

LAPORAN AKHIR

(P)



**PENGEMBANGAN GENOTIPE KEDELAI TOLERAN TERHADAP
CEKAMAN SALINITAS**

Tahun ke 1 dari rencana 2 tahun

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ABSTRAK

Lahan salin berpotensi untuk pengembangan tanaman kedelai, tetapi saat ini belum ada varietas kedelai yang toleran terhadap cekaman salinitas. Penelitian dengan tujuan untuk menentukan batas toleransi genotipe kedelai terhadap cekaman salinitas dan karakter morfologi tanaman kedelai pada kondisi salinitas dilaksanakan di rumah kaca Balai Penelitian Tanaman Kacang-Kacangan dan Umbi-umbian Malang mulai Bulan April sampai Agustus 2013. Penelitian dirancang menggunakan rancangan acak kelompok faktorial dimana perlakuan pertama ialah 4 kadar salinitas tanah yaitu L1: 0,9 dS m⁻¹, L2: 4 dS m⁻¹, L3: 7 dS m⁻¹ dan L4: 10 dS m⁻¹; perlakuan kedua adalah sebelas varietas/genotip kedelai yaitu (1) Wilis, (2) Tanggamus, (3) Gema, (4) LK/3474-403, (5) SU-7-1014, (6) MLG 2805-962, (7) MLG 3474-991, (8) IAC,100/Bur//Malabar 10-KP-21-50, (9) IAC,100/Bur//Malabar 10-KP-27-67, (10) IAC,100/Bur//Malabar 10-KP-3075 dan (11) Argopuro//IAC,100. Hasil penelitian menunjukkan bahwa pada level salinitas 7 dS m⁻¹ genotipe kedelai yang toleran adalah G8 (IAC,100/Bur//Malabar) dan agak toleran adalah G11 (Argopuro//IAC,100). Pada salinitas 10 dS m⁻¹ semua varietas/genotype tidak mampu bertahan sampai umur 43 das. Pada salinitas 4 dS m⁻¹ rata-rata varietas/genotype mengalami penurunan BK total tanaman sebesar 48,14% sedangkan pada salinitas 7 dS m⁻¹ rata-rata varietas/genotype mengalami penurunan BK total tanaman sebesar 64,89%. Varietas yang paling peka pada kondisi salinitas adalah G1 (Wilis) dan G2 (Tanggamus). Karakter agronomi dan fisiologi tanaman kedelai yang relatif toleran salinitas ditunjukkan dengan nilai IKC < 0.95, indeks klorofil daun lebih tinggi, score keracunan visual yang lebih rendah, mengalami penurunan hasil <50% pada level salinitas 7 dS m⁻¹, konsentrasi K lebih tinggi dan Na lebih rendah, bobot biji per tanaman dan bobot 100 bij lebih tinggi.

Keywords: stress salinitas, kedelai, genotip

ABSTRACT

Saline land potential for the development of soybean plants, but not a lot of research on soybean varieties tolerant to salinity stress.. Research with the aim to determine the limits of tolerance of soybean genotypes to salinity stress and the physiological and morphological characteristics of soybean in saline conditions was conducted in the greenhouse at Indonesian Legumes and Tuber Crops Research Institute, Malang, in April to May 2013. The study was designed using a randomized block design where the first treatment was 4 levels of soil salinity, namely L1: 0.9 dS m⁻¹, L2: 4 dS m⁻¹, L3: 7 dS m⁻¹ and L4: 10 dS m⁻¹; treatment The study was designed using a factorial randomized block design where the first treatment was 4 levels of soil salinity, namely L1: 0.9 dS m⁻¹, L2: 4 dS m⁻¹, L3: 7 dS m⁻¹ and L4: 10 dS m⁻¹; The second treatment was eleven varieties / genotypes of soybean, namely (1) Willis, (2) Tanggamus, (3) Echo, (4) LK/3474-403, (5)-SU 7-1014, (6) MLG 2805-962, (7) MLG 3474-991, (8) IAC, 100/Bur / / Malabar 10-KP-21-50, (9) IAC, 100/Bur / / Malabar 10-KP-27-67, (10) IAC , 100/Bur / / Malabar 10-KP-3075 and (11) Argopuro / / IAC, 100.. The results showed that the genotype G8 (IAC, 100/Bur / / Malabar) tolerant to salinity level 7 dS m⁻¹ and medium-tolerant is G11 (Argopuro / / IAC, 100). At salinity 10 dS m⁻¹ all varieties / genotypes were not able to survive until the age of 43 days after sowing (das). At salinity 4 dS m⁻¹, in general varieties / genotypes decreased total plant dry weight by 48.14%, while the salinity of 7 dS m⁻¹ total plant dry weight decreased by 64.89%. Willis and Tanggamus varieties classified as the most sensitive varieties. Agronomic and physiological characteristics of soybean plants that are relatively tolerant to salinity indicated by IKC value <0.95, higher leaf chlorophyll index, visual toxicity scores were low, 50% yield reduction in the level of salinity of 7 dS m⁻¹, relatively high concentrations of K and Na is lower, the dry weight of seeds per plant and dry weight of 100 seeds was higher

