

INTISARI

Penapisan terhadap kultivar padi gogo lokal Sulawesi Tengah merupakan salah satu cara untuk mengetahui tanaman padi gogo yang berdaya hasil tinggi dan tahan terhadap cekaman kekeringan. Kriteria seleksinya menggunakan indikator anatomis, biokimia, fisiologis, maupun morfologis karena beberapa indikator tersebut memiliki hubungan dengan mekanisme ketahanan tanaman terhadap cekaman kekeringan. Oleh karena itu, penelitian ini dilaksanakan dengan tujuan untuk mengetahui hubungan karakter fisiologis dan morfologis dengan hasil tanaman dan tingkat ketahanan kekeringan kultivar padi gogo lokal Sulawesi Tengah. Penelitian terdiri atas 2 tahap dengan menggunakan wadah polibag yang dilakukan di rumah plastik Kebun Percobaan Banguntapan Fakultas Pertanian Universitas Gadjah Mada, dimulai bulan April 2017 hingga September 2018. Penelitian tahap 1 merupakan pemilahan 20 kultivar padi gogo lokal Sulawesi Tengah ke dalam kelompok hasil tinggi dan tahan kering (HT-TK), hasil rendah dan tahan kering (HR-TK), hasil tinggi dan tidak tahan kering (HT-TTK), serta hasil rendah dan tidak tahan kering (HR-TTK). Dua puluh kultivar padi gogo lokal yang digunakan adalah Habo, Sampara, Mea, Dupa, Gado, Sunggul, Makuni, Tarumbu, Landaeo, Berra, Ngofa, Batu, Hiwanggu, Ranta, Kelor, Makole, Wanga, Paria, Ngkaru, serta Lambara. Kondisi cekaman kekeringan dengan penyiraman 1 hari dan 8 hari sekali. Penelitian tahap 2 dilakukan dengan menggunakan kultivar terpilih dari Percobaan 1 Habo, Sunggul, Hiwanggu, serta Lambara yang masing-masing mewakili karakter HT-TK, HR-TK, HT-TTK, dan HR-TTK. Perlakuan cekaman kekeringan dengan penyiraman 1 hari sekali dengan kadar lengas 31,54% setara 94,60% kapasitas lapangan, penyiraman 2 hari sekali dengan kadar lengas 27,85% setara 83,53% kapasitas lapangan, penyiraman 4 hari sekali dengan kadar lengas 23,36% setara 70,07% kapasitas lapangan, serta penyiraman 8 hari sekali dengan kadar lengas 13,41% setara 40,22% kapasitas lapangan. Kajian tingkat ketahanan cekaman kekeringan meliputi aspek anatomis, biokimia, fisiologis serta morfologis. Kesimpulan penelitian yaitu: 1) Kadar lengas tanah optimum kultivar tahan kering Habo dan Sunggul berada antara 23,38% – 23,69% setara 70,13%–71,06% kapasitas lapangan, sedangkan kadar lengas tanah optimum bagi kultivar tidak tahan kering Hiwanggu dan Lambara antara 26,75%–27,11 setara 80,23%–81,31% kapasitas lapangan. 2) Kultivar karakter HT-TK: Habo, Sampara, Mea dan Dupa; HR-TK: Sunggul, Gado, Makuni, Batu, Landaeo, Tarumbu, Berra dan Ngofa; HT-TTK: Hiwanggu, Ranta, dan Kelor, serta HR-TTK: Wanga, Makole, Paria, Ngkaru dan Lambara. 3) Pada kondisi cekaman kekeringan, kultivar tahan kering mempunyai perakaran lebih berkembang, dinding sel epidermis dan korteks akar lebih tebal, jaringan xylem dan floem akar dengan diameter lebih besar, trikoma permukaan daun lebih rapat, sehingga tanaman mempunyai kadar air dan efisiensi penggunaan air lebih tinggi; mempunyai aktifitas antioksidan enzimatis dan non enzimatis lebih tinggi, sehingga dapat menekan aktivitas. *Reactive oxygen species* (ROS) dan kerusakan membran sel; mempunyai konduktansi stomata dan kandungan klorofil lebih tinggi sehingga mempunyai laju fotosintesis lebih tinggi; mempunyai pertumbuhan lebih cepat dan umur panen lebih pendek sehingga mengalami cekaman dalam waktu lebih singkat, dan mempunyai komponen hasil lebih tinggi, sehingga mempunyai hasil lebih tinggi dibanding kultivar tidak tahan kering. 4) Kultivar padi gogo lokal Sulawesi Tengah yang memiliki sifat tahan kering menggunakan mekanisme menghindar (*avoidance*) dan tahan (*tolerance*).

