temperature 10°, securing, at our suggestion, the smallest type of heater obtainable. Eighty of these were placed to the acre. During the frost season he called in person at the Weather Bureau office every time frost warnings were issued. Consequently, while his orchard was completely isolated and surrounded by bare prairie, with the additional handicap of being in the coldest spot in the entire valley on that night, he successfully fought the freeze of April 19 with 80 per cent of his heaters in action. Three days later we personally inspected his orchard at his request, and found no damaged peaches.

It always had been taken for granted that peaches could not be protected in this district, but when this man not only saved the crop but did it under two heavy handicaps, he proved beyond argument that every peach and apple in the valley could have been saved. Consequently, those who lost are preparing to double the number of heaters in their orchards, or, where unable to do this immediately, to concentrate their heaters upon a much smaller acreage. Instead of receiving a blow, orchard heating here has received an impetus. Even in the Grande Valley, with which this station is not concerned, orchardists, hearing of Doctor Crile's remarkable performance, are preparing to protect their extensive pear orchards next spring.

Orchard heaters and thermometers.—Small heaters were shown to be decidedly more effective, cost for cost, than large ones. "Small heaters and plenty of them" is the advice given by the veterans to the beginners. An ideal orchard heating system would be one that warmed a continuous layer of air next to the ground. "Small heaters and pelnty of them" comes nearest to the ideal condition. One orchardist, who has saved a full crop of apples each spring for the last 12 years, declared that, while he is using the smallest, lowest heater obtainable, he would discard his entire equipment if he could secure a heater that is still smaller or lower.

At the suggestion of the writer, seconded by the county agricultural agent, a number of fruit growers last spring tried the experiment of placing the heaters directly under the trees. The results were so gratifying that in the future nearly all the orchards equipped with small, low heaters will be protected in this way. Portions of lower branches that were completely blackened with smoke suffered no damage and bore unblemished fruit

The local farm bureau organization is preparing to publish working drawings of one of our model instrument shelters and distribute them to all fruit growers in the district.

A CLIMATOLOGICAL CALENDAR FOR COLUMBIA, MO.[1]

By GEORGE REEDER, Meteorologist.

The writer has compiled the mean minimum temperature for Columbia, Mo., for each day of the year for use in class work and as forming the basis of short informal talks before commercial clubs and organizations. He has found so many interesting and instructive applications of these data that it seems desirable to outline the plan followed in the belief that his fellow workers will be benefited thereby.

The minimum temperature was chosen since it is largely the controlling factor in the vegetable world. After computing the means for the 32 years of record, they were assembled in groups. In forming the groups all temperatures within a range of 5° were put in the same group, thus all values between 15° and 20° were put in one group, all those between 21° and 25° in the next and so on up to the highest group which has a mean of 65.7°. As illustrating the time limits and the mean values of the different groups the table below is given:

TABLE 1.—*Mean minimum temperature, Columbia, Mo., by groups of significant dates.*

Inclusive dates.	Mean temperature.	Significant dates.
Feb. 11–22	22.4	The beginning of the annual upward march.
Feb. 23–Mar. 7	26.1	
Mar. 8–17	31.3	Mean minimum, Mar. 13, 33°; time to sow oats.
Mar. 18–22	35.0	
Mar. 23–Apr. 4	37.9	Mean minimum, Mar. 25, 38°; time to plant Irish potatoes.
Apr. 5–17	41.4	Mean minimum, Apr. 15, 42°; corn planting begins; Apr. 21, peaches and apples in blossom.
Apr. 18–May 2	47.5	
May 3–18	51.3	
May 19–June 2	57.2	
June 3–23	63.2	June 3, mean minimum, 60°; summer begins.
June 24–Aug. 20	65.7	July 9–11, three consecutive cooler nights; July 13–17, 5 consecutive warm nights.
Aug. 21–Sept. 11	61.0	Corresponds with period June 3–23, but in reverse order.
Sept. 12–25	56.4	
Sept. 26–Oct. 5	51.7	Time to sow winter wheat.
Oct. 6–18	46.8	
Oct. 19–26	42.5	
Oct. 27–Nov. 10	38.1	
Nov. 11–27	31.8	
Nov. 28–Dec. 11	26.4	
Dec. 12–Jan. 29	21.6	Jan. 12–13, two coldest days of winter; mean minimum, 14° and 16°, respectively.
Jan. 30–Feb. 10	17.8	The coldest 12-day period.

After assembling the daily means in groups and computing the group means it was found that the period from January 30 to February 10, inclusive, gave the lowest group mean, viz. 17.8°. That period therefore served as the starting point for the upward march of the group means. The date February 11 has therefore received the initial number in the consecutive series of 366 days.

Many interesting facts can be drawn from the series of means, as, for example, the dates of planting staple garden vegetables, the sowing of grains, etc. Other interesting features from a climatological standpoint are the lowest daily means for five consecutive days—the time of the greatest consecutive severe cold of the winter falls on February 1 to 5, although the absolute minimum for the year falls on January 12. A week later, January 19–23, is the date of the so-called "January thaw," during which time the mean minimum rises to 28° on January 20, immediately dropping to 23° on the 21st. Is there any relation between these two events? Many other interesting comparisons may be made.

[1] Condensed from the original manuscript.