

# Isolasi dan seleksi kapang halotoleran serta aplikasinya pada tanaman padi (*Oryza sativa* L.) varietas ciherang = Isolation and selection halotoleran fungi and its application in paddy (*Oryza sativa* L.) var. ciherang

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Abstrak

## **ABSTRAK**

Intrusi air laut ke daratan telah menjadi fenomena alam global. Salah satu dampak yang ditimbulkan dari kejadian tersebut adalah perubahan komunitas mikroba. Perubahan komunitas mikroba sangat berpengaruh pada tingkat kesuburan tanah. Pemanfaatan daerah pesisir untuk kegiatan pertanian akan sangat dipengaruhi oleh dampak perubahan tersebut. Pemanfaatan mikroba halotoleran sebagai biofertiliser diharapkan dapat meningkatkan hasil pertanian. Telah dilakukan penelitian mengenai isolasi dan seleksi kapang halotoleran pelarut fosfat dan penghasil IAA serta aplikasinya pada tanaman padi varietas Ciherang untuk mendapatkan isolat kapang halotoleran yang dapat digunakan sebagai agen biofertiliser dalam kondisi lingkungan salin. Diisolasi sebanyak 74 isolat kapang dari lingkungan mangrove Pulau Laki, Kepulauan Seribu dan Suwung, Bali. Tujuh isolat memiliki kemampuan pelarutan Ca-P yang tinggi. Pengujian ketahanan pertumbuhan pada variasi konsentrasi NaCl (0, 2, 5, 10, dan 20%) diperoleh satu isolat, yaitu PBB 3.1 yang mampu tumbuh sampai konsentrasi 20%. Isolat tersebut mampu melarutkan Ca-P sebanyak 68,97 mgL<sup>-1</sup> pada konsentrasi 2% NaCl pada inkubasi 72 jam. Produksi IAA tertinggi dicapai pada konsentrasi 0% NaCl, pada inkubasi 48 jam sebesar 0,533 mgL<sup>-1</sup>. Isolat PBB 3.1 diidentifikasi secara molekular sebagai *Aspergillus niger* (van Tieghem 1867).

Aplikasi inokulan *Aspergillus niger* PBB 3.1 dilakukan pada skala rumah kaca pada tanaman padi (*Oryza sativa* L.) varietas Ciherang, dengan variasi konsentrasi salinitas 0; 1,0; 1,5; 2,0 dan 2,5%. Pemberian inokulan *Aspergillus niger* PBB 3.1 sebanyak 200 g/10 kg pada media tanam berpengaruh terhadap pertumbuhan tanaman padi. Indikasi ini terlihat dari meningkatnya nilai FDA, populasi kapang, tinggi tanaman, jumlah anakan, dan bobot 1000 butir. Pemberian inokulan pada salinitas 0% mampu meningkatkan bobot 1000 butir sebesar 52%. Sedangkan pada salinitas 1,0% terjadi peningkatan produktivitas sebesar 144%. Mekanisme pengaruh inokulan *Aspergillus niger* PBB 3.1 masih perlu terus dikaji. Namun, fenomena tersebut membuktikan bahwa isolat *Aspergillus niger* PBB 3.1 berpotensi untuk dikembangkan sebagai inokulan biofertiliser pada tanaman padi varietas Ciherang yang ditanam dalam kondisi salin sampai 1,0%.

.;Intrusion of sea water into terrestrial environment is global phenomenon. One of the possible impacts of the sea water intrusion is the soil microbial community structures disturbances. The Change of soil microbial community structure will affect greatly soil fertility, and thus influence utilization of coastal areas for agricultural activities. The use of halotolerant microbes as biofertilizer in coastal areas are expected to increase agricultural yield.

*This research focused on the isolation and selection of halotolerant fungi and their application for biofertilizer of paddy (*Oryza sativa* L.) var. Ciherang. The special objective was to obtain halotolerant fungus which is capable of stimulating phosphate solubilization and producing growth hormone (IAA) in*

saline condition. Seventy four isolates fungi were obtained from mangrove and coastal environment of Laki Island in the Kepulauan Seribu and Suwung, Bali. Seven isolates were having good Ca-P solubilizing capacity. These isolate were further evaluated for their ability to grow under various NaCl concentration 0, 2, 5, 10, and 20%. One isolate *Aspergillus* (PBB.3.1) was proven to grow at 20% salinity. The strain was able to solubilize Ca-P of 68.97 mgL<sup>-1</sup> at salinity 2% after 72 hours, whereas IAA produced maximum 0.533 mgL<sup>-1</sup> at 0% salinity after 48 hours. Based on the ITS1 and ITS2 of LSU analyses, this strain was identified as *Aspergillus niger* (van Tieghem 1867).

Application of *Aspergillus niger* PBB 3.1 as biofertilizer for paddy (*Oryza sativa* L.) var. Ciherang was conducted in greenhouse. Five concentration of salinities were evaluated 0; 1.0; 1.5; 2.0 and 2.5%. Using 200 g/10 kg inoculant *Aspergillus niger* (PBB.3.1) stimulated the growth of paddy as indicated by an increase in FDA, population of fungi, plant height, panicle production and weight of seeds. Using 200 g/10 kg inoculant clearly affected the weight of 1000 grains, which can be seen on the 0% achieved 52% increase, whereas at 10% the weight of 1000 grains was much more stimulated, namely about 144%. The mechanism by which *Aspergillus niger* PBB 3.1 affect the growth and yield of paddy need further verification. Our experiment clearly noted that *Aspergillus niger* PBB 3.1 has the potential to be developed as biofertilizer for *Oryza sativa* L. var. Ciherang grown under saline conditions up to 1.0%.; Intrusion of sea water into terrestrial environment is global phenomenon. One of the possible impacts of the sea water intrusion is the soil microbial community structures disturbances. The Change of soil microbial community structure will affect greatly soil fertility, and thus influence utilization of coastal areas for agricultural activities. The use of halotolerant microbes as biofertilizer in coastal areas are expected to increase agricultural yield.