

## **I Climate data for the growing season 2018/2019**

*Helene Saltoft Kristjansen*

This chapter describes the overall weather conditions in Denmark during the growing season (September 2018–August 2019) and, in particular, in Flakkebjerg where the majority of the Aarhus University (AU) trials were located.

### **General weather conditions in Denmark**

In September, the rainfall was unevenly distributed across the country. Central and Western Jutland received a significant amount of rain and experienced several cloudbursts. The eastern parts of the country had far less rain. The average precipitation in September exceeded the normal precipitation by 11%. Both October and November had less precipitation than normal, 47 and 34 mm respectively, which was 48% below normal. Autumn temperatures reached an average of 10.1°C, which was 1.3°C above normal (1961-90).

The winter was warm and dry. The average temperature during the winter was 3.5°C, which was 2.9°C above normal. In general, precipitation exceeded the normal precipitation (1961-90) but compared with a 10-year average (2006-15) precipitation was below normal during the winter. The number of days with temperatures below zero in December-February was limited to only 31 days, which was 22 days fewer than normal. The snow cover during the winter was very low with 1.3 days recorded on average for December-February, which was 7.5 days below normal.

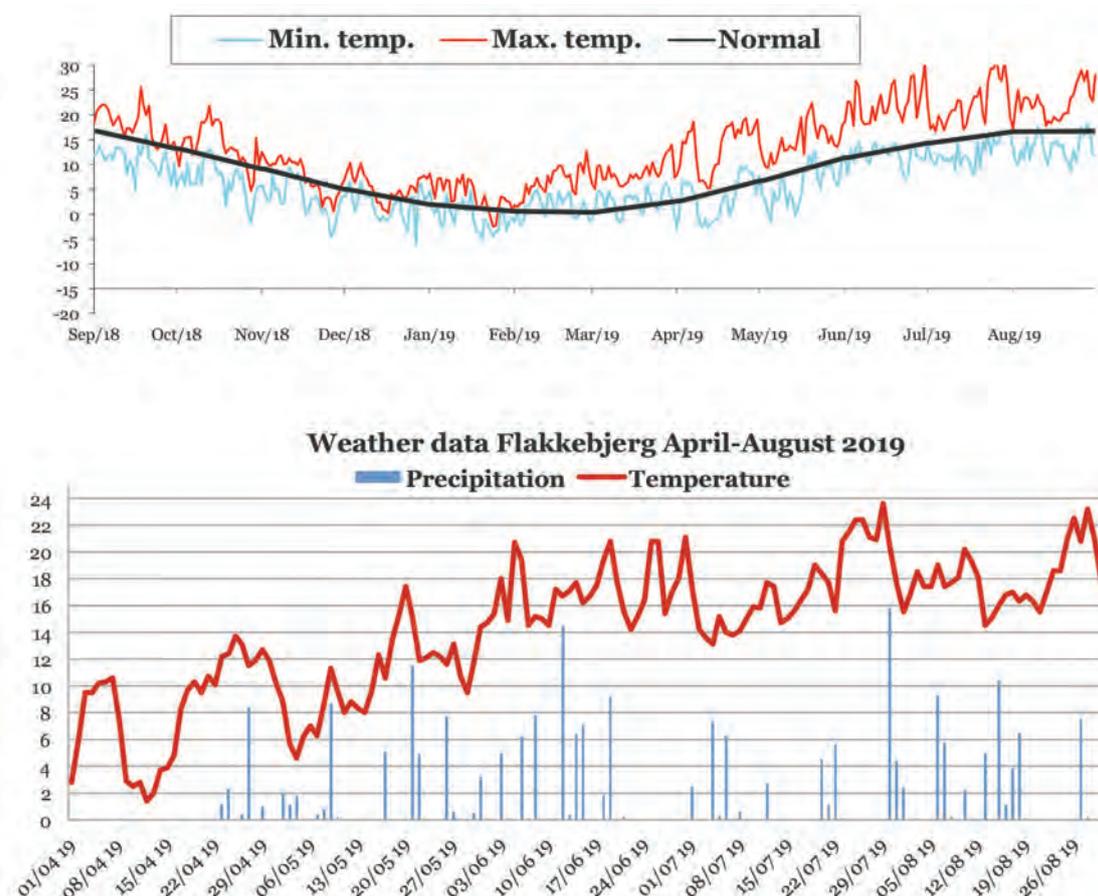
Spring 2019 began wet; precipitation was extremely high and set a new record with an average in March of 106 mm, which was 130% above normal (1961-90). However, precipitation was unevenly distributed across the country with 124 mm recorded in Central and Western Jutland and only 84 mm recorded in Western and Southern Zealand. It should be noted that almost all precipitation in March occurred during the first 15 days of the month. Temperatures in March and April exceeded the normal temperatures and reached an average of 5.5 and 8.1°C, which was 3.3 and 2.4°C respectively above normal. April was very dry, with only 15 mm precipitation recorded in the last days of the month. April 2019 saw a record of sunny hours with 274 hours of sunshine recorded, which exceeded the normal average by 69%. In contrast, May 2019 was quite cold compared to the previous year. The temperature average of 9.8°C and precipitation average of 54 mm were both considered normal (1961-90).

