Effect of Fertilizer and Shading on Emergence of *Echinochloa glabrescens*, *Monochoria vaginalis* and *Cyperus difformis*

Kim, Jong Seog*

Echinochloa glabrescens, *Monochoria vaginalis* 및 *Cyperus difformis* 發芽에 미치는 肥料施用과 遮光의 影響

金 鍾 奭*

ABSTRACT

The emergences of *Echinochloa glabrescens*, *Monochoria vaginalis*, and *Cyperus difformis* seeds were little affected by fertilizer application. All shading treaments resulted in decrease in emergence of *E. glabrescens*, while shading up to 67% slightly stimulated emergence of *M. vaginalis* and *C. difformis*. The peak emergence of *E. glabrescens* was at two week after sowing in the full sunlight, 31, and 52% shading, but no peak emergence at the 67% shading.

Emergence peaks of *C. difformis* were observed during 6 to 8 weeks after sowing for all shading levels employed.

Key words : *Shanding*, *Emergence*

INTRODUCTION

The nutrient level of the soil is another major factor that may influence weed germination and dormancy. Of the nutrients, nitrogen seems to be the most important. Fawcett and Slife (1978) found that seeds of *Chenopodium album* harvested from NO_3-treated plots were less dormant than unfertilized plants. This was correlated with NO_3 content in seeds. Increased germination of *Avena fatua* was observed following nitrogen fertilization (Sexsmith and Pittman, 1963). Addition of nitrogen fertilizer acidifies the surface layer of the soil under no-tillage systems (Blevins et al., 1977). However, Blevins et al. (1971) found that the decrease in surface pH resulting from no-tillage systems and nitrogen fertilization can be controlled effectively by liming. Liming increases soil pH which may influence the severity of weed infestations.

Mulches are intended to elevate soil temperature and moisture in the seed zone and suppress emergence of weeds by preventing sunlight from reaching the ground. The microclimate under the mulch depended upon the timing of application and the type of mulches used. Egley (1983) observed that polyethylene mulch for 1 to 4 weeks which used solarization highly reduced the total weed emergence from natural seed population for

* 全州又石大學 農學科 Dept. of Agronomy, Jeonju Woosuk University, Jeonju 565-800, Korea.

the growing season by 64% to 98%. Responso (1983) confirmed that mulching 14 days after corn (*Zea mays* L.) emergence significantly suppressed weed emergence and increased yields compared to the untreated ones.

In this study, the effects of fertilizer and shading on emergence of three weed species were determined under simulated field condition.

MATERIALS AND METHODS

Clay loam soil which was free of *E. glabrescens*, *M. vaginalis* and *C. difformis* was collected from the rice field at University of the Philippines at Los Banos (UPLB). The chemical properties of the soil were pH 7.3, organic matter 0.94%, and total nitrogen 0.09%.

Mature seeds of the three weeds were obtained from the rice field of UPLB in November 1985. The seeds were kept in a laboratory locker after the seeds were airdried, cheaned, and placed in paper bags.

The treatments were set-up in split plot randomized complete block design with three replications. The level of shading consisted of open (0%), 32%, 52%, 67% and azolla covering served as the main treatments; and levels of fertilizer (0, 30, 60, 90 and 60-60-60 kg/ha N, P_2O_5 and K_2O) as subtreatment.

Fish nets were supported by bamboo frames in the form of a dome 1.8m high, 1.5m wide, and 4 m long. C17 fish net reduced solar radiation by 32%, C17 plus B24 fish nets reduced solar radiation by 52%, and three layers of C17 fish nets imposed 67% shading (Table 1).

Table 1. Mean photosynthetic active radiation (PAR) values between 1100 and 1300 hours for the days 16-18 January 1986.

LEVEL OF SHADING	PAR VALUES(microeinsteins $m^{-2}sec^{-1}$)		
	Minimum	Maximum	Mean
Open (0%)	1550	1900	1763
32%	1110	1283	1197
52%	650	1000	853
67%	458	625	580

Photosynthetic active radiation (PAR) in the open and under the shade structure was measured during bright days using LI-190S Ouandtum Sensor.

Fifty seeds of each of the three species were incorporated into the 15cm soil depth in the pots that were flooded 2cm deep then topdressed with fertilizer or inoculated with *Azolla pinnata* R. Br. (Bangkok Collection #15) at 500g fresh weight/m_2

The number of emerged weed were counted every two weeks for 4 months.

RESULTS AND DISCUSSION

The emergence of *E. glabrescens*, *M. vaginalis*, and *C. difformis* seeds was not affected by fertilizer application but affected shading levels as shown in Table 2.

Table 2. Mean average of three weed species as affected by difference in shading during 4 months[a].

LEVEL OF SHADING	EMERGENCE (%) Weed Species		
	Echinochloa glabrescens	*Monochoria vaginalis*	*Cyperus difformis*
Open	21.2 a	1.1 b	1.7 c
32%	14.1 b	3.5 a	2.7 a
52%	8.3 c	3.2 a	2.4 ab
67%	4.1 d	2.7 a	1.9 bc
Azolla	13.7 b	0 c	2.5 a

[a] Means having the same letter are not statistically different at the 5% level.

