

# Stress Reaction to Several Plant on Pb Pollution Soil

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## 1. Introduction

In recent years, in the conventional physical chemistry processing, the soil pollution by organic matter and inorganic matter with correspondence poses a problem. One of the solution is phytoremediation using plant absorption power. The 1980s have the report that a plant suffers growth damage from the influence of the heavy metals contained in an automobile exhaust gas. According to the paper, the amount of metal contamination changes in the distance from a pollution source, and influence on a plant also changes. Change of the plant by soil pollution concentration may be able to be performed with the Natural Vegetation Index of soil pollution. This research examines the possibility of the Natural Vegetation Index from amount of pollution which utilized phytoremediation. The method prepared the lead pollution soil in which concentration differs, and planted several sort plant. The appearance change about the growth influence and color to them was monitored.

## 2. Materials and Methods

It measured within the green house in Kanagawa Prefecture. as a planting container, the PVC pipe (D15 cm xH50 cm) was attached, and put 60 PVC pipe in a one division(Photo 1, Fig 1). What mixed AKADAMA-soil by the pellet and medium AKADAMA-soil density 1:1 is used for soil. Each experimental unit which set the experiment unit to the hundredfold unit (10mg Pb/kg-dry soil) of the decuple unit (1mg Pb/kg-dry soil) of an unpolluted division and Pb, and Pb is an environmental standards

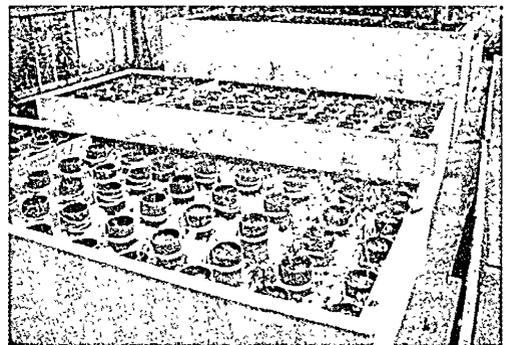


Photo 1 Equipment for an experiment

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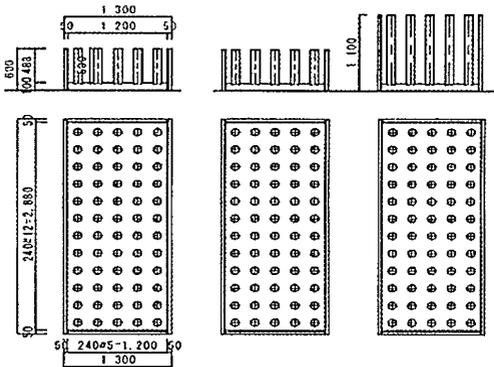


Fig.1 Equipment for an experiment

value of Japan (the amount inspection of elution). In the lowermost part, the 30-cm-thick adsorption layer which used heavy metal adsorption material was constructed. *Artemisia indica var. maximowiczii*, *Chenopodium album var. centrorubrum*, and *Zoysia japonica* are prepared for an experiment plant. It planted a total of three types of plant sorts at a time.

### 3. Results

In Pb division, although decline of leaf thickness had occurred certainly compared with the Cont. division, the difference in the numerical value by concentration was seldom able to be seen. Furthermore, the decuple of Pb had the increase in the number of leaves in July and afterwards. However, in the centuplicate of Pb, the tendency did not appear mostly. In stem length, the increase in stem length by the decuple of Pb was seen in the *Artemisia indica* and *Chenopodium album* division, and the centuplicate of Pb showed the downward tendency (Fig.2 ~ 4). More than showed that growth of a plant had a difference with the quantity of Pb in soil. A possibility that the soil pollution land survey using a plant could be performed by this was suggested.

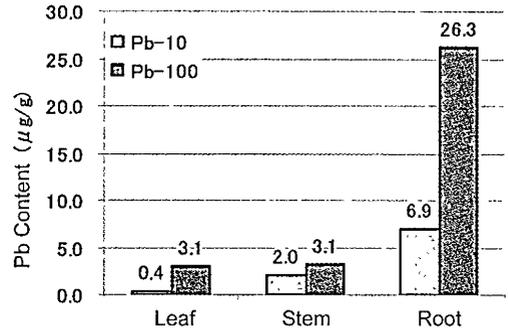


Fig.2 Content of Pb in *Artemisia indica* (Comparison with cont.)

