

RINGKASAN

Sejak tahun 2006, Indonesia dan bahkan dunia sedang menghadapi tantangan perubahan iklim yang menyebabkan rata-rata suhu pada permukaan bumi meningkat. Kenaikan suhu ini akan menyebabkan penurunan produksi pada beberapa tanaman termasuk padi. Setiap peningkatan suhu sebesar 1°C akan mempengaruhi penurunan hasil produksi padi sebesar 10%. Salah satu cara untuk mengatasi hal ini adalah dengan menggunakan varietas yang toleran terhadap suhu tinggi. Penelitian ini bertujuan untuk (1) mengetahui pengaruh cekaman suhu tinggi terhadap pertumbuhan tanaman padi sawah, (2) mengetahui pengaruh cekaman suhu tinggi terhadap hasil tanaman padi sawah, (3) mengetahui respons fisiologi tanaman padi sawah yang terkena cekaman suhu tinggi, dan (4) mengetahui varietas padi sawah yang memiliki potensi toleran cekaman suhu tinggi.

Penelitian ini dilaksanakan di *Screen House* Kebun Benih Tanaman Pangan, Balai Benih Tanaman Pangan dan Hortikultura (BBTPH) yang terletak di Desa Bojongsari dan Laboratorium Fakultas Pertanian Universitas Jenderal Soedirman pada bulan April hingga Desember 2023. Rancangan yang digunakan dalam penelitian ini adalah Petak Terbagi dengan dasar Rancangan Acak Kelompok (RAK). Petak utama (*main plot*) adalah cekaman suhu (T1: suhu siang hari antara 34,0-38,9°C dengan rata-rata suhu harian 30,5°C dan T2: suhu siang hari antara 39,0-43,9°C dengan rata-rata suhu harian 34,3°C), sedangkan anak petak (*sub plot*) adalah varietas padi (V1: Inpari 19, V2: Inpari 32, V3: Inpari 34, V4: Inpari 35, V5: IR 64, dan V6: Ciherang). Kombinasi kedua faktor menghasilkan 12 kombinasi perlakuan yang dilakukan sebanyak 3 kali pengulangan, dimana pada masing-masing pengulangan terdapat 2 unit percobaan yang berisi 4 tanaman, sehingga total tanaman yang akan digunakan pada penelitian ini berjumlah 288 tanaman. Variabel yang diamati adalah tinggi tanaman, jumlah daun, jumlah anakan, laju pertumbuhan tanaman, luas daun, kadar klorofil, kerapatan stomata, kandungan prolin, fertilitas serbuk sari, fertilitas biji, jumlah anakan produktif, persentase pengapuran gabah, jumlah gabah per malai, persentase gabah isi per rumpun, bobot gabah per rumpun, dan bobot gabah 1000 butir. Data yang diperoleh dari pengamatan dianalisis menggunakan uji F pada taraf kesalahan 5% dan apabila hasil analisis menunjukkan perbedaan yang nyata, maka dilanjutkan dengan uji jarak berganda Duncan pada taraf kesalahan 5%.

Hasil penelitian menunjukkan cekaman suhu pada rentang 39,0-43,9°C memberikan pertumbuhan tanaman pada fase vegetatif yang lebih baik namun hasil produksi pada fase generatif yang lebih rendah dibandingkan dengan tanaman pada suhu rentang 34,0-38,9°C. Tanaman padi yang terkena cekaman suhu pada rentang 39,0-43,9°C memberikan respons fisiologi berupa meningkatnya kerapatan stomata, namun tidak memberikan respons pada kadar klorofil dan kandungan prolin. Varietas yang diduga memiliki sifat toleran cekaman suhu tinggi adalah varietas Inpari 35 yang ditinjau dari fertilitas biji dan persentase gabah isi per rumpun.

SUMMARY

Since 2006, Indonesia even the world have been facing the challenge of climate change which has caused the average temperature on the earth's surface to increase. This increase in temperature will cause a decrease in production of several plants, including rice. Every increase in temperature by 1°C will affect the reduction in rice production by 10%. One way to overcome this is to use varieties that are tolerant of high temperatures. This research aims to (1) determine the effect of high temperature stress on the growth of lowland rice plants, (2) determine the effect of high temperature stress on the yield of lowland rice plants, (3) determine the physiological response of lowland rice plants exposed to high temperature stress, and (4) identify lowland rice varieties that have the potential to tolerate high temperature stress.

This research was carried out at the Food Crop Seed Garden Screen House, Food Crop and Horticulture Seed Center located in Bojongsari Village and the Laboratory of the Faculty of Agriculture, Jenderal Soedirman University from April to December 2023. The design used in this research was a Split Plot on the basis of Randomized Block Design. The main plot is temperature stress (T1: daytime temperature between 34.0-38.9°C with an average daily temperature of 30.5°C and T2: daytime temperature between 39.0-43.9°C with an average -average daily temperature 34.3°C), while the sub plots are rice varieties (V1: Inpari 19, V2: Inpari 32, V3: Inpari 34, V4: Inpari 35, V5: IR 64, and V6: Ciherang). The combination of the two factors resulted in 12 treatment combinations carried out in 3 repetitions, where in each repetition there were 2 experimental units containing 4 plants, so that the total number of plants used in this research was 288 plants. The variables observed were plant height, number of leaves, number of tillers, plant growth rate, leaf area, chlorophyll content, stomata density, proline content, pollen fertility, seed fertility, number of productive tillers, percentage of grain calcification, number of grains per panicle, percentage grain content per hill, weight of grain per hill, and weight of grain 1000 grains. Data obtained from observations were analyzed using the F test at an error level of 5% and if the results of the analysis showed significant differences, then it was continued with Duncan's multiple range test at an error level of 5%.

The research results showed that temperature stress in the range of 39.0-43.9°C provided better plant growth in the vegetative phase but production results in the generative phase were lower compared to plants in the temperature range of 34.0-38.9°C. Rice plants exposed to temperature stress in the range of 39.0-43.9°C gave a physiological response in the form of increased stomata density, but did not respond to chlorophyll levels and proline content. The variety that is thought to be tolerant of high temperature stress is the Inpari 35 variety, which is viewed from seed fertility and the percentage of grain content per hill.