RINGKASAN

Penelitian bertujuan untuk: 1) mengetahui konsentrasi genistein yang menghasilkan pertumbuhan dan hasil tanaman kedelai paling baik, 2) mengetahui frekuensi pemberian genistein yang menghasilkan pertumbuhan dan hasil tanaman kedelai paling baik, 3) mengetahui interaksi antara konsentrasi dan frekuensi pemberian genistein terhadap pertumbuhan dan hasil tanaman kedelai, 4) mengetahui intensitas sinar UV-B yang berpengaruh paling baik terhadap iklim mikro, pertumbuhan dan hasil tiga varietas kedelai, 5) mengetahui varietas kedelai yang memiliki pertumbuhan dan hasil paling baik pada berbagai intensitas sinar UV-B, 6) mengetahui interaksi antara intensitas sinar UV-B dan varietas kedelai terhadap iklim mikro, pertumbuhan dan hasil tiga varietas kedelai, 7) mengetahui varietas kedelai yang memiliki pertumbuhan dan hasil paling baik pada berbagau konsentrasi genistein, 8) mengetahui konsentrasi genistein yang berpengaruh paling baik terhadap pertumbuhan dan hasil tiga varietas kedelai, 8) mengetahui interaksi antara intensitas sinar UV-B dan varietas kedelai terhadap pertumbuhan dan hasil tiga varietas kedelai.

Penelitian dilaksanakan dalam 3 tahap, Tahap 1: telah dilaksanakan pada bulan Juli 2019-Oktober 2019 di kebun percobaan II Fakultas Pertanian dan Perikanan Universitas Muhammadiyah Purwokerto. Penelitian merupakan percobaan faktorial menggunakan polybag yang disusun dalam Rancangan Acak Kelompok (RAK). Faktor yang dicoba konsentrasi genistein (K): yaitu K_0 (0 mg/L), K_1(20 mg/L), K_2 (40 mg/L) dan K_3 (60 mg/L) dan frekuensi pemberian genistein (F): F_1(1 kali, umur 20 hst), F_2 (2 kali, umur 20 dan 30 hst), F_3 (3 kali, umur 20, 30 dan 40 hst), kombinasi faktor diulang tiga kali. Variabel pengamatan meliputi jumlah dan bobot bintil akar efektif, tinggi tanaman, luas daun, jumlah klorofil daun, kansentrasi genistein daun, jumlah cabang utama dan cabang produktif, bobot brangkasan segar dan kering, bobot akar segar dan kerin, jumlah biji, bobot biji pertanaman dan kandungan genistein biji. Data pengamatan dianalisis dengan Uji F pada taraf kepercayaan 95%, jika berbeda sangat nyata atau nyata dilanjutkan ke uji Ducan Multipe Range Test pada taraf kepercayaan 95%..

Penelitian tahap II telah dilaksanakan pada bulan Agustus 2019-Desember 2019 di kebun percobaan II Fakultas Pertanian dan Perikanan Universitas Muhammadiyah Purwokerto. Penelitian merupakan percobaan faktorial menggunakan polybag dalam rancangan Split Plot Design. Faktor yang dicoba lima varietas kedelai (V) sebagai anak perlakuan, yaitu V_1 (Deja 2), V_2 (Dena 1), V_3 (Devon 1), V_4 (Demas 1), dan V_5 (Detap 1), serta intensitas sinar UV-B (R) sebagai perlakuan utama, yaitu yaitu R_1 (3.000 $\mu W/cm^2$), R_2 (2.500 $\mu W/cm^2$), R_3 (2.000 $\mu W/cm^2$). Kombinasi faktor diulang tiga kali. Variabel pengamatan meliputi intensitas cahaya, radiasi sinar uv-b, suhu udara, suhu tanah, kelembaban udara, jumlah bintil akar efektif, bobot bintil akar efektif, tinggi tanaman, luas daun, jumlah klorofil daun, kandungan genistein daun, jumlah cabang produktif, bobot brangkasan kering, bobot akar kering, jumlah polong per tanaman, jumlah biji

pertanaman, bobot biji pertanaman, bobot 100 biji dan kondungan genistein biji. Data pengamatan dianalisis dengan Uji F pada taraf 95%, jika berbeda nyata dilanjutkan ke uji Ducan Multipe Range Test pada taraf kepercayaan 95%.

