

# SPECIAL REPORT



NEW YORK STATE AGRICULTURAL EXPERIMENT STATION, GENEVA, A DIVISION OF THE NEW YORK STATE COLLEGE OF AGRICULTURE AND LIFE SCIENCES, A STATUTORY COLLEGE OF THE STATE UNIVERSITY, CORNELL UNIVERSITY, ITHACA

NEW YORK STATE AGRIC

## Air Temperature at

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### MEAN AND HOURLY, 1970-1982

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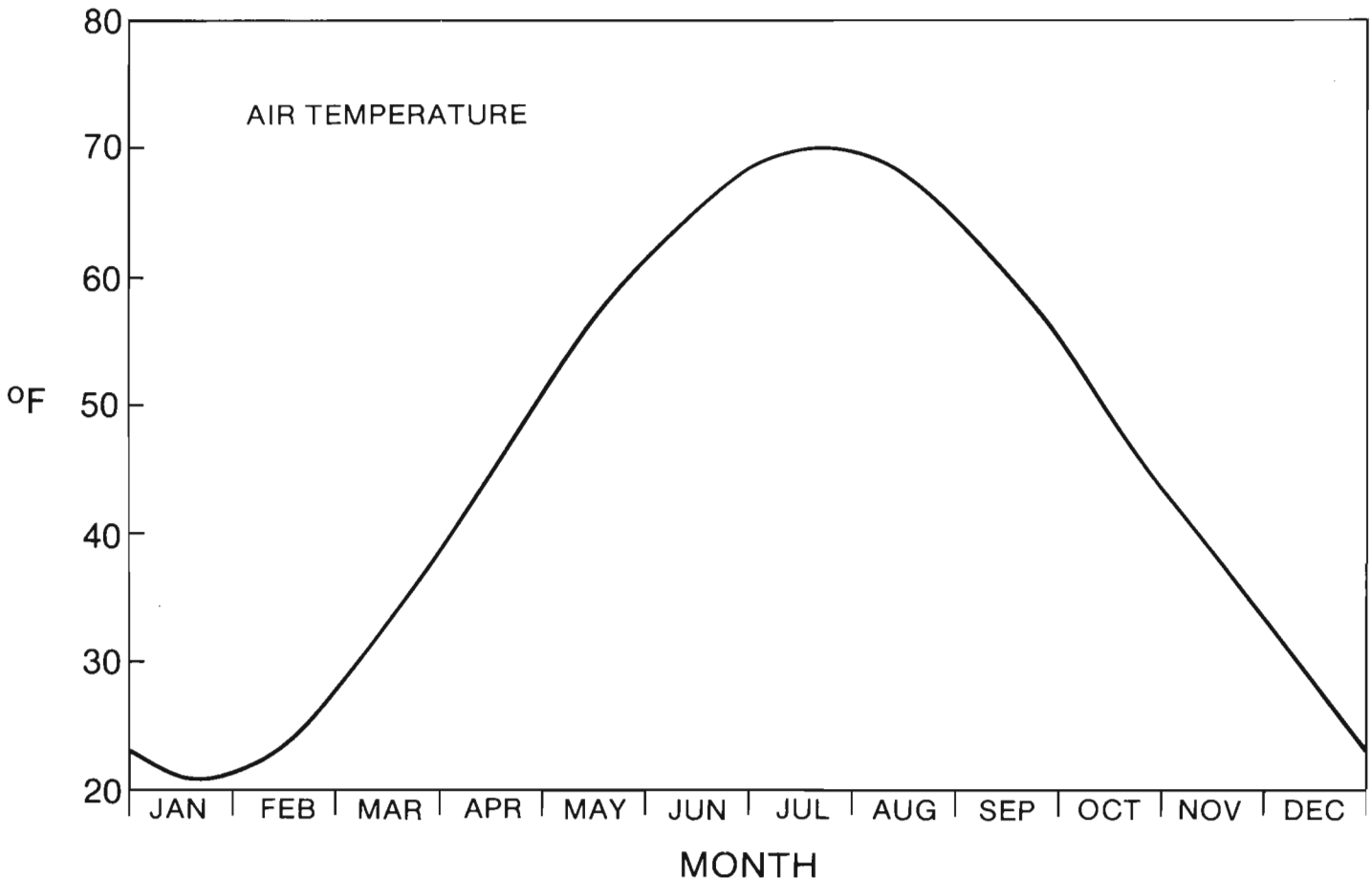


Figure 1. Air temperature at Geneva, New York, 1970-1982.

