IMPACT OF SUPPLEMENTAL UV-B RADIATION ON NUMBER OF TILLERS IN BARLEY (*HORDEUM VULGARE* LINN.)

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Abstract: Sun is the basic source of energy on the planet earth. It emits UV rays along with solar radiation. These UV rays increase the average temperature of the earth and harmful for living beings. Ultraviolet radiation was given by UV lamps. The number of tillers in *Hordeum vulgare* was increased when plants are irradiated with longer duration in comparison to control. In all the observations, the number of tillers was recorded highest in T_3 (2 hour) then T_4 (3 hour) and T_2 (1 hour) treatments. This increase in the number of tillers is helpful in yielding the higher amount of seeds, grains and a good amount of fodder.

Keywords: *Hordeum vulgare* Linn., Tillers, Ultra violet radiation

INTRODUCTION

Barley (*Hordeum vulgare* Linn.) is an annual herb which belongs to family Poaceae. It is used as food, fodder and raw material for beer industries. Sun is the basic source of the energy on the planet earth. Solar radiation consists of several type of ray e.g. Infra red, UV rays and far red rays etc. This radiation is used by the plant in the process of photosynthesis. Photosynthesis is the only process through which energy is utilized by living organisms. Bothmer and Jacobson, (1985) observed that barley is a drought tolerant annual grass updated to a wide variety of the soil moisture, light conditions and elevation. Barnes *et al*., (1988) observed that UV-B can reduce plant growth and yield, reduce plant height and leaf area and increase tillering, changes plant geometry. According to Torabinejad *et al.,* (1998), monocot species were more sensitive to ultraviolet radiation than dicot species. Many studies evaluating the impact of enhanced UV-B on crop yield have been carried out in both field and green house condition by Kakani *et al.,* (2003). Hidema *et al.,* (2004) observed that tiller number, dry mass, grain yield and grain size significantly decreased under elevated UV radiation in rice (*Oryza sativa* L.). Barley is a drought tolerant and industrial annual crop. So in present study it was undertaken to study the effect of supplemental UV radiation on tiller number.

MATERIAL AND METHOD

The present work was done in the Department of Botany, M.M.H. College Ghaziabad. Four fields of 1 x 1 meter square were prepared and nearly 200 seeds were grown in each plot. Supplemental UV-B treatment was given by UV lamps in different plots e.g. T_1 (No treatment or control), T_2 (1 hour treatment), T_3 (2 hour treatment) and T_4 (3 hour treatment) for different time period upto maturity of the plants. The impact of supplemental UV-B radiation was observed on number of tillers at fifteen (15) day interval. Fifteen (15) identical plants were taken carefully. The plants were transported to laboratory and observations were taken on the basis of number of tillers. The mean values of 15 plants were calculated, represented in results with ± standard deviation (S.D.) and test of significance at 5% level.

RESULT AND DISCUSSION

The data in table 1 and fig. 1 revealed that tiller number gets affected with the application of supplemental UV-B radiation. Tiller number in all supplemental UV-B radiations followed the increasing trend with advancement in the age of the crop. No tiller was formed upto 30 day stage of crop growth. At 60 day stage, 80% reduction in tiller number was observed at both 1 hr and 3 hr however promotion was observed 60% at 2 hr supplemental UV-B exposure. Tiller number at 90 day stage of crop growth was increased 186%, 300% and 71% at 1 hr, 2 hr and 3 hr supplemental UV-B exposure respectively. At maturity of the crop, tiller number was promoted 22% at 1 hr and 33% at 2 hr however inhibited 11% at 3 hr supplemental UV-B exposure when compared with control.

Table 1: No. of Tillers in field grown *Hordeum vulgare* under control and supplemental UV-B radiation.

UV-B Irradiance	**CROP AGE IN DAYS**							
Parameters	**15**	**30**	**45**	**60**	**75**	**90**	**105**	**120**
Control	---	---	---	1.00±0.71	1.20±0.45	1.40±0.89	3.80±1.09	5.40±0.89
1 hour	---	---	---	*0.20±0.451.	60±0.55	*4.00±1.22	4.00±1.00	6.60±1.14
2 hour	---	---	---	1.60±0.554	2.00±0.71	*5.60±1.14	3.20±0.84	*7.20±0.84
3 hour	---	---	---	0.20±0.45	1.40±0.89	2.40±0.55	4.60±1.14	4.80±0.45

± = standard deviation**, *** = significant at 5% level.

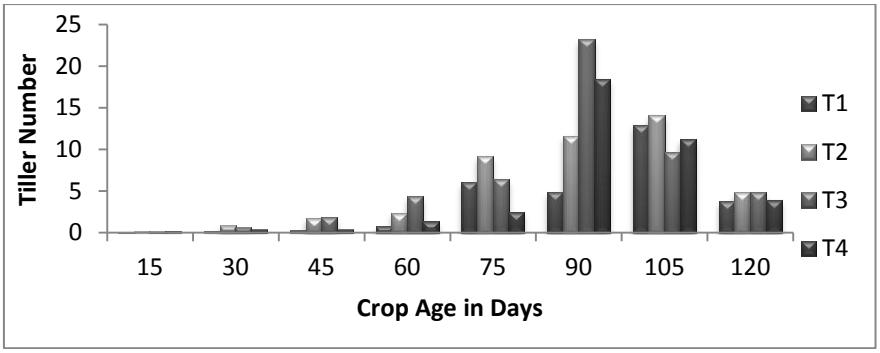

Fig. 1: Effect of supplemental UV-B radiation on tiller number in *Hordeum vulgare* Linn.

In all the observations, the number of tillers was recorded highest in T_3 (2 hour) then T_4 (3 hour) and T_2 (1 hour) when compared with control. The number of tillers in *Hordeum vulgare* was increased when plants were irradiated for longer duration of supplemental UV-B radiation in comparison to control. Increase in number of tillers simultaneously increases the number of ears, flowers and seeds per plant which increase the quantity of grains and fodder. These results are helpful to increase the economic importance of barley plant. Different UV treatment causes a promotary effect on the development of the tillers. The present study revealed that increase in supplemental UV-B radiation is beneficial for barley (*Hordeum vulgare* Linn.) plants. Kanash E.V. *et. al.*, (1991) observed the same results when they work on the barley (*Hordeum vulgare* Linn.) in spring season. However, Hidema *et al.*, (2005) observed the negative impacts of supplemental UV radiation on tillering in rice (*Oryza sativa* L.) plant.

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