

GREENHOUSE CLIMATOLOGICAL SUMMARIES

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The computing system at CSU now provides data in a fashion that requires minimum effort to put into a publishable form. Of course, Fort Collins is not Denver or Colorado Springs, and, as we well know, conditions along the Front Range can vary radically. However, we thought we might try it for a few issues to see if you think it may be of use.

Some of the units are different from what you are used to, but, we think, more valid for use in the future as new technology is implemented into commercial ranges. We think it is in a form that will be useful and interesting to commercial growers in Colorado. Comments will be welcomed.

FORT COLLINS GREENHOUSE CLIMATOLOGICAL SUMMARY FOR FIVE WEEKS, BEGINNING SEPTEMBER 29, 1985, AND ENDING NOVEMBER 2, 1985.¹ (See table footnotes for table heading explanations.)

| | Week beginning: | | | | | | | | | |
|---|-----------------|-------|--------|-------|---------|-------|---------|-------|---------|-------|
| | Sept. 29 | | Oct. 6 | | Oct. 13 | | Oct. 20 | | Oct. 27 | |
| | Day | Night | Day | Night | Day | Night | Day | Night | Day | Night |
| Average outside temperature (°F) ² | 48.3 | 35.2 | 50.1 | 40.1 | 52.3 | 41.2 | 60.6 | 47.1 | 53.4 | 43.3 |
| Maximum outside temperature (°F) | 74.3 | 55.4 | 73.4 | 58.1 | 68.9 | 56.3 | 74.3 | 61.7 | 75.2 | 63.5 |
| Minimum outside temperature (°F) | 23.9 | 18.5 | 25.7 | 25.7 | 32.0 | 27.5 | 42.8 | 30.2 | 35.6 | 28.4 |
| Degree-Days of heating ³ | 117 | 208 | 105 | 174 | 89 | 167 | 31 | 125 | 81 | 152 |
| Average hours in the period ⁴ | 10.4 | 13.6 | 9.0 | 14.7 | 10.6 | 14.1 | 9.8 | 16.1 | 9.2 | 14.6 |
| Accumulated, total solar ⁵ radiation (MJ/sq.m.) | 103.8 | 0.7 | 104.5 | 1.2 | 65.4 | 1.3 | 31.0 | 0.6 | 69.6 | 0.9 |
| Average relative humidity (%) ⁶ | 45.2 | 69.8 | 63.7 | 79.6 | 53.4 | 73.9 | 33.5 | 53.4 | 46.1 | 63.4 |
| Maximum relative humidity (%) | 91.5 | 100.0 | 100.0 | 100.0 | 75.0 | 100.0 | 74.3 | 92.6 | 87.3 | 94.4 |
| Minimum relative humidity (%) | 29.8 | 28.2 | 23.8 | 33.9 | 23.1 | 43.9 | 11.7 | 12.1 | 21.7 | 30.9 |
| Average absolute vapor pressure (mb) ⁷ | 5.2 | 4.9 | 7.8 | 6.7 | 7.1 | 6.4 | 6.1 | 5.9 | 6.4 | 6.0 |
| Average wind speed (mph) | 3.7 | 1.6 | 2.5 | 0.9 | 1.8 | 0.9 | 3.1 | 1.1 | 2.4 | 1.1 |
| Maximum wind speed (mph) | 34.7 | 17.0 | 26.7 | 14.1 | 10.3 | 19.0 | 34.3 | 22.4 | 26.0 | 29.3 |
| Average CO ₂ concentration (Pascal) ⁸ | 24.4 | | 19.9 | | 20.1 | | 20.5 | | 20.9 | |
| Maximum CO ₂ concentration (Pascal) | 26.9 | | 25.3 | | 27.2 | | 27.7 | | 25.1 | |

¹Instrumentation for outside measurements is located about 4 meters (13 ft) above the ground. Temperature and humidity probes are located in an aspirated, shielded enclosure.

²Computer system at CSU executes once every minute, accumulates the value and selects maximums and minimums. Average is the accumulation divided by the number of executions of the system for the day or night period.

³The Weather Bureau ordinarily averages maximum and minimum temperatures for a 24-hour period and subtracts from 65°F to obtain Degree-Days. In this table, the average temperature is subtracted from 65°F and multiplied by 7 to obtain Degree-Days for the week for each day or night period.

⁴Average number of hours when the system was at day or night settings. The system switches to day settings when the outside radiation reaches 70 watts per sq. meter, and returns to night settings at an outside radiation level of 10 watts per sq. meter. (1 watt = 1 Joule per second. There are 60 Joules in 1 watt-minute, 3600 Joules in 1 watt-hour.)