The temperature of the air is measured at the climatological reference station at the Vegetable Research Farm, New York State Agricultural Experiment Station, Geneva, NY. The weather station is located at latitude 42°51' N, longitude 77°02' W and elevation 718 feet above sea level.

Maximum and minimum temperatures of the air are measured using standard U.S. Weather Bureau maximum and minimum thermometers located 60 inches above a sod surface. The thermometers are mounted in a standard weather bureau instrument shelter. The daily maximum and minimum temperatures are recorded at 8:00 Eastern Standard Time on the calendar date at observation time ending the 24 hour recording interval.

A continuous recording thermograph located in

the same shelter also measures air temperature. Hourly temperatures were read from the charts from the continuous recording thermograph by means of a Summagraphics digitiser connected to a time shared computer (1,3) and recorded on the hour ending the 60 minute recording interval.

#### Tables 1 and 2

In this publication, daily mean temperatures calculated from the means of 24 hourly values per day (Table 1) are compared to daily means calculated from the maximum and minimum values per day (Table 2) for the years 1970-1982. The mean temperature from the hourly values was 46.5 F (Table 1) compared to the mean temperature from the maximum and minimum values which was 46.7 F (Table 2) for 1970-1982. The correlation coefficient between

Table 1. Mean temperature in degrees Fahrenheit (from 24 hourly readings/day) 1970-1982.

MONTH	Year													MEAN
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	
	temperature in degrees Fahrenheit													
Jan	17.6	19.4	25.1	27.5	26.3	27.7	16.9	13.7	20.3	21.7	24.1	17.5	17.2	21.2
Feb	23.7	25.2	21.8	21.9	21.7	26.1	29.2	24.1	16.4	14.4	20.5	32.1	23.9	23.2
Mar	29.8	27.5	28.3	40.8	31.7	28.9	36.5	38.7	27.9	37.3	30.7	34.4	32.4	32.7
Apr	46.6	39.9	39.6	46.2	47.8	37.4	46.4	46.9	41.3	43.5	45.3	47.8	42.9	44.0
May	57.7	53.9	56.7	52.5	53.0	61.4	52.5	58.7	58.0	57.8	59.0	56.4	59.5	56.7
Jun	65.6	66.1	60.9	67.4	65.2	65.0	67.7	62.2	65.2	66.1	61.8	66.3	61.9	64.7
Jul	71.0	67.5	68.5	70.8	70.2	71.5	65.8	69.8	69.3	70.5	70.9	70.1	71.2	69.8
Aug	69.6	65.8	66.2	71.0	68.7	69.0	66.0	65.9	70.0	67.5	70.8	67.6	65.6	68.0
Sep	63.2	63.9	61.3	60.6	58.0	58.2	59.0	60.9	59.4	60.3	62.1	59.3	60.4	60.5
Oct	53.3	55.6	44.9	52.3	46.4	53.0	45.2	47.4	47.9	49.3	46.6	46.1	50.7	49.1
Nov	41.3	36.3	35.0	39.6	38.4	45.9	33.1	42.0	39.2	42.0	35.7	38.4	41.1	39.1
Dec	26.4	31.4	30.4	29.4	30.6	27.8	22.1	26.5	29.6	32.1	23.0	28.7	35.4	28.7
Mean	47.2	46.0	44.9	48.3	46.5	47.7	45.0	46.4	45.4	46.9	45.9	47.1	46.8	46.5

Table 2. Mean degrees Fahrenheit (from daily maximum and minimum) 1970-1982.

