METHODS

Identification of propagule

In the experimental rice fields of the Philippine Rice Research Institute (PhilRice), Munoz, Nueva Ecija, Philippines, seedlings of Hydrolea were collected to identify propagules on August 2008.

[1]Akita Prefectural University, Akita 010-0195, Japan
[2]Philippine Rice Research Institute, Nueva Ecija, the Philippines
[3]National Agricultural Research Center, Tsukuba 305-8666, Japan
Corresponding author's email: himorita@akita-pu.ac.jp

Re-growth from stem segment under different burial conditions

Stem segments with one node at the eleventh position from the apex of shoot growing to around 30 cm in height were taken from a population infested in a fallow rice field of PhilRice on 15th August, 2008. Five segments were buried into puddled soil of Maligaya clay filled in a plastic pot of 25 cm diameter and 20 cm depth, immediately after removed from the shoot, with depth of 0 cm (soil surface), 2 cm and 5 cm, with four replications. Pots were flooded with 5 cm of water or saturated in a net house at PhilRice and re-growth from each segment was measured at 11 days after placement.

RESULTS

Identification of propagule

It was observed that shoots of Hydrolea developed from stem segments buried into paddy soil as shown in Figure 1. Though it did not indicate directly that the species was perennial, vegetative propagation was confirmed in Hydrolea through stem segments which might be cut and buried at plowing and puddling time in rice fields.

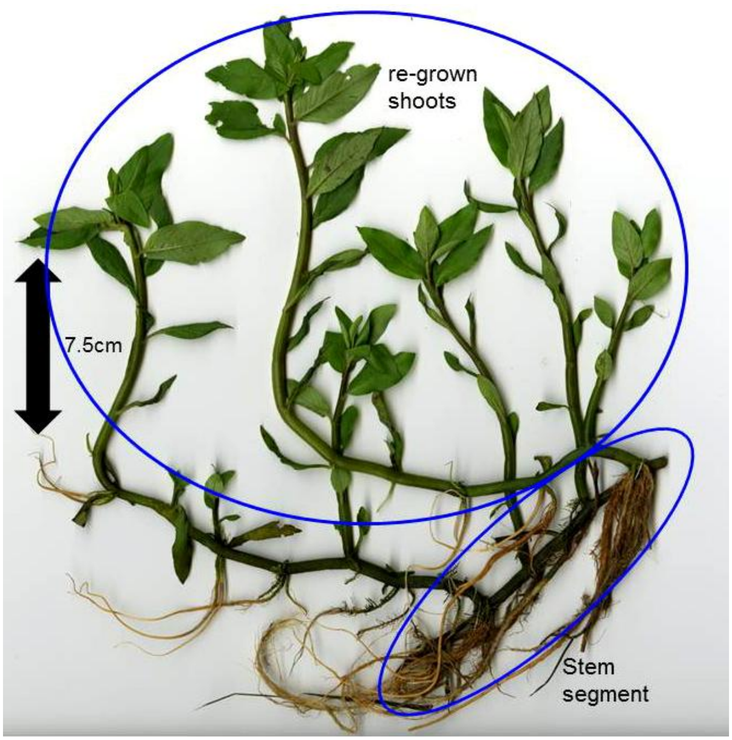

Figure 1. Young plant of Hydrolea collected in an experimental rice field of PhilRice.

Re-growth from stem segments under different burial conditions

Air temperature during the experiment was 31.7 and 23.8 degree Celsius for daily maximum and minimum, respectively. Re-growth of shoot occurred from the node of segments placed on the soil surface (0 cm)(Figure 2), while it could not be observed from those buried in the soil at depths of 2 and 5 cm. Re-growth which was determined by new shoots started three and five days after placement, and 90 and 25 percent of stem segments had re-growth for flooded and saturated conditions, respectively. It was considered that the stem segments buried into puddled soil died because they could not be collected at 11 days after burial. Length of re-grown shoot was longer in flooded than in saturated condition (Figure 3).

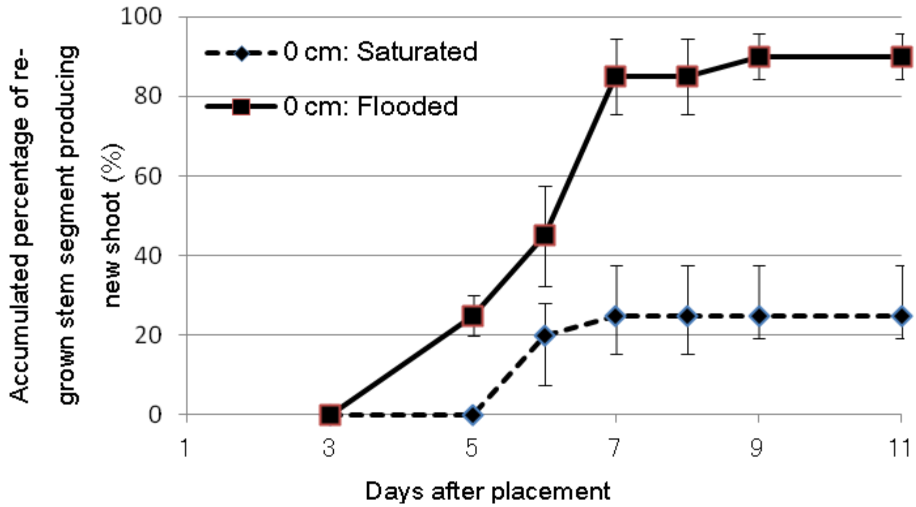

Figure 2. Changes in accumulated percentage of re-grown stem segments producing new shoots of Hydrolea placed on puddled soil. (Bar indicates S.E.)