Kata kunci : kultivar padi gogo, cekaman kekeringan, kadar lengas tanah optimum, hasil

ABSTRACT

Screening on local upland rice cultivars of Central Sulawesi is one of strategy to figure out high-yielding and drought resistant upland rice plant. This selection uses anatomy, biochemical, physiological and morphological criteria since some indicators have relation with plant defense mechanism against drought stress. Therefore, this research was conducted to recognize the relationship of physiological and morphological characters with crop yield and drought resistance level of local upland rice cultivars of Central Sulawesi. The experiment consisted of two stages using polybag container in plastic house of Demonstration Plot of Banguntapan, Faculty of Agriculture, Universitas Gadjah Mada, from April 2017 until September 2018. First stage study was the screening on 20 cultivars of local upland rice of Central Sulawesi Tengah into high-yield and drought resistant (HT-TK), low-yield and drought resistant (HR-TK), high-yield and non-drought resistant (HT-TTK), as well as low-yield and non-drought resistant (HR-TTK) groups. Those 20 used local upland rice cultivars were Habo, Sampara, Mea, Dupa, Gado, Sunggul, Makuni, Tarumbu, Landaao, Berra, Ngofa, Batu, Hiwanggu, Ranta, Kelor, Makole, Wanga, Paria, Ngkaru and Lambara. Drought stress condition was watering of once in a day, two, four and eight days. Second stage research used the selected cultivars from first experiment, i.e. Habo, Sunggul, Hiwanggu and Lambara representing the categories of HT-TK, HR-TK, HT-TTK and HR-TTK, respectively. Treatments of drought stress were once watering in a day with soil moisture of 31.54% equal to 94.60% of field capacity, once watering in two days with soil moisture of 27.85% equal to 83.53% of field capacity, once watering in four days with soil moisture of 23.36% equal to 70.07% of field capacity and once watering in eight days with soil moisture of 13.41% equal to 40.22% of field capacity. The study on drought resistance level included anatomy, biochemical, physiological and morphological aspects. The results showed that optimum soil moisture for drought resistant cultivars of Habo and Sunggul were 23.38%–23.69% equal to 70.13%–71.06% of field capacity in range, whereas the optimum soil moisture for non-drought resistant cultivars of Hiwanggu and Lambara were ranging from 26.75%–27.11% equal to 80.23%–81.31% of field capacity. The cultivars of Habo, Sampara, Mea and Dupa were grouped into HT-TK category; the cultivars of Sunggul, Gado, Makuni, Batu, Landaao, Tarumbu, Berra and Ngofa were HR-TK; the HT-TTK group involved Hiwanggu, Ranta and Kelor cultivars; while the HR-TTK category included Wanga, Makole, Paria, Ngkaru and Lambara cultivars. Under drought stress condition, drought resistant cultivars were characterized with more developed rooting, thicker cell walls of epidermis and root cortex, larger diameter of xylem and root phloem tissues, more tightly of trichome on leaf surface, so that they had higher water content, water use efficiency as well as activities of enzymatic and non-enzymatic antioxidants. Such condition could suppress the ROS activity and damage of cell membrane. In addition, those cultivars possessed higher stomatal conductance, chlorophyll content, photosynthetic rate, yield components and production, as well as faster growth and shorter harvest age so that they experienced the stress in shorter time compared to non-drought resistant cultivars. The drought resistant local upland rice cultivars of Sulawesi Tengah had resistance mechanisms of avoidance and tolerance.

Keywords: upland rice cultivar, drought stress, optimum soil moisture, yield