

Short Communication

Diurnal and monthly UV-B radiation received at Bangalore

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UV-B radiation is a specific portion of electromagnetic spectrum of the solar radiation reaching the earth's surface with wavelength of 280-320 nanometers. The effect of UV-B radiation on crop growth in different plant species has been studied by many investigators and it has negative impact on growth, yield and quality of some crop plants (Teramura *et al.*, 1990). Different plant species respond differently for UV-B radiation. Some are very sensitive and some are least sensitive. The enhanced UV-B radiation has an ill effect of decreasing photosynthesis, plant height and leaf area, dry matter production, yield and reduction of quality in many crops (Tevini *et al.*, 1989). The UV-Biometer is used to measure UV-B radiation and also to know the effectiveness of solar radiation for the induction of sunburn, phytoplankton mortality, skin elastosis and thymine dimmers and also global UV monitoring, especially in conjunction with information about ozone thickness, cloud cover and air pollution. The biological effectiveness of the UV radiation is measured in MED/hr (Minimum Erythema Dose per hour). One MED/hr would cause minimal redness of the average skin after an hour irradiation. The integral of the cross-multiplication of

irradiating flux ($Wcm^{-2} nm^{-1}$) and the Erythema action spectrum gives the effective power (Mckinlay and Diffey 1987) [Note: 1 MED/HR = $5.83 \times 10^{-6} Wcm^{-2} nm^{-1}$].

A study has been initiated during 2004 by the Agrometeorology division (AICRP), University of Agricultural Sciences, Bangalore (altitude 930 m amsl longitude 77°33' E and latitude 12°50' N) to know the diurnal and seasonal variation in total UV-B radiation received at the ground level. UV-Biometer of Model 501 type placed in open air space. The working principle of the instrument is same as that of Robertson-Berger meter. The observations of the radiation were recorded in 250 to 400 nm. The output is an integrated value of continuous 30 minutes and the data was recorded for the entire year 2004 uninterruptedly. Further this has been integrated for 24 hours, monthly and annual to obtain daily, monthly and annual total UV-B radiation at the ground level. The continuous irradiation for more than 2 MED for one hour, the human skin is going to be turned black. Beyond 3 hours skin is going to be burnt as indicated by the WMO (World Meteorological Organization).

Table 1 : Total (MED/hr) UV-B radiation during the year 2004

Months	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
JANUARY	8.95	7.53	8.01	9.64	8.09	7.44	7.00	8.52	8.73	9.47	9.63	9.58	10.04	10.12	10.19	10.40
FEBRUARY	5.61	10.54	11.44	10.06	9.71	9.71	6.76	7.87	10.40	10.51	10.61	12.31	12.07	11.70	11.36	11.36
MARCH	8.76	12.31	11.54	12.70	13.77	13.93	11.77	5.32	6.77	11.96	12.46	12.10	8.64	10.60	8.21	11.64
APRIL	4.48	8.10	13.09	9.03	9.49	6.60	11.02	13.76	12.01	11.26	5.06	10.13	8.64	10.60	8.21	11.64
MAY	11.30	13.73	4.57	6.48	7.08	6.69	8.17	9.17	8.20	12.61	13.36	12.92	11.27	7.57	9.42	10.41
JUNE	7.26	2.09	9.06	9.92	7.02	8.47	9.59	9.40	8.33	8.83	7.55	7.39	1.36	7.44	7.98	08.03
JULY	8.18	6.33	4.43	5.41	8.01	11.20	9.30	8.08	9.03	7.89	7.64	3.90	4.86	7.68	6.83	10.54
AUGUST	7.27	6.73	5.51	4.80	7.83	8.40	6.06	6.80	10.37	8.48	9.82	7.97	4.59	7.25	7.90	05.48
SEPTEMBER	9.13	9.59	6.37	6.77	6.16	5.24	7.22	6.90	4.64	4.64	8.48	8.21	6.53	8.46	6.91	08.15
OCTOBER	3.88	5.98	4.43	4.88	5.35	8.90	8.86	8.79	8.14	8.19	5.93	5.12	5.55	5.33	4.89	00.98
NOVEMBER	5.78	5.71	6.46	4.79	3.42	2.52	4.32	3.40	4.91	5.15	4.75	3.50	4.75	5.23	6.32	05.50
DECEMBER	5.18	0.00	5.01	5.01	5.11	5.41	5.38	4.79	35.08	5.19	5.02	5.27	3.56	4.93	5.30	05.26

