Seleksi kapang pendegradasi dioksin dengan pendekatan penghilangan warna remazol brilliant blue R dan poly S-119 serta pengukuran aktivitas enzim ligninolitik = Selection of fungi for dioxin degrading by decolorization of remazol brilliant blue R and poly S-119 also measurement ligninolytic activities

Husnun Hamidah Abbas, author

Abstrak

[Dioksin merupakan senyawa berbahaya yang dapat menyebabkan gangguan kulit, hati, hingga menimbulkan kanker. Degradasi dioksin dapat dilakukan oleh mikroorganisme seperti kapang yang menghasilkan enzim ligninolitik. Penelitian bertujuan untuk mendapatkan kapang yang memiliki enzim ligninolitik sehingga berpotensi dalam mendegradasi dioksin. Aktivitas enzim ligninolitik terlihat dari penghilangan warna pada Remazol Brilliant Blue R (RBBR) dan Poly S-119. Metode penelitian meliputi seleksi pada medium padat dan cair, pengukuran aktivitas enzim ligninolitik, serta identifikasi isolat. Seleksi kapang pada medium padat dilakukan dengan medium yang mengandung RBBR dan Poly S-119. Seleksi cair dilakukan dengan mengukur degradasi warna dan aktivitas enzim ligninolitik (lakase, mangan peroksidase, dan lignin peroksidase). Isolat hasil
seleksi diidentifikasi molekular 28S rRNA menggunakan primer NL-1 dan NL-4. Hasil seleksi padat menunjukkan sembilan isolat dengan zona degradasi, yaitu FIG- KT-540.1; F-IG-KT-539.2; F-IG-PT-6.3; F-IG-PT 1.16; F-IG-PT-2.14; F-IGPT- 2.5; F-IG-PT-2.7; F-IG-PT-3.1; dan F-IG-PT-2.11. Hasil seleksi cair menunjukkan dua isolat memiliki kemampuan mendegradasi warna tinggi yaitu FIG- KT-540.1 sebesar 59% mendegradasi warna RBBR dan F-IG-PT 1.16 sebesar 85% mendegradasi warna Poly S-119. Isolat F-IG-KT-540.1 dan F-IG-PT 1.16 memiliki aktivitas MnP yang tinggi sebesar 0,0132 dan 0,0186 OD/ml sampel/menit. Identifikasi kedua isolat menunjukkan isolat F-IG-KT-540.1 adalah Aspergillus oryzae dengan nilai bootstrap 99 dan isolat F-IG-PT 1.16 adalah Penicillium charlesii dengan nilai bootstrap 98. Kesimpulan yaitu isolat F-IG-KT-
540.1 dan F-IG-PT 1.16 yang memiliki kemampuan tinggi mendegradasi warna berpotensi mendegradasi dioksin. Penelitian lebih lanjut perlu dilakukan untuk mengetahui sinergi antara kedua isolat dalam mendegradasi dioksin.
.....Dioxins are harmful compounds which can damage skin, liver, and cause cancer. It can be degraded by microorganisms such as fungi with its ligninolytic enzymes. The research aim was to obtain fungi that has ligninolytic enzymes which potentially degrade dioxin. Activity of ligninolytic enzymes was showed from decolorization of Remazol Brilliant Blue R and Poly S-119 dye. Methods of the research include selection on solid medium and liquid medium, measurement of ligninolytic activity, and identification of fungal isolates. Selection on solid medium was carried out using RBBR and Poly S-119 dye. Selection on liquid medium was carried out through measurement on the color degradation and activity of ligninolytic enzymes (laccase, manganese peroxidase, and lignin peroxidase). The potential isolates in liquid selection medium were identified on 28S rRNA with NL-1 and NL-4 primers. The result showed that nine isolates have the degradation zone in a solid medium. They were F-IG-KT-540.1; F-IG-KT- 539.2; F-IG-PT-6.3; F-IG-PT 1:16; F-IG-PT-2:14; F-IG-PT-2.5; F-IG-PT-2.7; FIG- PT-3.1; and F-IG-PT-2.11. In liquid selection

medium, F-IG-KT-540.1 and FIG-
PT 1.16 isolates showed high capability to degrade dyes. Percentage of RBBR degradation in isolate F-IG-KT-540.1 was 59% and percentage of Poly S-119 degradation in isolate F-IG-PT-1.16 was 85%. Both F-IG-KT-540.1 and F-IG-PT 1.16 isolate have high activity of MnP. Activity of MnP of those isolate were 0,0132 and 0,0186 OD/ml/minutes respectively. The result of identification showed that F-IG-KT-540.1 isolate was Aspergillus oryzae with value of
bootstrap 99 and F-IG-PT-1.16 isolate was Penicillium charlesii with value of bootstrap 98. From this research, F-IG-KT-540.1 and F-IG-PT 1.16 isolates which have capability to degrade dyes potential for degrading dioxin. Further research is needed to determine the synergy between isolates F-IG-KT-540.1 and F-IG-PT- 1.16 to degrade dioxin., Dioxins are harmful compounds which can damage skin, liver, and cause cancer.
It can be degraded by microorganisms such as fungi with its ligninolytic enzymes.
The research aim was to obtain fungi that has ligninolytic enzymes which
potentially degrade dioxin. Activity of ligninolytic enzymes was showed from
decolorization of Remazol Brilliant Blue R and Poly S-119 dye. Methods of the
research include selection on solid medium and liquid medium, measurement of
ligninolytic activity, and identification of fungal isolates. Selection on solid
medium was carried out using RBBR and Poly S-119 dye. Selection on liquid
medium was carried out through measurement on the color degradation and
activity of ligninolytic enzymes (laccase, manganese peroxidase, and lignin
peroxidase). The potential isolates in liquid selection medium were identified on
28S rRNA with NL-1 and NL-4 primers. The result showed that nine isolates have
the degradation zone in a solid medium. They were F-IG-KT-540.1; F-IG-KT-
539.2; F-IG-PT-6.3; F-IG-PT 1:16; F-IG-PT-2:14; F-IG-PT-2.5; F-IG-PT-2.7; FIG-
PT-3.1; and F-IG-PT-2.11. In liquid selection medium, F-IG-KT-540.1 and FIG-
PT 1.16 isolates showed high capability to degrade dyes. Percentage of RBBR
degradation in isolate F-IG-KT-540.1 was 59% and percentage of Poly S-119
degradation in isolate F-IG-PT-1.16 was 85%. Both F-IG-KT-540.1 and F-IG-PT
1.16 isolate have high activity of MnP. Activity of MnP of those isolate were
0,0132 and 0,0186 ΔOD/ml/minutes respectively. The result of identification
showed that F-IG-KT-540.1 isolate was Aspergillus oryzae with value of
bootstrap 99 and F-IG-PT-1.16 isolate was Penicillium charlesii with value of
bootstrap 98. From this research, F-IG-KT-540.1 and F-IG-PT 1.16 isolates which
have capability to degrade dyes potential for degrading dioxin. Further research is
needed to determine the synergy between isolates F-IG-KT-540.1 and F-IG-PT-
1.16 to degrade dioxin.]