The average temperatures in June, July and August reached 16.2, 16.7 and 17.4°C respectively, which was slightly above normal (1961-90). Cloudbursts (> 15 mm in 30 min.) were recorded several times during the summer. Rainfall was unevenly distributed across the country. Particularly Central and Western Jutland had significant precipitation due to cloudbursts. Across the country, June and July had average precipitation of 58 and 67 mm respectively, which was close to normal. The average precipitation in August increased to 91 mm, which was 36% above normal. Rainfall and cloudbursts were unevenly distributed and especially Jutland was exposed. Farmers in Jutland experienced massive difficulties harvesting crops. Despite heavy rainfall, the number of sunny hours exceeded the normal in June, July and August. With recorded sunshine of 252, 222 and 202 hours, all summer months exceeded the normal by 21%, 13% and 9% respectively.

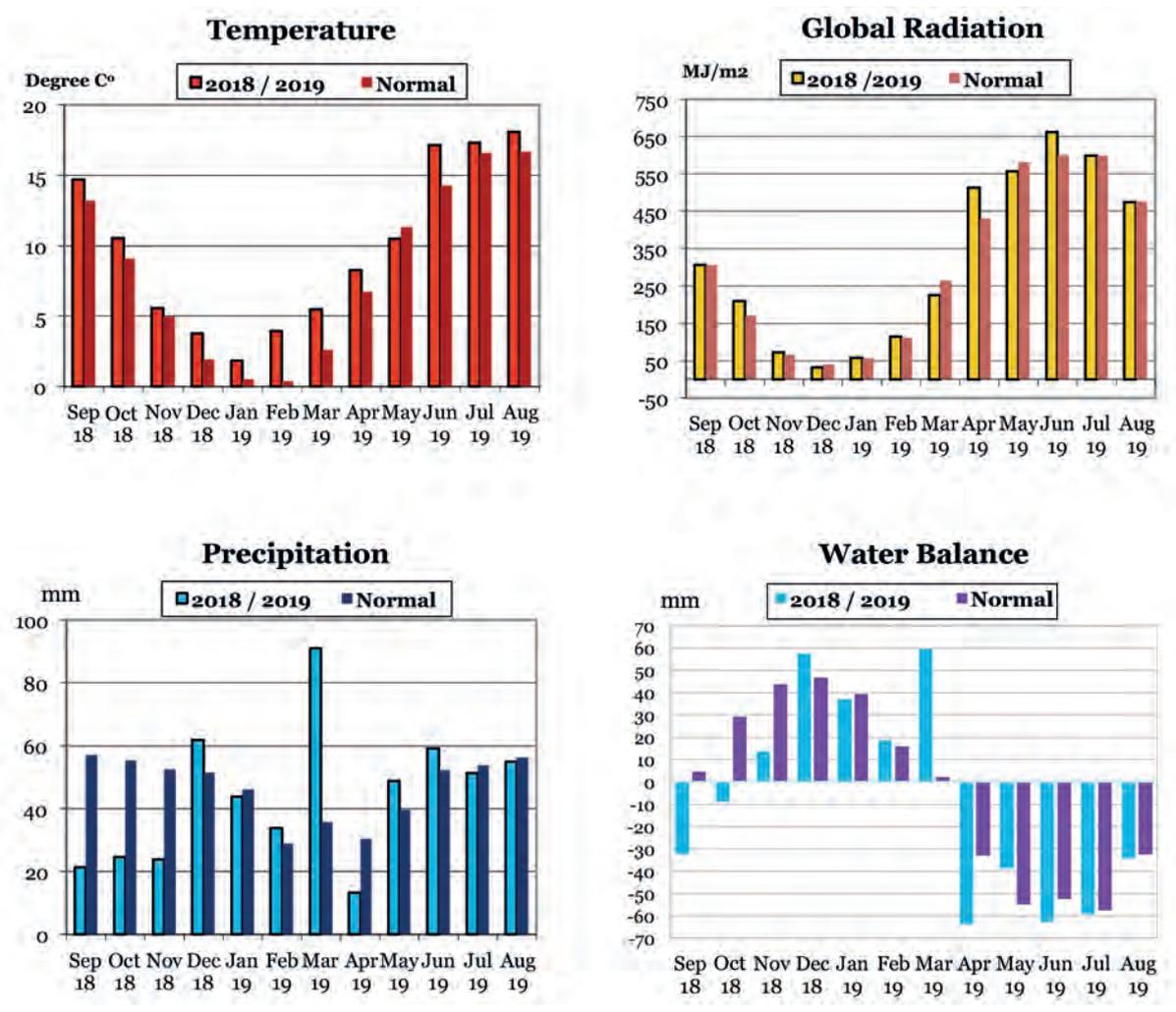
### Weather conditions at Flakkebjerg

At Flakkebjerg, normal autumn temperatures were recorded but precipitation was low with 21.3, 24.6 and 23.9 mm, respectively, recorded during the autumn, which was far below normal. Winter cereals were sown and established without any problems.