⁵Units are in MegaJoules per square meter, accumulated for the week. One square meter = 10.8 square feet. System uses a glass-covered, silicon cell pyranometer to measure solar radiation. One MegaJoule is one million Joules.

⁶Percent relative humidity treated in the same manner as outside temperature.

⁷Vapor pressure in millibars = vapor pressure at saturation at the average temperature times relative humidity.

⁸Absolute CO₂ concentration in Pascals (unit of pressure). Barometric pressure at Ft. Collins taken as 846.6 millibars. At 25°C, CO₂ concentration for 335 ppm is 26.6 Pascals and, at sea level, 33.9 Pascals. The system does not analyze for CO₂ at night, being set automatically to zero at switchover to night settings.

Some comparisons of fuel prices for 1983, first month of last quarter in the industrial sector. From International Energy Prices, Department of Energy, Energy Information Administration, DOE/EIA-0424 (83), Superintendent of Documents, Washington, D.C. (U.S. dollars)

| Country | Diesel Fuel Tax (gallon) | | Gasoline Tax (gallon) | | Light Fuel Oil Tax (gallon) | | Heavy Fuel Oil Tax (barrel) | | Natural Gas Tax (CCF) | | Electricity Tax (KW-HR) | | Steam Coal Tax (short ton) | |
|----------------|--------------------------|-----|-----------------------|------|-----------------------------|-----|-----------------------------|------|-----------------------|-----|-------------------------|------|----------------------------|------|
| United States | 1.15 | .21 | 1.26 | .21* | .89 | NA | 27.26 | NA | 4.22 | NA | .05 | NA | 39.12 | NA |
| Canada | NA | NA | 1.52 | .41* | 1.03 | NA | 37.97 | 0 | 2.92 | .25 | .026 | NA | 48.34 | NA |
| France | 1.45 | .46 | 2.30 | 1.24 | 1.02 | .08 | 28.14 | .97 | 4.12 | 0 | .047 | NA | 67.62 | NA |
| West Germany | 1.60 | .62 | 2.01 | .97 | .90 | .02 | 28.14 | .84 | NA | NA | .049 | NA | 94.53 | 0 |
| Italy | 1.20 | .22 | 2.71 | 1.69 | 1.12 | .22 | 26.15 | .09 | 4.43 | 0 | .055 | NA | NA | NA |
| United Kingdom | 1.79 | .77 | 2.25 | 1.20 | .89 | .04 | 29.14 | 1.74 | 3.41 | 0 | .043 | 0 | 68.29 | 0 |
| Sweden | 1.25 | .19 | 2.04 | .82 | 1.08 | .19 | 37.81 | 8.14 | NA | NA | .028 | .005 | 43.77 | 1.37 |
| Netherlands | 1.22 | .25 | 2.24 | 1.27 | NA | NA | 28.65 | .56 | NA | NA | .047 | 0 | NA | NA |
| Japan | NA | NA | 2.43 | .88 | 1.74 | NA | 42.38 | NA | 11.02 | .10 | .092 | .003 | 47.01 | 0 |

NA = not available

* = unleaded, regular gasoline

Some comparisons of fuel prices for 1983, first month of last quarter, in the household sector. From International Energy Prices, Department of Energy, Energy Information Administration, DOE/EIA-0424 (83), Superintendent of Documents, Washington, D.C. (U.S. dollars)

| Country | Light Fuel Oil Tax (gallon) | | Natural Gas Tax (CCF) | | Electricity Tax (KW-HR) | | Residential Coal Tax (short ton) | |
|----------------|-----------------------------|-----|-----------------------|------|-------------------------|------|----------------------------------|-------|
| United States | 1.06 | NA | 6.08 | NA | .075 | NA | NA | NA |
| Canada | 1.02 | 0 | 4.45 | .25 | .036 | NA | NA | NA |
| France | 1.20 | .26 | 8.81 | 1.38 | .090 | NA | 223.45 | NA |
| West Germany | 1.03 | .15 | NA | NA | .094 | .017 | 219.56 | 25.26 |
| Italy | 1.29 | .39 | 7.17 | 1.00 | .068 | NA | 143.70 | 10.61 |
| United Kingdom | 1.07 | .04 | 5.20 | 0 | .073 | 0 | 116.84 | 0 |
| Sweden | 1.10 | .19 | NA | NA | .049 | .005 | 118.59 | 1.37 |
| Netherlands | 1.10 | .21 | 6.36 | .98 | NA | NA | NA | NA |
| Japan | 1.49 | 0 | 15.61 | .10 | .126 | .005 | NA | NA |

NA = not available