

# The Study of The Heavy Metal Adsorption to Absorption Ratio in The Spanish Moss (*Tillandsia usneoides* L.)

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## II. METHODOLOGY

**Abstract**—This research aimed to investigate the using of Spanish moss (*T. usneoides* L.) to be the passive sampler to trap the heavy metal air pollution by measuring the quantitative ratio of the Mercury's adsorption to absorption. Plant samples were placed into 4 sets of 4 corners at the Gas Separation Plant, Songkhla Province for 6 months (May to October, 2014). Samples were kept month to month to analyze via the Inductively Coupled Plasma Optical Emission Spectrometer (ICP-OES), Atomic Absorption Spectrometry (AAS) and Scanning Electron Microscopy (SEM). The result showed that Pb was indeed present in *T. usneoides* L. at  $4.30 \pm 0.05$  mg Pb per kg plant.

**Keywords**— *Tillandsia usneoides* L., Adsorption to Absorption Ratio, Heavy Metals.

## I. INTRODUCTION

AIR pollution is the most difficult problem to be handled because of the wide boundary with various factors. The transportation sectors or industry sectors always have the combustion system which causes the dust or particle matters problem including the problem of heavy metals. Even though the Pollution Control Department of Thailand has launch the protection regulation but the measurement is difficult and costly. Using plants as biomonitor seems to be a good monitoring method.

This research used Spanish moss (*Tillandsia usneoides* L.) of the Bromeliaceae family which is air plant type. The characteristic of plant is epiphyte or no need soil. On the long line of plant, there are trichomes or scale leaves [1] [2] look like white hairy. The trichome can absorb the moisture in the air resulting in low maintenance of plant. This kind of plant is CAM plants which open the stomata during the night time to consume the water very efficient [3]. This plant can absorb the dust containing heavy metals [4] such as cadmium, copper, vanadium, manganese, iron, cobalt, nickel [5] and mercury in the air [6][7]. It can be used as biomonitoring in the industrial and urban area [8] including the natural gas separation plant in Songkhla, Thailand for this study.

This research was to study the bearded hermit species existing in Thailand. For example, in testing for heavy metals in the air. The sampling and laboratory analysis to account for the absorption and bioavailability of mercury. Conducted for a period of six months and given a trial in the Trans Thai - Malaysia (Thailand) Limited, Chana District, Songkhla Province.

2.1 The Spanish moss 80 cm length is hung on of the steel frames 100 cm width at four corners of the gas separation by placing the north, south, east and west of the Trans Thai - Malaysia (Thailand) Limited, Songkhla. (Fig.1).



Fig. 1: Sample set of Spanish moss around at 4 sites of the Trans Thai - Malaysia (Thailand) Limited

2.2 The sampling and analysis of mercury adsorption to absorption ratio had done every month for the period of 6 months (June 2014 - October 2014). The area is around the Trans Thai - Malaysia (Thailand) Limited, Songkhla.

2.3 The analysis will check the amount of lead, cadmium, mercury in Spanish moss by cleaning the sampled with water and find the heavy metal in both from water and in the washed plant in order to calculate the ratio.

## III. RESULT AND DISCUSSION

The results of the analysis of Hg, Cd and Pb (in mg/kg) for the first month in June 2014 showed that there is only Pb  $4.30 \pm 0.05$  mg Pb per kg plant whereas other heavy metal is lower than the detection limit.

## IV. CONCLUSION

For the first month of testing, the result shows that there is

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some Lead in Spanish moss. The trace back to the raw material or the process of the gas separation as the source of Lead may not from the factory. For the further study, the second month testing might be done to ensure the result. The sampling and measurement is however investigated for the correctness.

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