The effect of shading on emergence of these species was varied depending on weed species. Emergence of *E. glabrescens* was significantly decreased by shading. However, a complete cover of azolla had poor suppression of emergence of *E. glabrescens*. Emergence of *C. difformis* was stimulated by inoculation of azolla. These results indicated that growing azolla in the pots just provided a certain level of shading which is not enough to suppress weed. Janiya and Moody (1985) found that *M. vaginalis* and *E. glabrescens* were all suppressed by azolla at rice flowering. The discrepancy in the results can be explained by the fact that seedlings below the azolla cover

were also counted.

Shading up to 67% slightly stimulated emergence of *M. vaginalis* and *C. difformis*. This behavior suggests that these two species can emerge even during the later part of the cropping period and necessitates another weeding operation.

Emergence pattern of *E. glabrescens*, *M. vaginalis*, and *C. difformis* at different shading levels where 60 kg N/ha were applied is shown on Figure 1. The effects of shading on emergence patterns of these species were varied depending on species. the peak emergence of *E. glabrescens* under full sunlight was at two week after sowing and gradually decreasing until 4 weeks. At 31 and 52% shading, the peak of emergence occurred during the second week but decreased abruptly 2 weeks and later. Shading level of 67% resulted in very poor emergence and low peaks at 2 and 4 weeks and at 10 and 12 weeks after sowing. These observations support the previous result that light is a stimulating factor for the emergence of *E. glabrescens*.

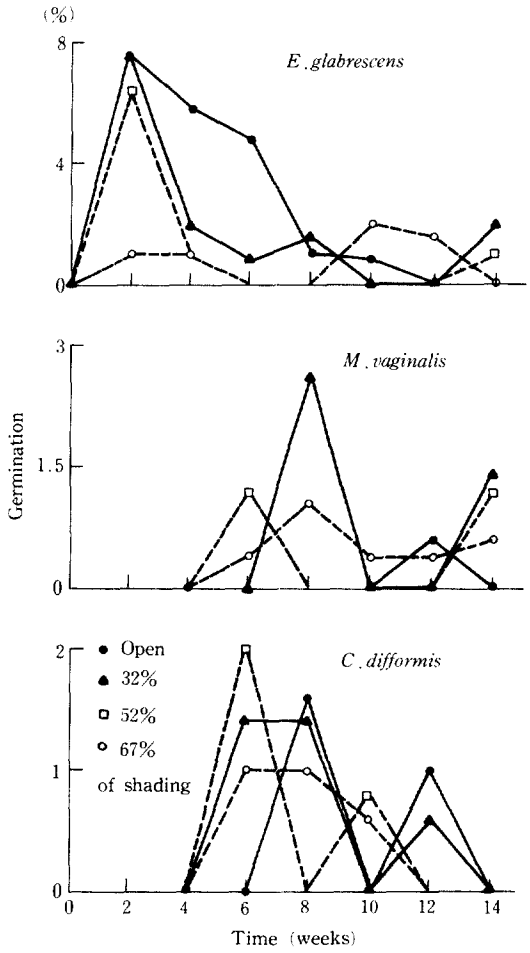

Fig. 1. Emergence pattern of three species as affected by shading during four months at the application of 60 kg/ha N.

The emergence pattern of *M. vaginalis* was not clear at any shading since the number of seedlings was very few. No definite pattern of response to shading can be made out for *M. vaginalis*. For *C. difformis*, emergence peaks were observed between 6 to 8 weeks after sowing for all shading levels. The emergence patterns observed correlate well with actual emergence pattern in the field. The annual grass usually emerges during the first week after crop planting while the sedges and broadleaf weeds emerge later.

摘 要

Edinochloa glabrescens, Monochoria vaginalis, 및 ***Cyperus difformis*** 種子의 發芽에 미치는 肥料施用의 影響은 거의 없었다. 遮光은 ***E. glabrescens*** 의 發芽를 減少시켰지만, 67 %까지의 遮光은 ***M. vaginalis*** 와 ***C. difformis*** 의 發芽를 促進시키는 경향이었다. ***E. glabrescens*** 의 最高發芽點은 無遮光, 31% 및 52 % 遮光條件下에서는 播種 後 2 주에 나타났으나 67 % 遮光條件下에서는 뚜렷치 않았다. ***C. difformis*** 의 最高發芽點은 모든 遮光條件에서 播種 後 6 주에서 8 주 사이에 나타났다.

LITERATURE CITED

1. Blevins, R.L., D. Cook, S.H. Phillips, and R.E. Phillips. 1971. Influence of no-tillage on soil moisture. Agron. J. 63 : 593-596.
2. Blevins, R.L., G.W. Thomas, and P.L. Cornelius. 1977. Influence of no-tillage and nitrogen fertilization on certain soil properties after five years of continuous corn. Agron. J. 69 : 383-386.
3. Egley, G.H. 1983. Weed seed and seedling

reductions by soil solarization with transparent polyethylene sheets. Weed Sci. 31 : 404-409.

4. Fawcett, R.S. and F.W. Slife. 1978. Effects of field application of nitrate on weed seed germination and dormancy. Weed Sci. 26 : 594-596.
5. Janiya, J.D. and K. Moody. 1985. The role of azolla for weed control in transplanted rice. IRRI Saturday seminar, 27 July 1985. Los Banos, Laguna, Philippines.
6. Responso, E.M. 1983. Evaluation of rice straw mulch and other cultural weed control methods in corn (*Zea mays* L.). Philipp. J. Weed Sci. 10 : 48-50.
7. Sexsmith, J.J. and U.J. Pittman. 1963. Effects of nitrogen fertilizers on germination and stand of wild oats. Weed Sci. 11 : 99-101.