Months	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Monthly
JANUARY	10.19	8.42	9.79	10.14	7.69	8.94	8.47	8.17	8.04	7.15	8.80	8.44	9.39	6.99	8.20	272.15
FEBRUARY	11.89	11.24	10.14	4.26	12.09	13.16	13.14	11.92	11.65	12.17	11.31	10.75	5.96	-	-	301.68
MARCH	10.51	12.21	9.68	9.56	9.82	6.31	9.29	8.96	8.95	9.77	9.87	9.36	10.43	7.48	10.60	315.27
APRIL	10.51	12.21	11.63	9.98	7.82	10.49	9.15	9.17	1.61	8.96	9.90	9.98	9.87	8.83	-	283.22
MAY	5.86	8.36	10.44	7.77	10.32	10.63	10.53	9.51	9.23	10.05	8.88	9.17	9.06	0.00	6.89	279.62
JUNE	9.83	7.67	9.03	9.90	10.06	9.71	8.97	9.22	10.00	7.29	8.09	9.17	8.62	62.44	-	299.72
JULY	10.28	10.48	12.06	8.68	8.38	5.21	5.02	6.67	6.18	6.72	7.92	7.66	7.19	7.66	7.00	236.41
AUGUST	10.33	8.23	9.27	6.79	5.32	9.94	7.24	10.57	10.41	9.17	8.04	8.88	7.13	9.04	-	235.79
SEPTEMBER	3.61	9.14	5.75	5.06	7.85	8.65	6.00	52.35	7.63	6.38	6.45	5.21	6.46	9.11	-	253.05
OCTOBER	0.00	4.33	6.70	6.52	6.50	6.17	5.32	7.02	6.11	6.43	6.16	5.77	3.59	3.47	3.01	172.27
NOVEMBER	4.56	5.38	6.25	6.52	6.19	5.77	5.06	5.32	5.75	3.75	3.07	0.00	5.14	5.08	-	144.32
DECEMBER	5.15	5.21	5.08	2.95	1.30	4.16	5.21	5.58	5.45	5.34	5.36	4.75	5.01	5.07	4.04	175.15
Annual total																2968.65

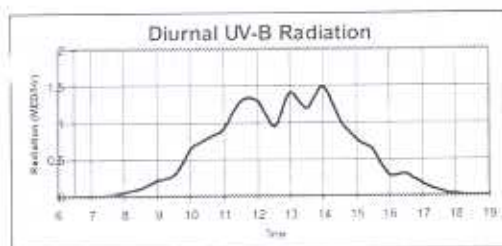


Fig. 1. The diurnal observation of UV-B radiation recorded on 06-3-2004

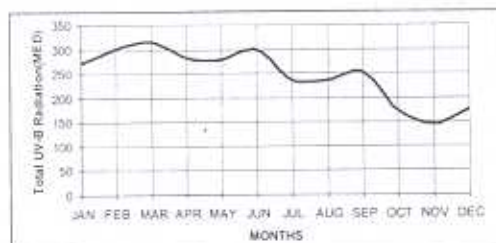


Fig. 2. Integrated monthly values of UV-B radiation recorded during 2004

Total UV-B radiation

The daily, monthly and annual UV-B radiation values are given in table 1. The annual variation of the UV-B radiation is plotted in Fig. 1, it is observed that the maximum UV-B radiation is received between 12.00 noon to 2.00 P.M (during noon) and 6th March 2004 has received the highest daily total UV-B radiation of 13.93 MED during the year. The monthly integrated values indicates that March month has received the highest of 315.27 MED and November month received lowest of 144.32 MED UV-B radiation during the year 2004. Remaining months received the UV-B radiation in between these two values and shown in Fig. 2, The annual total radiation received during the year 2004 is 2968.65 MED, The data recorded at our center indicates that the UV-B radiation is still below the threshold level.

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