Weather summary for 2015

Weather in Los Baños was summarized, including observations taken every 15 minutes, from automated weather observation systems. With this detail in weather monitoring, it was possible to describe weather patterns on different levels. This weather summary contains three sections. The first section is on annual weather patterns and the corresponding monthly and seasonal changes of basic weather agro-meteorological variables. In the second one—with a record of extreme weather conditions underpinned as hottest day, coldest night, and most humid day—the changes within an extreme day, called a diurnal pattern, was graphed. In the third section, the development of a weather disturbance (typhoon) until its peak and dissipation as reflected on rainfall amount and maximum wind speed was described. This three-level presentation deepens the understanding of the changes in weather in Los Baños.

A. Weather pattern

Annual rainfall for 2015 was 1,829 mm for the IRRI dryland (upland) site and 1,814 mm for the wetland (lowland) site. These values were 284 mm lower than the long-term average rainfall total for the dryland site and 217 mm lower for the wetland site.

Los Baños experienced extreme rainfall with the occurrence of typhoons Ineng and Lando, during which daily total rainfall amount increased three to five times the average monthly amount of rainfall (Fig. 1). The wettest day at IRRI was on 19 December, with 89 mm of rainfall. The longest recorded continuous wet spell was 11 days (7-17 September) at the dryland site and 10 days (3-12 July) on the wetland site. The longest continuous dry spell was 25 days at the dryland site (19 January-12 February) and 14 days in the wetland site (7-20 April).

Mean monthly solar radiation reached the peak in April (19.9 MJ m^{-2} d^{-1} for the dryland site and 19.2 MJ m^{-2} d^{-1} for the wetland site), then gradually declined in December (12.1 MJ m^{-2} d^{-1} for the dryland site; 12.4 MJ m^{-2} d^{-1} for the wetland site). The highest recorded daily accumulated solar radiation for 2015 was on 22 April (24.9 MJ m^{-2} d^{-1}) at the dryland site and 3 June (23.8 MJ m^{-2} d^{-1}) at the wetland site.

The highest mean monthly duration of bright sunshine was 9.2 hr d^{-1} in April; it declined to low values of 5.6 hr d^{-1} in December. The longest record of sunshine in Los Baños was on 3 June, with 12.4 hr of bright sunshine.

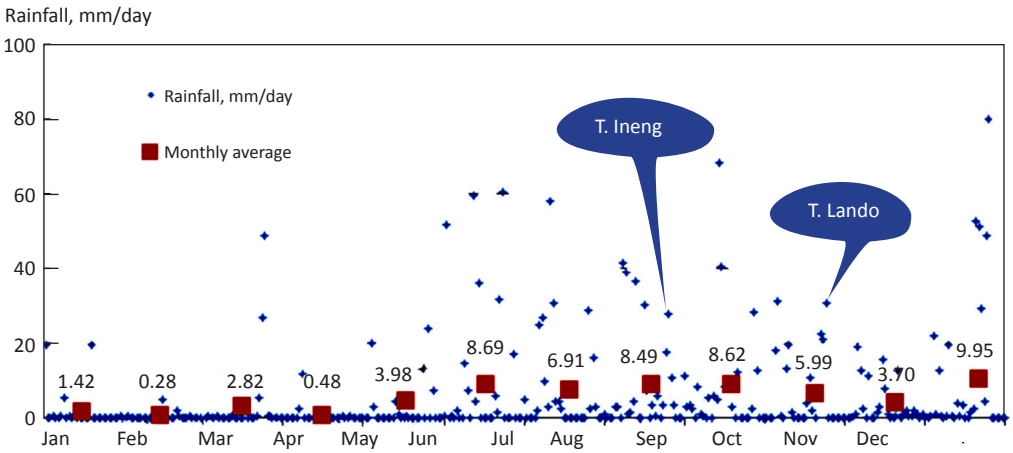

Fig. 1. Comparison of daily total rainfall (blue diamond) and monthly average rainfall (red squares with labels) in mm day^{-1}. Typhoons Ineng in August and Lando in October increased the rainfall amount to more than 10 mm day^{-1}, so much more than the daily rice water requirement.

