Isolation and Characterization of Phosphate Solubilizing Fungi From Andisol impacted by Mount Sinabung Eruption, North Sumatera

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Abstract
Isolation of microbial solubilizing phosphate from Andisol impacted by the eruption of Mount Sinabung has been done in the laboratories Soil Biology of the Faculty of Agriculture USU. This study aimed to obtain microbial solubilizing phosphate sourced from Andisol affected by the eruption of Mount Sinabung. Isolation using pikkovskaya media with a source of phosphate Ca$_3$(PO$_4$)$_2$. Results of the research that has been conducted done produce 5 isolates were grouped by similarity of color colony which is then purified ie fungal isolates that have the colony color black coded AJ1, fungal isolates which have a colony color yellowish coded AJ2, isolates fungal colonies which have color coded green light AJ3, fungal isolates which have a black colony color coded AJ4 and isolate colonies of fungi which has a dark green color coded AJ5.

Keywords: Andisol, Isolation, phosphate solubilizing fungi

Introduction
Phosphorus (P) is required by the plants for vital functions such as cell division (Saber et al., 2005; Zaidi et al., 2009; Elser 2012). The total soil P, only 0.1 % is plant available and the remaining soil P is inaccessible to plants. Andisol have the ability to retain large amounts of phosphate, Research Mukhlis et al (2014) retention of P in Andisol ranged from 94.22 to 99.91 % indicate that the retention of P is very high. In this regard the biopreparation containing viable and sufficient number of efficient phosphate solubilizing microorganisms (PSM) has provided some solution to the P problems (Ahmed and Khan 2010; Hui et al. 2011; Xiang et al. 2011; Khan et al. 2013). The existence of microorganisms phosphate solubilizing from one place to another is very diverse. One of the factors that cause such is the nature of biological diversity. There are living underacidic conditions, and some are living in neutral and alkaline conditions, there are xerophilic, mesophilic and thermophilic, living there as there are aerobic and anaerobic, and severaother properties that vary. Each of
these microorganisms have special characteristics and optimal environmental conditions different influencing the effectiveness of dissolving phosphate. In addition, the pH also affects the activity of microorganisms in the soil. The content of volcanic ash from the eruption of Mount Sinabung the relatively acidic pH of 3.6 to 4.98. Soil mixed with volcanic ash pH 4.83 (Balitbangtan, 2014; Sukarman and soeparto, 2015).

Phosphate solvent microorganism growth is strongly influenced by soil acidity. On acid soils, microorganisms activity dominated by fungi because the fungi growth optimum at pH 3 to 5.5. Fungi growth decreases when the pH increases. Shaped fungi in soil or vegetative mycelium spores. Phosphate solubilizing microorganism activity is highly dependent on soil pH (Soepardi, 1983). In the laboratory, the detection and estimation of the ability of microorganisms phosphate solubilizing is done by using the Petri dish method. Selective media commonly used to isolate and multiply organism phosphate solubilizing is a medium that Pikovskaya, the potential for microorganisms to dissolve the phosphate unavailable qualitatively characterized by a clear zone (halozone) around the colony.

Material and Methods

The place and time of the study
Sampling was conducted in the District NamanTeranKaro district of North Sumatra province. For insulation in Soil Biology Laboratory of the Faculty of Agriculture USU. The experiment was conducted in February 2015- June 2015. Materials used in this study is that soil samples taken from the rhizosphere of potato plants affected by the eruption of Mount Sinabung, Media Pikovskaya, distilled water and chemicals used for analysis in the laboratory. The tools used in this study is a drill ground, autoclave, petridish, Laminar Air Flow, as well as other tools used during the study. Soil sampling taken from a potato plant rhizosphere area affected by volcanic eruption Sinabuang composite at a depth of 0-20cm.

Isolation phosphate solubilizing microorganism. Soil 10g put into 250 ml Erlenmeyer flask containing 90 ml of sterile physiological solution and then made up to 5 times dilution. Worn suspension of 3 dilution land in anticipation of the dilution is not obtained fungus phosphate solvent. Furthermore, pour 12 ml of media Pikovskaya (temperature 45 - 50°C) into a petri dish containing 1 ml suspension had been ground, let it media harden (solid), the petri dish was incubated in an incubator and upside down for 3 days with a temperature of 28-30°C. After incubation for 3 days was observed growing on the media. The existence of microbial
phosphate solvent indicated by the formation of clear zone (holozone) surrounding the colony. The colony is then purified and separated by color similarity colonies formed. Hypa or fungal colonies placed on a glass slide, the glass culture incubated for 3 days at room conditions. After an incubation period, a fungus that grows on a glass slide which was observed mikroskopisnya characteristic feature of hyphae, hyphae branching type, as well as the characteristics of conidia under the microscope.

**Results and Discussion**

Andisol soil samples which have been isolated were observed growth by presence or absence of clear zone (holozone) is formed. Isolation fungal phosphate solubilizing has been done produce 5 isolates were grouped by similarity of color colony that fungal isolates that have the colony color green coded AJ1, fungal isolates which have a colony color yellowish coded AJ2, fungal isolates which have a colony color light green coded AJ3, fungal isolates which have a black colony color coded AJ4 and fungal isolates which have colonies of green color - black coded AJ5. To more clearly seen in the following table.

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Characterization of phosphate solubilizing fungal macroscopically and microscopically directly and microscopically using a microscope that fungal isolates obtained results with macroscopic characteristics AJ1 code shown in the form of a light green colored colonies that grow slowly for approximately 9 cm in 7 days. Surface looks like velvet with a flat edge colony. Microscopic characteristics unbranched conidiophores and conidia are smooth walled with elliptical or oval. Isolates AJ2 code macroscopic characteristics such as the color yellow colonies initially but over time turn green with thick velvety surface. Growth reached 9 cm in 7 days, with branching conidiophores and conidia are elliptical.

Isolates AJ3 code in the form of macroscopic characteristics of the early colony color light brown then develops into greenish white but brown the more dominant colony by colony uneven edge. Growth colonybe come slow, reaching more than 3.2 cm in 7 days, growth is irregular. While microscopic characteristics that branched conidiophores conidia form a pyramid with a round to oval. Isolates AJ4 code macroscopic characteristics such as the color of colonies was originally white then black as powder. Growth reached 9 cm in diameter in 7 days. One colony joined with the others so that the petri dish full of black spores. Microscopic characteristics that conidia are black, round and tend to split and has ornamentation in the form of thorns irregular. Conidiophores unbranched and thin-walled.

Isolates AJ5 code has a characteristic macroscopic colonies in the form of color green with a flat edge colony. Growth reached more than 9 cm in 7 days. Form colonies in petri dishes like flowers and very quickly meet the petri dish. While microscopic characteristic that is thin unbranched conidiophores with conidia are round to oval.
Conclusion

Activity insulation produces 5 isolates were grouped by similarity of color colony which is then purified ie fungal isolates that have the colony color Black coded AJ1, isolates fungus colony color yellow code AJ2, fungal isolates which have a colony color light green code AJ3, fungal isolates had colony color black coded AJ4 and fungal isolates which have a green colony color coded AJ5.

References


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