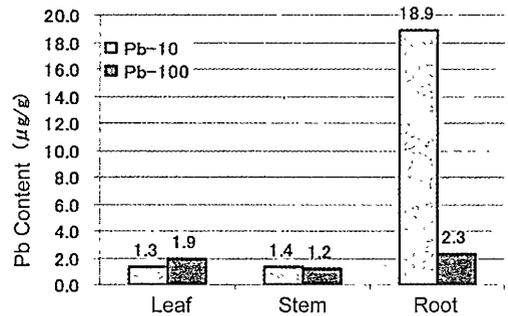


Fig.3 Content of Pb in *Chenopodium album var. centrorubrum* (Comparison with cont.)

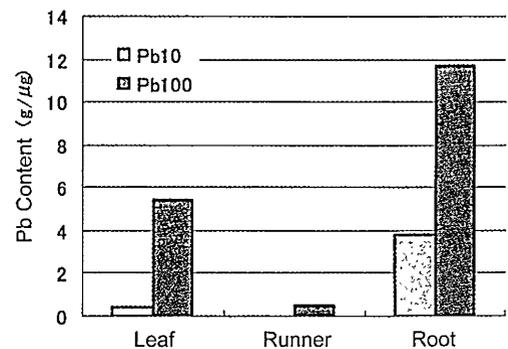


Fig.4 Content of Pb in *Zoysia japonica* (Comparison with cont.)

In this experiment, the value in [ Ec ] soil showed around 0.08 in almost all soil. A thing without change of the big soil by the heavy metal addition to soil is seeded. Based on it, the measurement result of each plant is

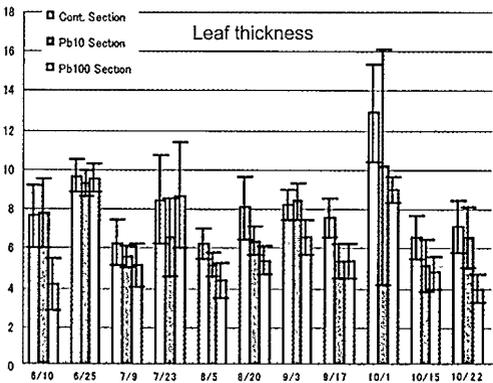
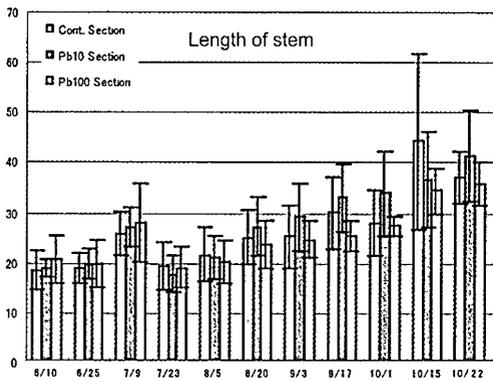
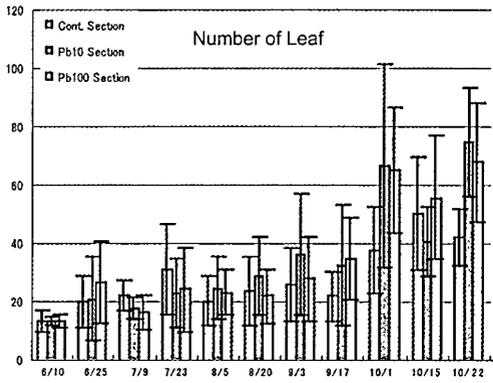


Fig.5 The growth situation of *Artemisia indica*

shown below.

