

2004 WEATHER REPORT

Erik B. G. Feibert and Clinton C. Shock
Malheur Experiment Station
Oregon State University
Ontario, OR

Introduction

Air temperature and precipitation have been recorded daily at the Malheur Experiment Station since July 20, 1942. Installation of additional equipment in 1948 allowed for evaporation and wind measurements. A soil thermometer at 4-inch depth was added in 1967. A biophenometer, to monitor degree days, and pyranometers, to monitor total solar and photosynthetically active radiation, were added in 1985.

Since 1962, the Malheur Experiment Station has participated in the Cooperative Weather Station system of the National Weather Service. The daily readings from the station are reported to the National Weather Service forecast office in Boise, Idaho.

Starting in June 1997, the daily weather data and the monthly weather summaries have been posted on the Malheur Experiment Station web site on the internet at www.cropinfo.net.

On June 1, 1992, in cooperation with the U.S. Department of the Interior, Bureau of Reclamation, a fully automated weather station, linked by satellite to the Northwest Cooperative Agricultural Weather Network (AgriMet) computer in Boise, Idaho, began transmitting data from Malheur Experiment Station. The automated station continually monitors air temperature, relative humidity, dew point temperature, precipitation, wind run, wind speed, wind direction, solar radiation, and soil temperature at 8-inch and 20-inch depths. Data are transmitted via satellite to the Boise computer every 4 hours and are used to calculate daily Malheur County crop water-use estimates. The AgriMet database can be accessed through the internet at www.usbr.gov/pn/agrimet and is linked to the Malheur Experiment Station web page at www.cropinfo.net.

Methods

The ground under and around the weather stations was bare until October 17, 1997, when it was covered with turfgrass. The grass is irrigated with subsurface drip irrigation. The weather data are recorded each day at 8:00 a.m. Consequently, the data in the tables of daily observations refer to the previous 24 hours.

Evaporation is measured from April through October as inches of water evaporated from a standard 10-inch-deep by 4-ft-diameter pan over 24 hours. Evapotranspiration (ET_c) for each crop is calculated by the AgriMet computer using data from the AgriMet weather station and the Kimberly-Penman equation (Wright 1982). Reference evapotranspiration (ET₀) is calculated for a theoretical 12- to 20-inch-tall crop of alfalfa assuming full cover for the whole season. Evapotranspiration for all crops is calculated using ET₀ and crop coefficients for each crop. These crop coefficients vary throughout the growing season based on the plant growth stage. The crop coefficients are tied to the plant growth stage by three dates: start, full cover, and termination dates. Start dates are the beginning of vegetative growth in the

spring for perennial crops or the emergence date for row crops. Full cover dates are typically when plants reach full foliage. Termination dates are defined by harvest, frost, or dormancy. Alfalfa mean ETc is calculated for an alfalfa crop assuming a 15 percent reduction to account for cuttings.

Wind run is measured as total wind movement in miles over 24 hours at 24 inches above the ground. Weather data averages in the tables refer to the years preceding and up to, but not including, the current year.

2004 Weather

The total precipitation for 2004 (11.98 inches) was higher than the 10-year (10.19 inches) and 60-year (10.16 inches) averages (Table 1). Precipitation in October was about three times the 10-year and 60-year averages. Total snowfall for 2004 (24 inches) was higher than the 10-year (14.0 inches) and 61-year averages (18.2 inches) (Table 2).

The highest temperature for 2004 was 104°F on July 18 (Table 3). The lowest temperature for the year was -1°F on January 5. The average maximum and minimum air temperatures for March were substantially higher than the 10-year and 60-year averages. March 31 reached 80°F.

March had the highest number of growing degree days (50° to 86°F) for that month since 1986, when measurements were started (Table 4, Fig. 1). The total number of degree days in the above-optimal range in 2004 was close to the average (Table 5).

The months of May through December had total wind runs lower than the 10-year average (Table 6). Total pan-evaporation for 2004 was close to the 10-year and 56-year averages (Table 7). Total accumulated ETc for all crops in 2004 was close to the 10-year average (Table 8).

The average monthly maximum and minimum 4-inch soil temperatures in 2004 were close to the 10-year and 37-year averages (Table 9).

The last spring frost ([32°F) occurred on April 16, 13 days earlier than the 28-year average date of April 29; the first fall frost occurred on October 24, 19 days later than the 28-year average date of October 5 (Table 10). The 191 frost-free days was the longest frost-free period over the last 14 years.

No other weather records were broken in 2004 (Table 11).

References

Wright, J.L. 1982. New evapotranspiration crop coefficients. J. Irrig. Drain. Div., ASCE 108:57-74.

Table 1. Monthly precipitation at the Malheur Experiment Station, Oregon State University, Ontario, OR, 1991-2004.

Table 2. Annual snowfall totals at the Malheur Experiment Station, Oregon State University, Ontario, OR, 1991-2004.

Table 3. Monthly air temperature, Malheur Experiment Station, Oregon State University, Ontario, OR, 2004.

Figure 1. Cumulative growing degree days (50-86°F) over time for selected years compared to 14-year average, Malheur Experiment Station, Oregon State University, Ontario, OR.

Table 4. Monthly total growing degree days (50-86°F), Malheur Experiment Station, Oregon State University, Ontario, OR, 1991-2004.

Table 5. Monthly total degree days in the above-ideal (86 -104°F) range, Malheur Experiment Station, Oregon State University, Ontario, OR, 1991-2004.

Table 6. Wind-run daily totals and monthly totals, Malheur Experiment Station, Oregon State University, Ontario, OR, 2004.

Table 7. Pan-evaporation totals, Malheur Experiment Station, Oregon State University, Ontario, OR, 2004.

Table 8. Total accumulated reference evapotranspiration (ET₀) and crop evapotranspiration (ET_c) (acre-inches/acre), Malheur Experiment Station, Oregon State University, Ontario, OR, 1992-2004.

Table 9. Monthly soil temperature at 4-inch depth, Malheur Experiment Station, Oregon State University, Ontario, OR, 2004.

Table 10. Last and first frost ([32°F) dates and number of frost-free days, Malheur Experiment Station, Oregon State University, Ontario, OR, 1990-2004.

Table 11. Record weather events at the Malheur Experiment Station, Oregon State University, Ontario, OR.