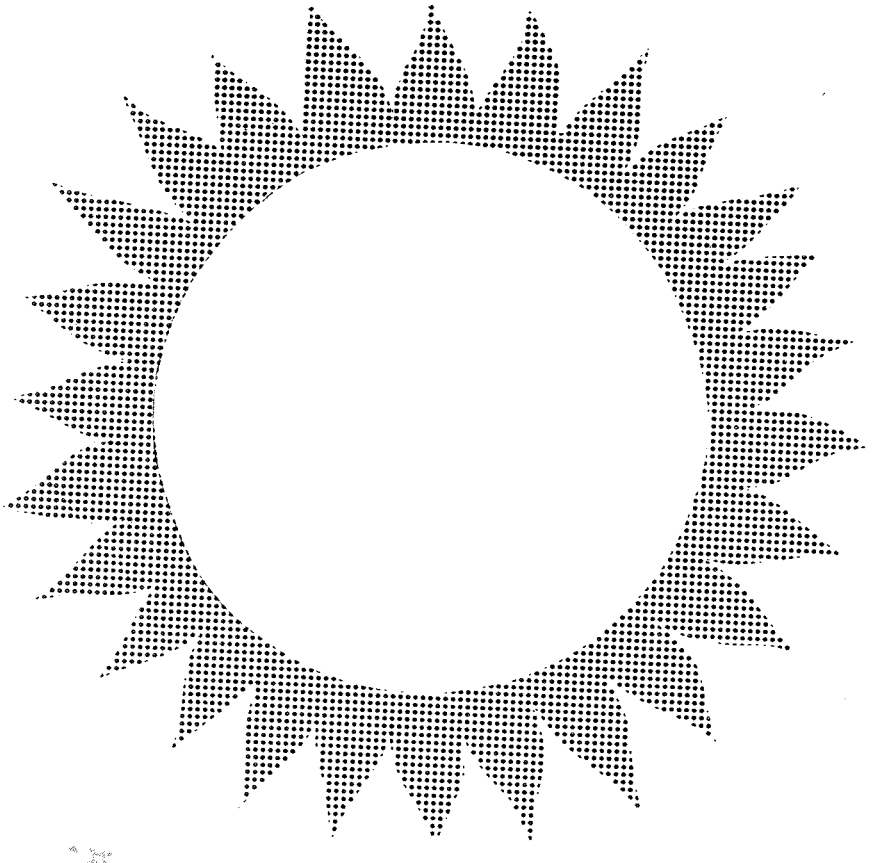
RESEARCH CIRCULAR NO. 22

SOLAR RADIATION



AT GENEVA, NEW YORK
1961 - 1969

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The intensity of solar and sky radiation falling upon a horizontal plane was intercepted by an Epply pyrheliometer and was recorded on a continuous chart potentiometer at Geneva, New York. Geneva has a latitude of 42° 53' North and a longitude of 77° 00' West and an elevation of 750 feet above sea level.

The purpose of this Circular is to present the mean daily amounts of solar radiation and the range between the minimum and maximum amounts of solar radiation during the entire year at Geneva, New York, so that these values may be related to plant responses.

Solar radiation and its effect on the earth are discussed in books edited by Robinson (8) and by Gates (4). Smoothed curves to present values of solar radiation have been used by Crabb (2). Solar radiation has been related to evaporation from a free water surface (3), evapotranspiration (6), and the daily rise in soil temperature at the 2-inch depth (5). Peak air temperature lagged peak solar radiation by nearly 1 month during the growing season (7).

Mean daily values of solar radiation by 10-11 day and monthly periods from 1961 to 1969 are given in Table 1. There was an average of 119 Kg Cal/cm^2/year or an average of 326 g cal/cm^2/day.

Seven-day moving average curves of the mean daily and the maximum and minimum values of solar radiation were obtained by a computer program written by Mrs. G. Loftus for the IBM 360/65 computer (Fig. 1). The curves show the wide range between maximum and minimum values of solar radiation that occurred on any calendar day, especially during the growing season.

The Eppley 50-junction pyrheliometer, Serial No. 1868, purchased in 1948, was found to develop an emf of 7.34 millivolts per g cal/cm^2/min(S). In October 1962 the instrument was recalibrated and found to develop 8.15 millivolts per g cal/cm^2/min (Int.). That same month the instrument was reconditioned, again recalibrated, and found to develop an emf of 6.65 millivolts per g cal/cm^2/min(Int.). From June 14, 1962 to October 31, 1962 an Eppley 50-junction pyrheliometer Serial No. 4088 was used and developed an emf of 8.15 millivolts per g cal/cm^2/min(Int.).

The recording potentiometer was a single-record, fast-speed, strip chart potentiometer with an 11-inch-wide chart adjusted to a full scale of 2.0 g cal/cm^2/min and a chart speed of 2 inches per hour. The potentiometer was set at half of full scale at the emf developed by the Eppley per 1 g cal/cm^2/min. Solar radiation, expressed as gram calories per square centimeter per day, was obtained by adding the readings for each 20-minute period from the chart during the day, in accordance with instructions of the official "Manual of Radiation Observations."

