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Effect of UV-B Radiation on the Germination of Capsicum Annum Seeds

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Abstract

The advent of depletion of ozone layer with the reported subsequent increase of UV irradiation has led to interest in the effect of UV light on cellular organism.

In this study the effect of UV radiation was observed on the seeds of Capsicum annum with different time interval that mean 1 5 minute, 60 minute and 180 minutes for 60 minute daily. It was found that when UV -B radiation was applied for 15 min. daily, there was an incensement in the percentage of seed germination, the percentage of survival of Seedling and percentage of mortality of Seedling. On the other hand on treatment of UV –B radiation for 180 minute daily, there was a decreasement in percentage of seed germination, percentage of survival of Seedling and percentage of mortality of Seedlings.

Keywords: UV-B Radiation, *Capsicum annum,* Seed Germination, Mortality and Survival.

Introduction

The ozone in the stratosphere between 15 -60 kilometres above the earth filter UV wavelength to hit the Earth's surface selectively. Ozone absorb UV–B light only. UV-B radiation increasing due to depletion of Ozone layer. Harmful effect of UV–B radiation were expressed by Council of scientific affairs (USA) in 1989. Mathew and Skorska in 1996 reported that different species have different response to the level of UV-B radiation. Some studies showed different effect of UV–B radiation in germination of various kind of seeds.

Review of Literature

Smith, H in 1982 observed that the plant growth and development depends on the energy that is derived from the the light.Schmitt, J and R.D. Wulff in 1993 reported that the habitat and ecosystem of plants can very greatly even when there are minor changes in light. The quality and quantity of light are related to the growth and development of plant.

Caldwell, et.al.in 1989 and Sarkar, et.a lin 2011 studied there has been an increase in research concerning the effect of ultraviolet light 100-400 nm on plant growth and development. Peykarestan and Seify in 2012 studied that the percent germination of the the Red Bean seeds was inversely related to UV irradiation doses while Noble in 2002 observed that germination of Kale, Cabbage ,Radish and Agave seeds were spedup due to UV irradiation .Furness,et. al. in 1999 reported that the exposure of UV on plant for a few week decreased plant height ,leaf area, plant dry weight ,an increased auxiliary branching and leaf curling .Siddique, et,al. in 2007 observed that the speed germination decreased with increased supplemental UV-B radiation in Soyabean crop. Krystna zuk-Golazewska, et.al in 2003 studied the effects of different doses of UV–B radiation on Avena fatua and Setaria viridis induced changes in leaf and plant morphology. The irradiation of seeds with high doses of UV light disturb the synthesis of protein reported by Xiuzher in 1994, hormone imbalance by Robie. et. al. in 1996 ,enzyme activity by Stoeva and Bineva in 2001. The morphological, structural and functional changes depend on the strength and duration of of UV radiation stress.

Objective of the Study

To observe the effect of UV-B radiation on the germination of Capsicum annum seeds with different time intervals.

Material and Methods

The germination experiment was conducted at Government P.G. College, Uttarkashi, (Uttarakhand) in the month of January. The seeds of crop were collected from the F.R.I, Dehradoon.The uniform seeds of *Capsicum annum* L. were selected and surface sterilized by absolute ethyl alcohol and then 0.1% mercuric chloride solution of one minute each,

thoroughly rinsed with distilled water. Total 100 seeds of crop were divided into four sets. One set has five petridishes. One set of seeds of crop were soaked in distilled water for 24 hours and then placed on absorbent cotton lined petridishes and treated with UV-B radiation for 15 minute daily, supplied by sun-lamp and filtered with quartz filters. The other third and fourth sets of seeds of crops were prepared in the same manner as above but time of treatment with UV-B light was different. The third and fourth set of seeds of crops were treated with UV-B radiation for 60 min. and 180 min. daily respectively. These sets were supplied with distilled water daily. Daily UV-B radiation supplied to the seeds was about 24.33 J/m^2/sec.

Germination percentage was recorded on the basis of radical emergence as 2mm in length and considered as germinated.

Result and Discussion

Studies for percentage of seed germination, percentage of survival of seeds and percentage of mortality of seedilngs under the influence of UV-B radiation for 15,60 and 180 min. daily for 60 days were carried out in laboratory condition. The results For percentage of seed germination, percentage of survival of seeds and percentage of mortality of seedlings summarized in the form of table 1,2 and 3 respectively. The percentage of seed germination, percentage of survival of seeds and percentage of mortality of seedlings of *Capsicum annum* were recorded 96, 92 and o4 respectively in control where no treatment of UV-B radiation was given. The seeds of crops in one set which was treated withUV-B radiation for 15 min. for 60 days daily, the percentage of seed germination, percentage of survival of seeds and percentage of mortality of seedlings were observed 98, 97 and 01 respectively.The second set of seeds of crop which was treated with UV-B radiation for 60 min for 60 days daily were recorded 95,93 and 02 respectively. The last fourth set of seeds of crops which was treated with UV-B radiation for 180 min. for 60 days daily was found 67, 59 and 08 respectvily.

Table -1

Germination Percentage of Seeds of *Capsicum Annum* on Treatment with Uv-B Radiation at Different Interval of Time

Days	Control	UV-B 15 Min	UV-B 60 Min	UV-B 180 Min
5	-	-	-	-
10	-	5	-	-
15	7	12	9	2
20	45	63	55	29
25	78	84	69	44
30	95	98	93	64
35	96	98	95	67
40	96	98	95	67
45	96	98	95	67
50	96	98	95	67
55	96	98	95	67
60	96	98	95	67

Table -2

Survival Percentage of Seeds of *Capsicum Annum* on Treatment with UV-B Radiation at Different Interval of Time

DAYS	CONTROL	UV-B 15 MIN	UV-B 60 MIN	UV-B 180 MIN
5	-	-	-	-
10	-	5	-	-
15	7	12	9	2
20	34	61	49	22
25	73	82	66	34
30	89	94	88	56
35	91	96	92	59
40	92	97	93	59
45	92	97	93	59
50	92	97	93	59
55	92	97	93	59
60	92	97	93	59

Table -3

Mortalitypercentage of Seedlings of *Capsicum Annum* on Treatment with Uv-B Radiation at Different Interval of Time

Days	Control	UV-B 15 Min	UV-B 60 Min	UV-B 180 Min
5	-	-	-	-
10	-	-	-	-
15	-	-	-	-
20	9	2	6	7
25	3	2	3	10
30	6	4	5	8
35	5	2	3	8
40	4	1	2	8
45	4	1	2	8
50	4	1	2	8
55	4	1	2	8
60	4	1	2	8

Conclusion

It can be concluded from the above study that the percentage of seed germination, percentage of survival of seeds and percentage of mortality was found to increase insignificantly with treatment of UV-B radiation for 15 min. but decreased drastically on treatment with UV-B radiation for a long period that was 180 minute.

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