

RINGKASAN

Padi (*Oryza sativa* L.) merupakan kebutuhan pokok bagi masyarakat Indonesia sehingga kebutuhannya akan terus meningkat seiring dengan pertambahan jumlah penduduk. Perubahan iklim yang menyebabkan peningkatan suhu udara menjadi salah satu tantangan dalam upaya produksi padi. Cekaman suhu tinggi mengakibatkan penurunan hasil dan kualitas pada budidaya padi karena dapat menyebabkan jumlah gabah berkurang, bobot gabah isi menurun, dan meningkatnya gabah mengapur. Oleh karena itu, perlu adanya penelitian mengenai respon pertumbuhan tanaman padi melalui karakteristik morfologi dan fisiologinya sehingga dapat diketahui genotipe padi yang memiliki kemampuan beradaptasi pada lingkungan dengan cekaman suhu tinggi. Penelitian ini bertujuan untuk (1) mengetahui karakteristik morfologi dan fisiologi beberapa genotipe tanaman padi, (2) mengetahui respon pertumbuhan tanaman padi pada cekaman suhu tinggi, dan (3) mengetahui genotipe tanaman padi yang memiliki potensi toleran cekaman suhu tinggi.

Penelitian ini dilaksanakan di Balai Benih Tanaman Pangan dan Hortikultura/UPT Pertanian Kebun Benih Padi dan Palawija Desa Bojongsari Kecamatan Kembaran Banyumas, Laboratorium Agroekologi, dan Laboratorium Agronomi dan Hortikultura Fakultas Pertanian Universitas Jenderal Soedirman, Purwokerto pada bulan Juni hingga Desember 2021. Rancangan percobaan yang digunakan adalah Rancangan Petak Terbagi (*Split-plot Design*) dengan 2 faktor dan 3 ulangan. Faktor pertama (*main plot*) adalah perlakuan cekaman suhu tinggi (T) yaitu T1= 38°C dan T2= 40°C. Faktor kedua (*sub plot*) yaitu varietas padi (V) yang terdiri atas V1= Inpari 34 Agritan, V2= Inpari 35, V3= Inpari Unsoed 79 Agritan, V4= Jeliteng, V5= Padi Hitam/PH 3, dan V6= Padi Hitam/PH 5. Masing-masing faktor dikombinasikan sehingga diperoleh 12 kombinasi perlakuan dan diulang sebanyak tiga kali sehingga total terdapat 36 unit percobaan. Variabel yang diamati yaitu tinggi tanaman, jumlah anakan, jumlah daun, panjang akar, luas daun, nilai klorofil, kerapatan stomata, fertilitas serbuk sari, jumlah malai, bobot 1000 biji, bobot gabah per rumpun, laju pertumbuhan tanaman, dan persentase butir kapur. Data kuantitatif yang diperoleh dari pengamatan dianalisis menggunakan analisis sidik ragam atau *Analysis of Variance* (Anova). Apabila terdapat perbedaan di antara perlakuan, maka dilanjutkan dengan Duncan's Multiple Range Test (DMRT) pada taraf kesalahan 5% dan 1%.

Hasil penelitian menunjukkan bahwa cekaman suhu tinggi pada 40°C dapat meningkatkan persentase butir kapur. Varietas padi menunjukkan keragaman pada tinggi tanaman, jumlah anakan, jumlah daun, panjang akar 5 Minggu Setelah Tanam (MST), luas daun, nilai klorofil, kerapatan stomata, dan bobot 1000 butir. Varietas Inpari Unsoed 79 Agritan unggul dalam rendahnya persentase butir kapur dan PH 3 memiliki penurunan persentase butir kapur yang terkecil, sehingga keduanya memiliki potensi toleran terhadap cekaman suhu tinggi dibandingkan varietas lain yang diuji karena pada taraf perlakuan suhu 40°C. Interaksi antara dua faktor memberikan pengaruh terhadap nilai klorofil pada umur 6 MST dan persentase butir kapur.

SUMMARY

Rice (*Oryza sativa* L.) is a staple food for the Indonesian people so their needs will continue to increase along with the increase in population. Climate change which causes an increase in air temperature is one of the challenges in rice production. High temperature stress decreases rice yield and quality production because it can cause decrease number of seeds and number of yield grain, and increase grain chalkiness. Therefore, it is necessary to conduct research on the growth response of rice plants through their morphological and physiological characteristics so that we can select which rice genotypes have the ability to adapt to high temperature stress. This study aims to (1) determine the morphological and physiological characteristics of several genotypes of rice plants, (2) determine the response of rice plant growth to high temperature stress, and (3) determine the genotypes of rice plants that have the potential to tolerate high temperature stress.

This research was carried out at the Center for Food Crops and Horticulture (UPT Agriculture) for Rice and Palawija Seed Gardens, Bojongsari, Kembaran, Banyumas, Agroecology Laboratory, and Agronomy and Horticulture Laboratory, Faculty of Agriculture, Jenderal Soedirman University, Purwokerto from June to December 2021. The experimental design used was a Split-plot Design with 2 factors and 3 replications. The first factor (main plot) was the treatment of high temperature stress (T), T1 = 38°C and T2 = 40°C. The second factor (sub plot) is rice variety (V) which consists of V1 = Inpari 34 Agritan, V2 = Inpari 35, V3 = Inpari Unsoed 79 Agritan, V4 = Jeliteng, V5 = Black Rice/PH 3, and V6 = Black Rice/PH 5. Each factor was combined with total 12 treatment combinations and repeated three times to get 36 experimental units. The variables observed were plant height, number of tillers, number of leaves, root length, leaf area, chlorophyll value, stomata density, pollen fertility, number of panicles, weight of 1000 seeds, weight of grain per clump, plant growth rate, and liming of grain. Quantitative data obtained from observations were analyzed using analysis of variance. It was continued with Duncan's Multiple Range Test (DMRT) at an error level of 5% and 1%.

The results showed that high temperature stress at 40°C can increased the percentage of grain chalkiness. The treatment of rice varieties affected the variables of plant height, number of tillers, number of leaves, root length 5 Weeks After Planting (WAP), leaf area, chlorophyll value, stomata density, and weight of 1000 grains. Inpari Unsoed 79 Agritan was excel in low percentage of grain chalkiness and PH 3 has the smallest decrease in the percentage of grain chalkiness, so they have the potential to be tolerant of high temperature stress compared to other varieties tested at a temperature treatment level of 40°C. The interaction between the two factors had an effect on the chlorophyll value at the age of 6 WAP and the percentage of grain chalkiness