Penelitian tahap III telah dilaksanakan pada bulan Agustus sampai Desember 2021 di kebun percobaan II Fakultas Pertanian dan Perikanan Universitas Muhammadiyah Purwokerto. Penelitian merupakan percobaan faktorial menggunakan polybag dalam rancangan Split Plot Design. Faktor yang dicoba lima varietas kedelai (V) sebagai perlakuan utama, yaitu V1 (Deja 2), V2 (Dena 1), V3 (Demas 1), serta konsentrasi genistein (G) sebagai anak perlakuan, yaitu G0 (mg/L), G1(60 mg/L), G2 (120 mg/L), dan G3 (180 mg/L), kombinasi faktor diulang tiga kali. Variabel pengamatan meliputi: tinggi tanaman, luas daun, jumlah klorofil daun, kandungan genistein daun, jumlah bintil akar efektif, bobot brangkasan kering, jumlah cabang produktif, jumlah polong isi per tanaman, jumlah biji per tanaman dan bobot biji per tanaman. Data pengamatan dianalisis dengan uji F pada taraf kepercayaan 95%, apabila berbeda nyata, diteruskan uji Duncan Multiple Range Test (DMRT) pada taraf kepercayaan 95% mengunakan program Costat Statical Software.

Hasil penelitian tahap I: Hasil penelitian menunjukan 1)pemberian konsentrasi genistein sampai 60 mg/L meningkatkan hasil kedelai yang ditunjukkan oleh peningkatan jumlah biji dan bobot biji per tanaman. Jumlah biji per tanaman meningkat 44,82% dibanding konsentrasi 0 mg/L, 5,34% dibanding konsentrasi 20 mg/L dan 4,91% dibanding konsentrasi 40 mg/L. Bobot biji per tanaman meningkat 30,95% dibanding konsentrasi 0 mg/L, 5,07% dibanding konsentrasi 20 mg/L dan 4,68 % dibanding konsentrasi 40 mg/L, walaupun konsentrasi genistein tidak meningkatkan pertumbuhan tanaman kedelai 2) semakin banyak frekuensi pemberian genistein meningkatkan jumlah biji dan bobot biji per tanaman. Pemberian genistein tiga kali meningkatkan jumlah biji per tanaman 19,36% dibanding pemberian satu kali dan 14,01% dibanding pemberian dua kali. Pemberian genistein tiga kali meningkatkan bobot biji per tanaman 16,75 % dibanding pemberian satu kali dan 18,29% dibanding pemberian dua kali, walaupun frekuensi pemberian genistein tidak meningkatkan pertumbuhan tanaman kedelai.3) tidak ada interaksi antara konsentrasi genistein dan frekuensi pemberian genistein pada pertumbuhan dan hasil kedelai, menunjukkan bahwa pengaruh konsentrasi genistein tidak bergantung pada frekuensi pemberian genistein.

Hasil penelitian tahap II: Intensitas sinar UV-B menurunkan kandungan genistein daun umur 35 hari setelah tanam dan 45 hari setelah tanam, serta kandungan genistein biji yang dipengaruhi oleh varietas kedelai yang digunakan dan menunjukkan adanya interaksi varietas dan intensitas sinar UV-B. Intensitas sinar UV-B menurunkan pertumbuhan dan hasil panen lima varietas tanaman kedelai, varietas kedelai Detap 1 mengalami penurunan pertumbuhan tertinggi 2,06 % dan varietas Deja 1 mengalami penurunan hasil tertinggi 19,44 %.

Hasil penelitian tahap III::1) terdapat interaksi antara konsentrasi genistein dan frekuensi pemberian genistein pada variabel pertumbuhan yaitu tinggi tanaman, kandungan genistein daun, bobot brangkasan kering, bobot akar kering dan jumlah

cabang produktif, dan variabel hasil hasil yang meliputi Jumlah polong isi per tanaman, jumlah biji per tanaman, dan bobot biji per tanaman, 2) konsentrasi genistein 120 mg/L menghasilkan jumlah bintil akar efektif 32,26 butir, jumlah klorofil daun 32,26 mg/L, jumlah cabang produktif 3,6 buah, dan bobot 100 biji 13,43 g. 3) Varietas demas 1 menghasilkan jumlah bintil akar efektif berbanyak 42,44 buah, Jumlah klorofil daun terbanyak 29,30 (mg/L) dan jumlah cabang produktif 3,37 buah

SUMMARY

The research aimed to achieve the following objectives:

1. Determine the best concentration and frequency of genistein application for soybean growth and yield.
2. Investigate the interaction between genistein concentration and application frequency on soybean growth and yield.
3. Identify the most effective type of plastic shading on microclimate, growth, and yield of three soybean varieties.
4. Determine the soybean variety with the best growth and yield under various plastic shading conditions.
5. Explore the interaction between plastic shading and soybean varieties on microclimate, growth, and yield of three soybean varieties.
6. Identify the most effective genistein concentration for the growth and yield of three soybean varieties.
7. Discover the soybean variety with the best growth and yield under different genistein concentrations.

