

# VEGETATION TYPES EXPLORATION OF GOLD HYPERACMULATORS WHICH ARE POTENTIAL AS PHYTOMINING AGENTS IN EX-GOLD MINING LAND

by Tien Aminatun, Anna Rakhmawati, Sri Atun

## ABSTRACT

Gold phytomining is the extraction of gold from soil substrates by harvesting specially selected hyperaccumulator plants. Exploration of vegetation types that have the potential to act as hyperaccumulators needs to be carried out, among others by investigating plant species that are able to grow and develop well in mining areas, then analyze the concentration of gold in the soil and plant biomass. Therefore, the objectives of this research are to: (1) find out what types of vegetation are able to grow and develop well at the gold mine site; (2) analyzing the concentration of gold content in the ex-gold mine soil and the dominant plant biomass in the gold mining area; and (3) analyzing the potential of the dominant vegetation in the former gold mine site as a hyperaccumulator in phytomining.

This research is an exploratory research with survey method. The research location is in the gold mining area in Ratatotok, Southeast Minahasa Regency, North Sulawesi, which is mostly the IUP area of PT Sumber Energi Jaya. The research variables are: (1) the types of plants that make up the vegetation community at the research site; (2) the concentration of gold content in soil samples taken from the research site; and (3) the concentration of gold content in plant specimens whose population is dominant in the vegetation community structure that makes up the ecosystem at the study site. The stages of work in this research include: (1) determining the sampling location which consists of 3 segments based on the duration of mining activity, and each segment has 5 sampling plots; (2) soil sampling was carried out for each sampling location and laboratory tests on the gold content in each soil sample were carried out at the Environmental Engineering Laboratory, Islamic University of Indonesia, Yogyakarta; (3) measurement of climatic and edaphic parameters in each sampling plot; (4) vegetation analysis for each segment; and (4) measurement of the gold content of plant specimens at the Environmental Engineering Laboratory of the Islamic University of Indonesia, Yogyakarta. Data analysis includes analysis of vegetation community structure by calculating INP and Diversity Index, different test using ANOVA for data on gold concentration in soil samples and plant specimens, as well as descriptive analysis conducted to see differences in plant community structure between segments.

The research results are; (1) The types of vegetation that are able to grow and develop well at the gold mine site consist of herbaceous, shrub/shrub and tree strata, with the highest diversity of vegetation being at the Bulex-2 mine site which has the highest gold content compared to other sites, and has a dominant mineral type of quartz, a small amount of kaolinite and plagioclase; (2) Site Bulex1 (location A) has the highest average soil gold content compared to other sites, with the highest content of 1,286 ppm. Both Bulex1 (location A) and Leon (location B) had gold content still above the economic threshold ( $>0.2$  ppm), while Bulex 2 (Location C) averaged slightly below the economic threshold, with the lowest gold is 0.029 ppm. None of the gold content in the sample plants reached 0.2 ppm. Tridax procumbens which was dominant in locations with the highest soil Au accumulated quite high Au also compared to other dominant vegetation types; and (3) Tridax procumbens, which is the dominant herb at gold mining sites, is suspected to have the potential as a hyperaccumulator in phytomining, but further studies are needed to test this assumption.

Kata Kunci: *hyperaccumulator vegetation, phytomining, gold mining*