

**POT EXPERIMENTAL OF H₂S SPENT AC
ADSORBENT AS A POTENTIAL GREEN
SOIL CONDITIONER TO ENHANCE PLANT
GROWTH**

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**BACHELOR OF CHEMICAL ENGINEERING
(ENVIRONMENT) WITH HONOURS**

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AS A POTENTIAL GREEN SOIL CONDITIONER TO
ENHANCE PLANT GROWTH**

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ABSTRACT

AC is a carbon-rich stable substance with highly porous material that has been used for H₂S removal from gas streams. However, the spent AC generated from the H₂S removal may lead to the waste management issue since it is listed as schedule waste in Forth Schedule of the Environmental Quality Regulations 2005. Due to its physical and chemical characteristics, spent AC may be potentially utilized as a soil conditioner. The main objective of this study was to investigate the effect of H₂S spent Activated Carbon (AC) adsorbents on the plant growth via pot experimental and to analyse the characteristics of used soil and H₂S spent AC adsorbents as a potential green soil conditioner. Initially, raw AC and spent pre-oxidized AC were subjected to H₂S adsorption process. Then, three (3) different spent adsorbents: (1) raw AC, (2) H₂S spent AC and (3) H₂S spent pre-oxidized AC were tested on chili's plants for about 2 weeks. Finally, the analysis of plant growth was done by using Statistical Package for the Social Sciences (SPSS). Besides, the characterization of H₂S spent adsorbent and used soil were attempted by using Bruner–Emmett–Teller (BET) and Inductively Coupled Plasma – Optical Emission Spectrometry (ICP-OES). As a result, the H₂S spent pre-oxidized AC yielded the highest plant growth compared to H₂S spent AC and raw AC. Besides, the H₂S spent pre-oxidized AC showed a large surface area and micropore volume (553.2027 m²/g and 0.331428 cm³/g) compared to raw AC (518.4858 m²/g and 0.303345 cm³/g). Lastly, all treated soil comprised of Mg, Ca, Cd, Zn, Mo, Co, Cu, Mn, Fe and Ni, with Fe had the highest concentration in H₂S spent pre-oxidized AC (122.8 mg/L). In a nutshell, H₂S spent pre-oxidized AC is the best soil conditioner to boost chili's plant compared to the H₂S spent AC and raw AC due to high surface area, large micropore volume and consisted of various minerals and heavy metal contents.