MONTH	Year													MEAN
	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	
	temperature in degrees Fahrenheit													
Jan	15.3	18.7	25.1	27.5	25.8	27.7	16.6	13.9	19.4	21.1	24.7	16.2	16.3	20.6
Feb	22.7	24.3	19.7	19.6	20.3	27.1	30.5	24.3	16.3	13.2	20.8	31.1	23.0	22.5
Mar	28.0	28.5	28.5	40.1	31.6	29.9	37.0	38.6	27.8	36.9	30.1	33.9	34.1	32.7
Apr	46.4	41.4	40.2	46.7	47.0	38.1	46.8	46.8	42.0	44.3	45.6	48.6	43.2	44.4
May	57.5	54.5	57.9	52.9	52.9	61.6	53.0	59.5	56.9	56.4	58.5	56.8	59.8	56.8
Jun	64.9	66.1	62.4	68.1	64.1	66.0	67.5	63.5	65.2	65.1	62.1	66.7	62.7	65.0
Jul	70.3	68.4	70.0	71.1	70.0	71.7	67.3	71.2	69.6	70.4	70.6	71.3	71.0	70.2
Aug	70.1	67.1	67.4	71.8	69.0	70.1	66.6	68.0	70.5	67.6	71.6	68.5	65.6	68.8
Sep	62.9	64.7	62.2	61.8	59.0	58.1	59.5	62.0	60.2	61.1	62.5	60.1	61.0	61.2
Oct	53.2	56.3	45.5	53.1	45.9	53.2	45.4	48.4	48.8	50.8	46.8	46.1	50.8	49.6
Nov	41.5	37.9	34.9	40.6	39.4	45.7	34.7	42.3	39.9	43.5	35.9	39.6	42.2	39.9
Dec	26.4	31.9	30.5	29.1	30.1	27.3	21.6	26.7	29.5	32.3	23.2	28.3	35.2	28.6
Mean	46.6	46.6	45.4	48.5	46.3	48.0	45.5	47.1	45.5	46.9	46.0	47.3	47.1	46.7

the 13 year x 12 month values (n=156) for the mean monthly temperatures from the hourly values (Table 1) correlated with the mean monthly values from the maximum and minimum values (Table 2) has an R-squared = 99.8 per cent.

**Table 3**

The distributions of mean number of hours per month within 10 F intervals are given in Table 3. The temperature intervals with the greatest number of hours (underlined in Table 3) ranges from 233.9 hours within the 11 F to 20 F interval in January to a high of 323.3 hours within the 61 F to 70 F interval in August. Note that December had the widest range in temperatures from a cold -19 F to -10 F interval to a warm 71 F to 80 F interval with the greatest number of hours in the 21 F to 30 F interval. The narrowest ranges in temperature were in July and August, from the 41 F to 50 F interval to the 91 F to 100 F interval.

**Table 4**

The mean temperatures within 24 hourly intervals or the daily cycles of temperature are given in Table 4. These daily cycles of temperature may be used as

a guide for adjusting temperature under artificial conditions in plant growth chambers in order to simulate the mean temperatures under outdoor conditions for studying the plants' responses to environmental conditions. For example, the mean daily July temperature cycle has a low of 62 F at 4:00 hour and a high of 78 F at 15:00 and 16:00 hours (Table 4). However, the distribution of temperatures for July ranged from a mean of 2.7 hours in the 41 F to 50 F interval to 2.2 hours in the 91 F to 100 F interval (Table 3).

The daily cycles for hourly solar radiation were presented in a publication including the same years 1970-1982 (2). These solar radiation values may be used as a guide for adjusting light under artificial conditions to simulate the outdoor conditions for any month of the year.