Maximum temperature reached its highest value on 20 April (36.2 °C) at the dryland site and on 3 June (36 °C) at the lowland site. The lowest recorded value was 23.0 °C in both sites on 18 January. Eight days of 2015 had a temperature reading of more than 35 °C in the wetland site and most of these hot days occurred in April, May, and June.

The average monthly minimum temperature increased from January to May, and gradually decreased till December. The coldest days of 2015 in Los Baños was on 17 March (18.0 °C) at the dryland site and 1 November (18.0 °C) at the wetland site. There were 63 days with a minimum temperature of more than 25 °C. Most of the warm nights occurred between April and October. One warm night was also recorded in November.

Daily mean wind speed measured at a height of 2 m was 1.6 m s^{-1} for the dryland site and 1.5 m s^{-1} for the wetland site. Wind speed was generally low (less than 2.0 m s^{-1}) except during the occurrence of tropical weather disturbances. Typhoon Lando had a peak wind speed of 23 m s^{-1} at 0900 on 17 October at the dryland station. Daily mean wind speed was only 7.2 m s^{-1} at the dryland and 5.3 m s^{-1} at the wetland station.

Because of a slightly higher temperature, lower amount of rainfall, and higher vapor pressure deficit at mid-day, free water evaporation in the upland site was slightly higher than the wetland site. Open-pan evaporation total was 2,011 mm at the dryland site and 1,891 mm at the wetland site. These values were 204 mm higher than the long-term evaporation total at the dryland site and 233 mm higher than the long-term evaporation total at the wetland site.

B. The diurnal weather pattern

Earlier, we looked at patterns within the year and identified months within the wet or dry cropping seasons. Now, with diurnal patterns, we look at weather changes within the day. Patterns on the hottest day (21 May), coldest night (23 February), and the most humid day (29 October) from the wetland site are presented.

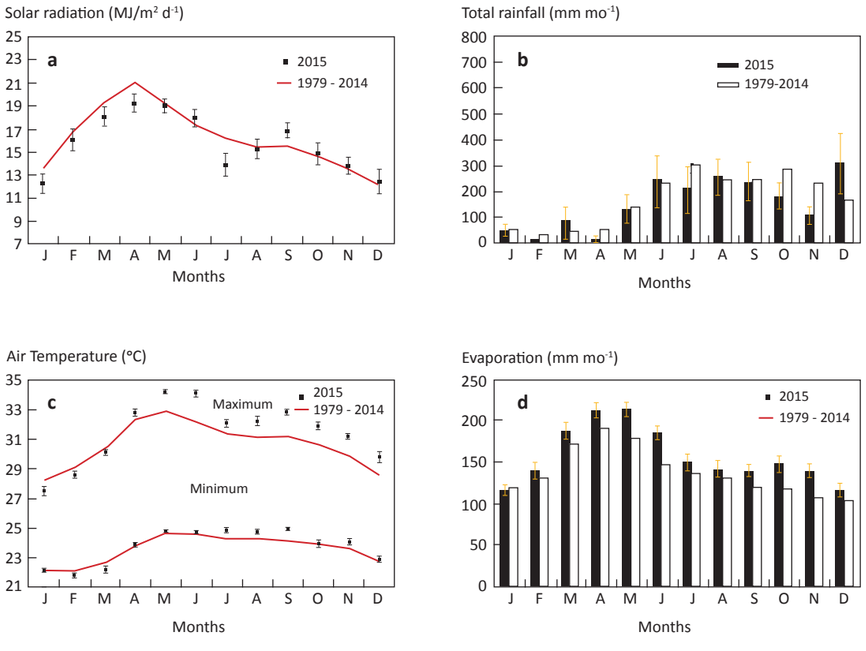

Fig. 2. Annual weather patterns for (a) daily solar radiation in MJ m^{-2} day^{-1}, (b) total rainfall (mm) per month, (c) maximum and minimum air temperature in °C , and (d) total evaporation (mm) per month.