DISCUSSION

Propagation with stem segments in rice fields was observed in Hydrolea, though life form of the species requires clarification under rice cultivation in central and northern Luzon Island. Segments of wintered rhizomes of Knotgrass (*Paspalum distichum*) and its close relative (*P. distichum* var. *indutum*) could not re-grow when buried into puddled soil while approximately 80% of segments sprouted when placed on the surface of puddled soil (Okuma *et al.,* 1983).

Results in this study suggest that burying stem segments by careful puddling might be effective to prevent re-growth of Hydrolea in rice fields. Flooding after placement of stem segments on the puddled soil encouraged re-growth of shoots in this study. Drainage after transplanting is practiced during the early growth stage of rice plants commonly by farmers in the regions in order to prevent damage by the apple snail (*Pomacea canaliculata*). This management practice might also be effective to suppress re-growth from stem segments placed on the surface of puddled rice fields.

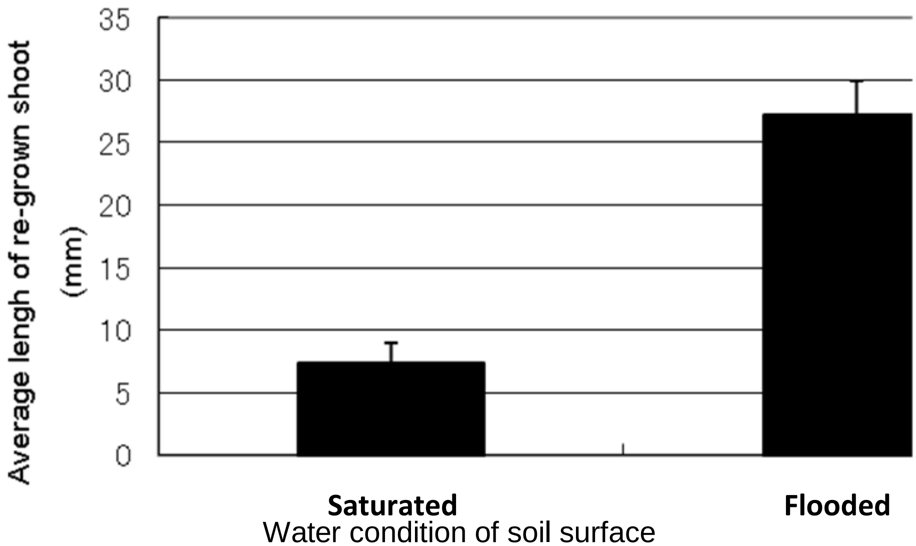

Figure 3. Length of re-grown shoot from stem segment placed on puddled soil (0 cm) under different water conditions at 11 days after placement (Bar indicates S.E.).

Further investigations on size, position and age of segment, and texture, moisture and temperature of soil are needed to establish the effective management measures for Hydrolea in central and northern Luzon Island of the Philippines. In addition, differences in susceptibility to herbicides between seedlings from seeds and re-grown shoots from stem segments in Hydrolea should be investigated.

ACKNOWLEDGRMENT

We gratefully acknowledge the Japan International Cooperation Agency (JICA) for providing an opportunity to conduct this study in the project of development and promotion of local-specific integrated highyielding rice and rice-based technologies. Our appreciation is extended to Dr. M.C. Casimero , the Philippine Rice Research Institute, for her kind and valuable suggestions on this study.

REFERENCES CITED

Fabro, L.E., A.H.M. Ramirez, F.V. Bariuan, E.C. Macatula and R.C.L. Gabriel. 2005. Biology and management of *H. zeylanica* (L.) VAHL. WSSP scientific session, 36th Anniversary and Annual Convention of the Pest Management Council of the Philippines, PhilRice, Munoz, Nueva Ecija.

Harada, J., H. Shibayama and H. Morita. 1996. *Weeds in the Tropics.* (AICAF, Tokyo), pp. 146-147.

Okuma, M., S. Chikura and Y. Moriyama. 1983. Ecology and control of a subspecies of *Paspalum distichum* L. "Chikugo-suzumenohie" growing in creeks in the paddy area on the lower reaches of Chikugo river in Kyushu 3.Ecological investigation on sprouting of stems. Weed Res. Jap. 28(1):31-34 (in Japanese with English summary).

Pancho, J.V. and S.R. Obien. 1995. Manual of Ricefield Weeds in the Philippines. (PhilRice, Nueva Ecija), pp.182-183.

Soerjani, M., A.J.G.H. Kostermans and G. Tjitrosoepomo. 1987. Weeds of Rice in Indonesia. (Balai Pustaka, Jakarta). pp.310-311.