**SUMMARY**

These mean and hourly temperatures plus the solar and diffuse radiation data (2) represent time distributions (both daily and yearly cycles) of

**Table 3. Temperature within 10 degree intervals, 1970-1982.**

MONTH	temperature in degrees Fahrenheit											
	-19	-9	1	11	21	31	41	51	61	71	81	91
	to	to	to	to	to	to	to	to	to	to	to	to
	-10	0	10	20	30	40	50	60	70	80	90	100
	mean number of hours per month within each interval											
Jan	0.5	22.7	112.2	<u>233.9</u>	202.2	141.6	27.5	3.2	0.3	0.0	0.0	0.0
Feb	0.7	14.6	82.2	188.1	<u>202.2</u>	145.8	35.8	7.7	0.6	0.0	0.0	0.0
Mar	0.0	0.7	9.8	83.5	228.1	<u>262.8</u>	108.6	39.8	9.0	1.3	0.4	0.0
Apr	0.0	0.0	0.0	9.2	80.4	215.3	<u>218.8</u>	124.5	50.5	19.5	1.7	0.0
May	0.0	0.0	0.0	0.0	1.8	40.2	185.2	<u>250.3</u>	183.1	67.2	16.3	0.0
Jun	0.0	0.0	0.0	0.0	0.0	1.4	39.2	199.5	<u>293.1</u>	148.5	38.4	0.0
Jul	0.0	0.0	0.0	0.0	0.0	0.0	2.7	104.8	<u>302.2</u>	243.6	88.5	2.2
Aug	0.0	0.0	0.0	0.0	0.0	0.0	14.5	124.4	<u>323.3</u>	224.2	56.5	1.0
Sep	0.0	0.0	0.0	0.0	0.0	8.0	84.5	<u>280.5</u>	243.1	86.5	17.2	0.1
Oct	0.0	0.0	0.0	0.0	12.1	139.5	<u>276.6</u>	212.7	91.2	11.4	0.5	0.0
Nov	0.0	0.0	0.5	13.0	131.0	<u>287.0</u>	188.1	80.0	19.3	1.1	0.0	0.0
Dec	0.2	1.2	25.9	127.2	<u>271.0</u>	234.0	61.7	20.0	2.6	0.1	0.0	0.0
<b>Total</b>	<b>1.5</b>	<b>39.2</b>	<b>230.5</b>	<b>655.0</b>	<b>1128.6</b>	<b>1475.7</b>	<b>1243.2</b>	<b>1447.4</b>	<b>1518.3</b>	<b>803.4</b>	<b>219.5</b>	<b>3.2</b>

**Table 4. Mean degrees Fahrenheit within 24 intervals, 1970-1982.**

Month	Hourly intervals ending at																								
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
Jan	20	20	20	19	19	19	19	20	21	22	23	24	25	24	24	23	22	21	21	21	20	20	20	20	20
Feb	21	21	21	21	20	20	20	21	23	25	26	27	28	28	27	26	25	24	23	22	22	22	22	22	22
Mar	30	29	29	29	29	30	31	33	35	36	37	37	38	37	37	36	34	33	32	32	31	31	30	30	
Apr	39	39	39	38	38	39	41	43	45	47	48	49	50	51	51	50	49	47	45	43	42	42	41	40	
May	51	51	50	49	50	51	54	56	58	60	62	63	63	64	64	63	63	61	59	56	55	54	53	52	
Jun	59	58	58	58	58	60	62	65	66	68	70	71	72	72	72	71	71	69	67	64	62	61	60	60	
Jul	64	63	63	62	63	64	67	70	72	74	75	76	77	78	78	77	76	74	72	70	67	66	65	64	
Aug	62	62	62	61	61	63	65	68	70	72	74	75	76	76	76	75	74	71	68	66	65	64	63	63	
Sep	56	56	56	55	55	56	58	60	62	64	66	67	68	68	67	66	64	62	60	59	58	57	57	56	
Oct	46	46	45	45	45	45	46	48	50	52	53	54	55	55	55	54	52	50	49	48	47	47	46	46	
Nov	37	37	37	37	37	37	37	38	40	41	42	43	43	43	42	41	40	39	39	38	38	37	37	37	
Dec	28	28	27	27	27	27	27	28	29	30	31	31	31	31	31	30	29	29	28	28	28	28	28	28	

Isopleths at 20, 30, 40, 50, 60 and 70° F.

temperature and energy at Geneva, NY. These data may be used for planning physical structures in relation to the temperature and solar radiation and for relationships to biological processes in plants.

**LITERATURE CITED**

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