Figure 3a shows temperature trends within a day of maximum temperature (blue line) and minimum temperature (red line) from the wetland site. Both the hottest and coldest days followed a similar diurnal pattern, during which the sun rose at 0530 and 0600, respectively. Temperature continued to rise at 1500, then decreased until 1800. The highest diurnal difference was 9 °C. The blue line shows hot temperatures (> 34.0 °C) from 0000 until about 1500. The coldest temperature (18.4 °C) occurred at about 0500.

Lowest relative humidity on record occurred (Fig. 3b) at 1100. From 84% values in the morning, relative humidity gradually dropped to its lowest (60%), then gradually increased. By midnight, relative humidity was at 83%. It remained high until the sun rose again the following day.

C. Typhoon Lando

Some weather events were not confined within a day, such as the most memorable weather event at IRRI for 2015. When Typhoon Lando passed over Los Baños in mid-October, it rained for a total of 17.5 hours intermittently. Figure 4a shows a three-day rainfall event from 17 to 19 October, each event corresponding to strengthening rainfall ringbands of Typhoon Lando. The rainfall events were characterized by peaks at 3.3 mm, 4.8 mm, and 11.2 mm. The last ringband was nearest to the eyewall of the typhoon, which brought the strongest force of winds and rains. The highest recorded 24-hour amount of rainfall was 37 mm on 19 October. In Figure 4b, wind speed remained below 5 m sec^{-1}, gradually increasing as the eye of the typhoon came nearer, finally reaching its peak (16 m sec^{-1}) at about 1530 on 18 October.

Despite the continuously changing weather, typical climate extremes and weather patterns could be distinguished in Los Baños.

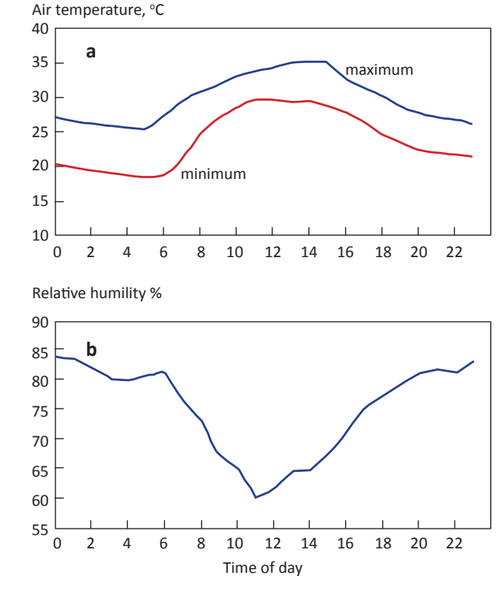

Fig. 3. Diurnal patterns of extreme (a) temperatures (°C) and (b) humidity (%), recorded in 2015. The x-axis signifies time of day from midnight. Observations were recorded every 15 minutes.

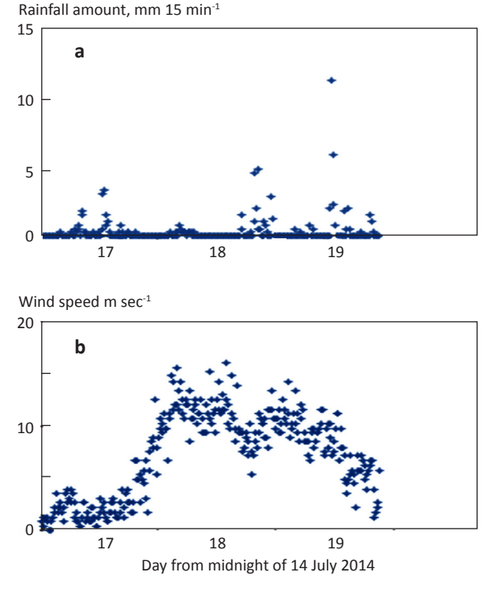

Fig. 4. Weather patterns during the passage of Typhoon Lando over Los Baños. IRRI wetland station (a) rainfall amount in mm and (b) maximum wind speed in m sec^{-1}. Observation points were reported every 15 minutes, giving 96 observations per day.