Stage 1:

The research was conducted from July 2019 to October 2019 at the experimental farm of the Faculty of Agriculture and Fisheries, Universitas Muhammadiyah Purwokerto. It followed a factorial experiment design using polybags arranged in a Randomized Complete Block Design (RCBD). The study tested different genistein concentrations (K0, K1, K2, and K3) and application frequencies (F1, F2, and F3) with three replications. Observations included effective root nodule count, plant height, leaf area, chlorophyll content, genistein concentration in leaves, main and productive branch count, fresh and dry weight of shoots and roots, seed count, and seed weight per plant. Data were analyzed using F-test at a 95% confidence level, and if significant differences were found, a Duncan Multiple Range Test was conducted at a 95% confidence level.

Stage 2:

The research was conducted from August 2019 to December 2019 at the experimental farm of the Faculty of Agriculture and Fisheries, Universitas Muhammadiyah Purwokerto. It followed a factorial experiment design using polybags in a Split Plot Design. The study tested five soybean varieties (V1 to V5) as the main treatment and three plastic shading conditions (R_0, R_1, and R_2) as the sub-treatment with three replications. Observations included light intensity, UV-B radiation, air and soil temperatures, air humidity, effective root nodule count, leaf area, chlorophyll content, genistein content in leaves, productive branch count, dry weight of shoots and roots, pod count per plant, seed count and weight per plant, and genistein content in seeds. Data were analyzed using F-test at a 95% confidence level, and if significant differences were found, a Duncan Multiple Range Test was conducted at a 95% confidence level using the Costat Statistical Software.

Stage 3:

The research was conducted from August to December 2021 at the experimental farm of the Faculty of Agriculture and Fisheries, Universitas Muhammadiyah Purwokerto. It followed a factorial experiment design using polybags in a Split Plot Design. The study tested three soybean varieties (Deja 2, Dena 1, and Demas 1) as the main treatment and four genistein concentrations (G0, G1, G2, and G3) as the sub-treatment with three replications. Observations included plant height, leaf area, chlorophyll content, genistein content in leaves, effective root nodule count, dry weight of shoots, productive branch count, pod count per plant, seed count per plant, and seed weight per plant. Data were analyzed using F-test at a 95% confidence level, and if significant differences were found, a Duncan Multiple Range Test (DMRT) was conducted at a 95% confidence level using the Costat Statistical Software.

The results of Stage 1: The research results indicate that 1) administering concentrations of genistein up to 60 mg/L increases soybean yield, as evidenced by an increase in the number and weight of seeds per plant. The number of seeds per plant increased by 44.82% compared to the 0 mg/L concentration, by 5.34% compared to the 20 mg/L concentration, and by 4.91% compared to the 40 mg/L concentration. The weight of seeds per plant increased by 30.95% compared to the 0 mg/L concentration, by 5.07% compared to the 20 mg/L concentration, and by 4.68% compared to the 40 mg/L concentration, although the genistein concentration did not enhance soybean plant growth. 2) Increasing the frequency of genistein administration further boosts the number and weight of seeds per plant. Administering genistein three times increases the number of seeds per plant by 19.36% compared to a single administration and by 14.01% compared to two administrations. Administering genistein three times increases the weight of seeds per plant by 16.75% compared to a single administration and by 18.29% compared to two administrations, although the frequency of genistein administration doesn't enhance soybean plant growth. 3) There is no interaction between genistein concentration and administration frequency regarding soybean growth and yield, indicating that the influence of genistein concentration is independent of genistein administration frequency.

The results of Stage 2: The research results reveal that the intensity of UV-B radiation decreases the content of genistein in leaves at 35 days after planting and 45 days after planting, as well as the genistein content in seeds influenced by the soybean variety used, indicating an interaction between variety and UV-B radiation intensity. UV-B radiation intensity reduces the growth and harvest yield of five soybean plant varieties. Detap 1 soybean variety experienced the highest growth reduction of 2.06%, and Deja 1 variety had the highest yield reduction of 19.44%.

The results of Stage 3: 1) There is an interaction between genistein concentration and frequency of genistein application on growth variables, including plant height, leaf genistein content, dry shoot weight, dry root weight, and the number of productive branches, as well as yield-related variables such as the number of filled pods per plant, number of seeds per plant, and seed weight per plant.2) A genistein

concentration of 120 mg/L results in an effective number of root nodules of 32.26, leaf chlorophyll content of 32.26 mg/L, 3.6 productive branches, and a weight of 100 seeds at 13.43 g. 3. Demas 1 variety produces the highest effective number of root nodules at 42.44, the highest leaf chlorophyll content at 29.30 mg/L, and 3.37 productive branches.