Keywords: salinity stress, soybean, genotype

RINGKASAN

Salinitas menjadi salah satu ancaman bagi keberlanjutan pertanian hampir semua negara di dunia termasuk Indonesia. Hingga pertengahan abad ke 21, salinitas diperkirakan menghilangkan lebih dari 50% lahan subur. Permasalahan salinitas di Indonesia sudah mulai perlu mendapatkan perhatian yang serius, karena di beberapa daerah dilaporkan terjadi peningkatan kadar salinitas tanah pertanian. Peningkatan salinitas terjadi secara alami dan karena campur tangan manusia disebabkan oleh: pemupukan kimia yang berlebihan, irigasi air tanah, masuknya air laut ke daratan akibat bencana alam, pencemaran bahan kimia, intrusi air laut ke daratan serta naiknya air laut ke daratan. Pengaruh salinitas akan semakin meningkat pada musim kemarau. Kondisi ini berdampak buruk pada tanaman kedelai yang biasa ditanam pada musim kemarau. Sampai saat ini belum ada varietas unggul kedelai yang toleran terhadap cekaman salinitas. Informasi toleransi varietas-varietas tersebut terhadap salinitas sangat terbatas. Penelitian toleransi terhadap salinitas tersebut sangat penting untuk mengetahui tingkat toleransi dari genotip-genotip kedelai yang diharapkan mempunyai tingkat toleransi terhadap salinitas yang relatif tinggi. Tujuan penelitian adalah untuk mendapatkan batas kritis toleransi salinitas genotip kedelai, mempelajari karakteristik agronomi dan fisiologi tanaman kacang kedelai terhadap cekaman salinitas.

Penelitian dilakukan di rumah kaca Balai Penelitian Tanaman Kacang-Kacangan dan Umbi dilakukan mulai bulan April – Agustus 2013. Penelitian dirancang menggunakan rancangan acak kelompok faktorial dimana perlakuan pertama ialah 4 level salinitas tanah yaitu L1: 0,9 dS m⁻¹, L2: 4 dS m⁻¹, L3: 7 dS m⁻¹ dan L4: 10 dS m⁻¹; perlakuan kedua adalah sebelas varietas/genotip kedelai yaitu (1) Wilis, (2) Tanggamus, (3) Gema, (4) LK/3474-403, (5) SU-7-1014, (6) MLG 2805-962, (7) MLG 3474-991, (8) IAC,100/Bur//Malabar 10-KP-21-50, (9) IAC,100/Bur//Malabar 10-KP-27-67, (10) IAC,100/Bur//Malabar 10-KP-3075 dan (11) Argopuro//IAC,100. Parameter pengamatan adalah tinggi tanaman, bobot kering tajuk, Bobot kering akar, Bobot kering total tanaman, indeks luas daun, kandungan klorofil daun, kandungan Na, K, Cl akar dan daun, DHL tanah.