*Artemisia indica* (Fig.5 ~ 7) : In the decuple of Pb, an average of 40% of increase in the number of leaves was seen from the second half of July. However, in the centuplicate of Pb, it was transition lower

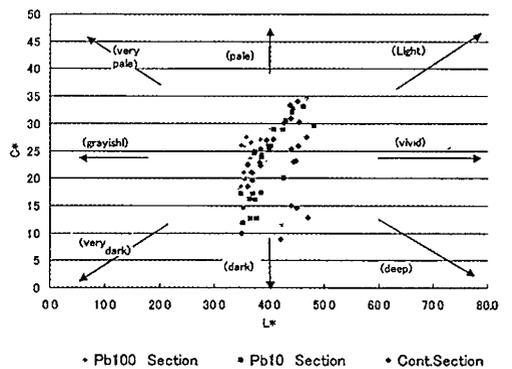
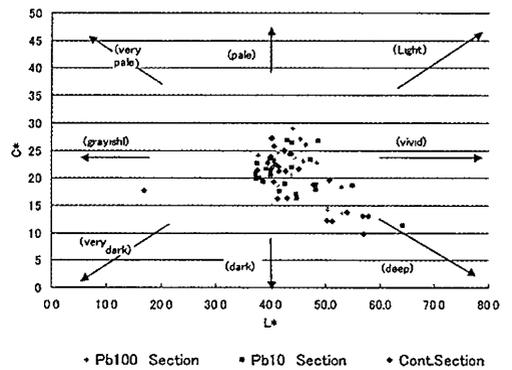
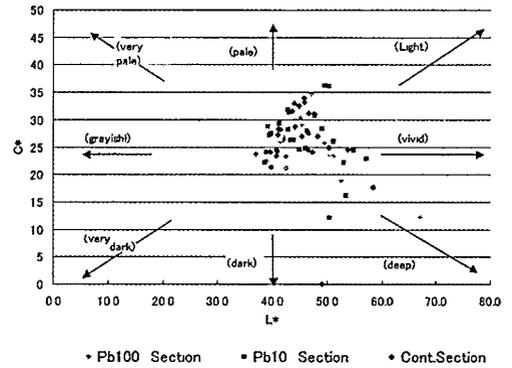


Fig.6 Color tone of *Artemisia indica*

than a Cont. division. About stem length, an average of 10% of increase was seen by the decuple of Pb. In the centuplicate of Pb, growth prevention was seen for a while. Furthermore, about 25% of reduction of leaf thickness was seen for both Pb(s)

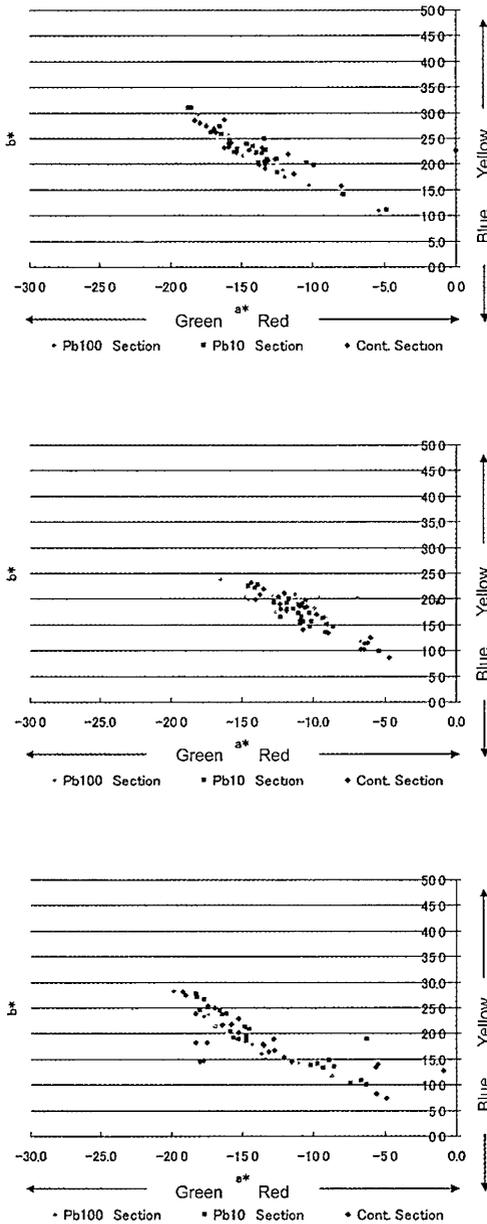


Fig.7 Coler degree of *Artemisia indica*

division. Furthermore, in the color tone of the leaf, transition in the direction of ashes was seen on September 3 compared with the Cont. division compared with June 25. In October 15, the whole got it scattered. Correlation was not found by the