REFERENCES

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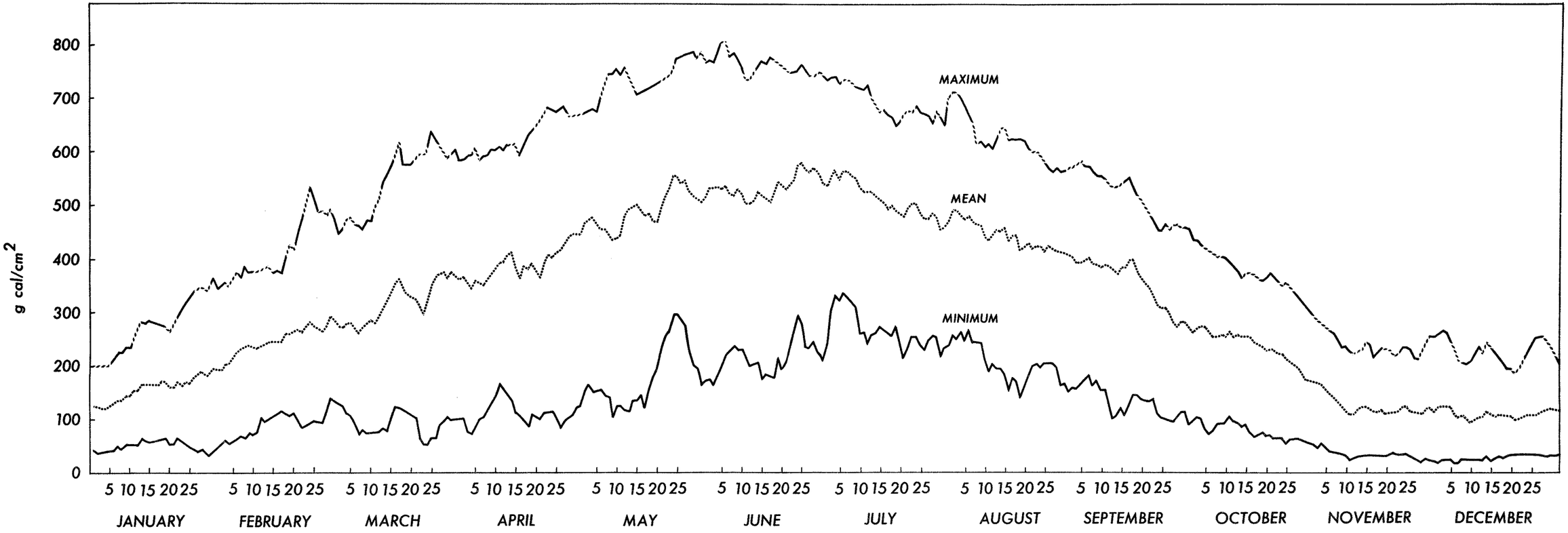

Table 1.--Solar Radiation at Geneva, New York, 1961 to 1969 (mean g cal/cm^2/day)

Date	1961	1962	1963	1964	1965	1966	1967	1968	1969	1961-69
Jan. 1-10	180	125	143	105	109	107	122	146	119	128
11-20	192	217	194	157	142	128	168	148	125	163
21-31	264	174	287	163	164	184	129	120	138	180
Avg.	214	172	211	142	140	141	139	137	128	158
Feb. 1-10	300	210	292	190	149	240	210	172	196	218
11-20	254	268	281	226	226	180	250	267	224	242
21-28	258	215	492	329	190	242	257	289	177	273
Avg.	272	232	345	246	182	212	238	241	201	242
Mar. 1-10	218	421	323	196	211	264	279	279	308	278
11-20	374	335	424	364	330	306	339	256	284	335
21-31	309	428	525	272	312	326	328	323	279	345
Avg.	300	396	427	277	286	300	316	287	290	320
Apr. 1-10	289	426	372	318	404	275	325	359	344	346
11-20	362	403	490	392	252	408	372	514	394	399
21-30	392	587	454	324	382	341	507	376	348	412
Avg.	347	472	439	344	346	341	401	417	362	386
May 1-10	521	504	467	488	459	430	324	424	447	452
11-20	558	691	446	503	539	390	459	318	413	480
21-31	507	682	458	552	488	523	611	413	533	530
Avg.	528	628	457	516	495	450	469	386	466	488
June 1-10	572	654	515	468	500	457	579	545	410	522
11-20	611	477	450	581	493	584	563	453	432	516
21-30	613	601	603	576	571	633	536	417	473	558
Avg.	599	577	523	542	521	558	559	472	438	532
July 1-10	625	666	499	511	578	596	491	504	565	559
11-20	507	534	444	478	556	549	457	507	465	500
21-31	501	481	549	484	460	459	446	562	452	488
Avg.	543	558	499	491	529	532	464	525	493	515
Aug. 1-10	529	442	454	469	374	499	490	486	427	463
11-20	534	494	389	401	419	427	429	458	484	449
21-31	398	531	416	400	355	416	356	407	513	421
Avg.	484	490	420	422	382	446	423	449	476	444
Sept. 1-10	499	383	360	420	319	377	438	369	358	392
11-20	452	357	392	367	252	343	468	430	335	377
21-30	428	225	336	262	286	268	256	305	256	291
Avg.	460	322	362	350	286	330	387	368	316	353
Oct. 1-10	309	235	363	288	177	307	268	223	232	267
11-20	308	281	290	266	252	167	203	290	186	249
21-31	263	172	216	184	172	280	176	162	166	199
Avg.	292	227	287	244	199	252	214	223	194	237
Nov. 1-10	196	161	92	150	190	90	150	119	65	135
11-20	127	163	104	136	124	133	108	81	92	119
21-30	131	168	93	112	92	115	130	70	115	114
Avg.	152	164	96	133	135	113	130	90	91	123
Dec. 1-10	122	181	151	112	87	95	95	86	109	115
11-20	108	183	140	99	60	87	84	92	90	105
21-31	116	210	121	58	101	122	100	95	108	114
Avg.	115	192	137	89	83	102	94	91	102	112