Hasil penelitian menunjukkan bahwa pada level salinitas 7 dS m⁻¹ genotipe kedelai yang toleran adalah G8 (IAC,100/Bur//Malabar) dan agak toleran adalah G11 (Argopuro//IAC,100). Pada salinitas 10 dS m⁻¹ semua varietas/genotype tidak mampu bertahan sampai umur 43 das. Pada salinitas 4 dS m⁻¹ rata-rata varietas/genotype mengalami penurunan BK total tanaman sebesar 48,14% sedangkan pada salinitas 7 dS m⁻¹ rata-rata varietas/genotype mengalami penurunan BK total tanaman sebesar 64,89%. Varietas yang paling peka pada kondisi salinitas adalah G1 (Wilis) dan G2 (Tanggamus). Karakter agronomi dan fisiologi tanaman kedelai yang relatif toleran salinitas ditunjukkan dengan nilai IKC < 0.95, indeks klorofil daun lebih tinggi, skor keracunan visual yang lebih rendah, mengalami penurunan hasil <50% pada level salinitas 7 dS m⁻¹, konsentrasi K lebih tinggi dan Na lebih rendah, , bobot biji per tanaman dan bobot 100 bij lebih tinggi.

SUMMARY

Salinity become one threat to the sustainability of agriculture all countries in the world, including Indonesia. Until the mid- 21th century, the salinity is estimated to eliminate over 50% of productive land. Salinity problems in Indonesia have started to need to get serious attention, because in some areas reported increased levels of salinity of agricultural land. Increased salinity occurs naturally and due to human intervention due to : excessive chemical fertilization, irrigation ground water, sea water ingress into the land due to natural disasters, chemical pollution, sea water intrusion into the land and the sea rising to the mainland. Effect of salinity will increase in the dry season. These conditions have a negative impact on soybean crops commonly grown in the dry season. Until now there is no soybean varieties tolerant to salinity stress. Information varieties tolerant to salinity is very limited. Tolerance to salinity research is very important to know the level of tolerance of soybean genotypes are expected to have a higher tolerance to salinity is relatively high. The purpose of the study is to obtain the critical limit of salinity tolerance of soybean genotypes, learn agronomic and physiological characteristics of soybean plants to salinity stress.

The study was conducted in the greenhouse Indonesian Legumes and Tuber Crops Research Institute conducted from April to August 2013. The study was designed using a randomized block design where the first treatment was 4 levels of soil salinity, namely L1: 0.9 dS m⁻¹, L2: 4 dS m⁻¹, L3: 7 dS m⁻¹ and L4: 10 dS m⁻¹; treatment The study was designed using a factorial randomized block design where the first treatment was 4 levels of soil salinity, namely L1: 0.9 dS m⁻¹, L2: 4 dS m⁻¹, L3: 7 dS m⁻¹ and L4: 10 dS m⁻¹; The second treatment was eleven varieties / genotypes of soybean, namely (1) Willis, (2) Tanggamus, (3) Echo, (4) LK/3474-403, (5)-SU 7-1014, (6) MLG 2805-962, (7) MLG 3474-991, (8) IAC, 100/Bur // Malabar 10-KP-21-50, (9) IAC, 100/Bur // Malabar 10-KP-27-67, (10) IAC , 100/Bur // Malabar 10-KP-3075 and (11) Argopuro // IAC, 100.. Observation parameters were plant height, canopy dry weight, root dry weight, total plant dry weight, leaf area index, leaf chlorophyll content, the content of Na, K, Cl roots and leaves, DHL ground.

The results showed that the genotype G8 (IAC, 100/Bur // Malabar) tolerant to salinity level 7 dS m⁻¹ and medium-tolerant is G11 (Argopuro // IAC, 100). At salinity 10 dS m⁻¹ all varieties / genotypes were not able to survive until the age of 43 days after sowing (das). At salinity 4 dS m⁻¹, in general varieties / genotypes decreased total plant dry weight by 48.14%, while the salinity of 7 dS m⁻¹ total plant dry weight decreased by 64.89%. Willis and Tanggamus varieties classified as the most sensitive varieties. Agronomic and physiological characteristics of soybean plants that are relatively tolerant to salinity indicated by IKC value <0.95, higher leaf chlorophyll index, visual toxicity scores were low, 50% yield reduction in the level of salinity of 7 dS m⁻¹, relatively high concentrations of K and Na is lower, the dry weight of seeds per plant and dry weight of 100 seeds was higher

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