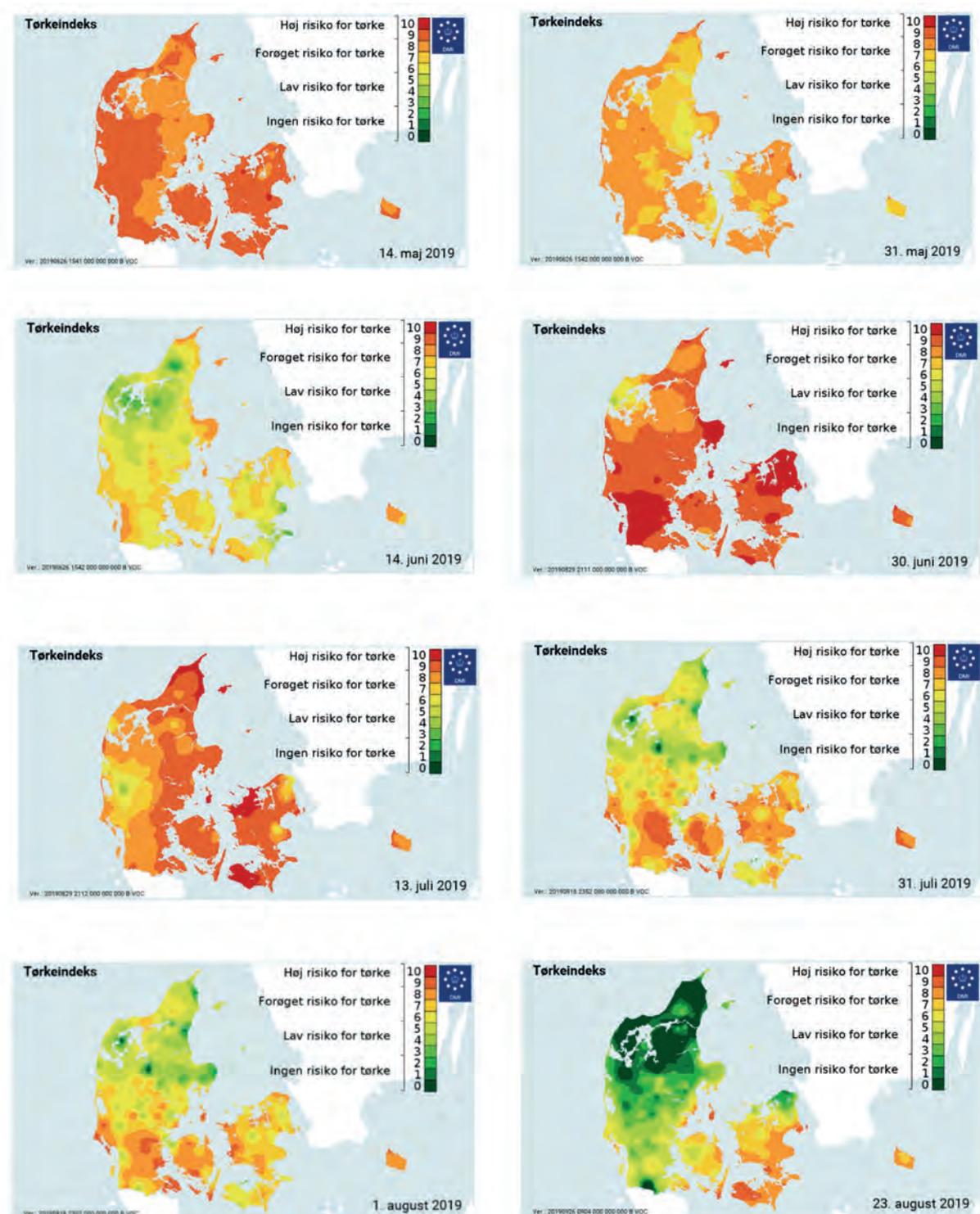
The first frost did not occur until January, and only very few days had temperatures below zero degrees. In general, the winter was warm and dry. All winter, the temperatures were far above normal with an average of 3.2°C, which was 2.2°C above normal. Snowfall only occurred on a few days in January. High temperatures continued during March and precipitation increased heavily. During the first 17 days of March 91 mm of rain was recorded, which was 55 mm above normal. This surplus of precipitation was much needed due to the dry autumn and winter. The considerable amount of precipitation in March and high temperatures in both March and April ensured establishment of spring crops. May turned out to be cold (10°C) and windy (Figure 1). Precipitation in May was close to normal, but because of lack of precipitation in April most fields suffered from drought in spring 2019 and crops slowed down growth for a while (Figure 2). Temperatures increased during June, July and August. Average temperatures during the summer together with evenly distributed average precipitation ensured good infestation of leaf diseases in cereals (Figure 2). In Figure 3, the drought situation during the season can be seen for each of the important growing months. Most fungicide trials at Flakkebjerg were irrigated 2 times during the summer. In general, the harvest of crops was easy and most crops were harvested under dry conditions by the end of August. Cereal yields were high due to good cropping conditions and high fungicide responses were also measured in crops with severe disease infestations.



**Figure 1.** The automatic weather station at Flakkebjerg is located 12 km from the West Zealand coast. The climate at Flakkebjerg is representative of the area in which most of our trials are situated. The normal climate is given as an average of thirty years (1973-2013).



**Figure 2.** Climate data from AU Flakkebjerg for the growing season September 2018–August 2019. The temperature is in °C, the global radiation measured in MJ/m<sup>2</sup>, the precipitation in mm, and the water balance is the difference between precipitation and potential evaporation.



**Figure 3.** Drought index for May-August 2019. Danish Meteorological Institute (DMI).

### Drought Index 2019 (DMI)

#### Scale:

- 0-2 No risk of drought (green)
- 3-5 Low risk of drought
- 6-8 Increased risk of drought
- 9-10 High risk of drought (red)