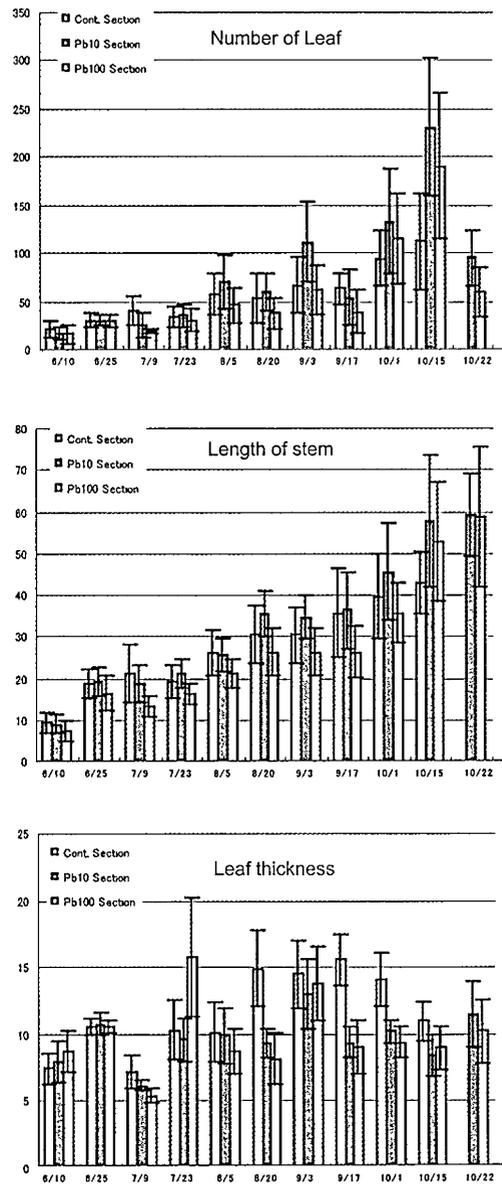


Fig.8 The growth situation of *Chenopodium album var. centrorubrum*

amount of content-among soil Pb(s), and the quantity of Pb absorbed in the plant as a result of analysis.

*Chenopodium album var. centrorubrum* (Fig.8 ~ 10) : The number of leaves increased not less than 20% compared with the Cont.

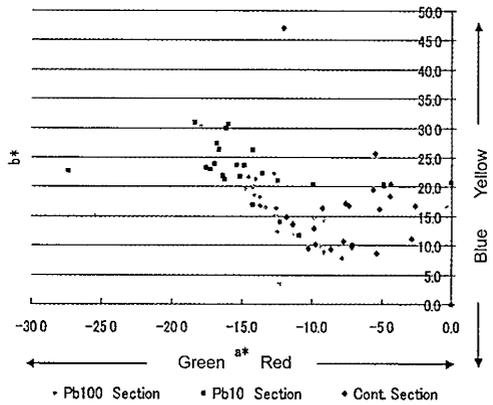
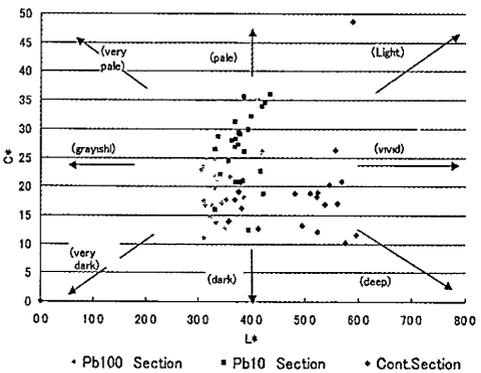
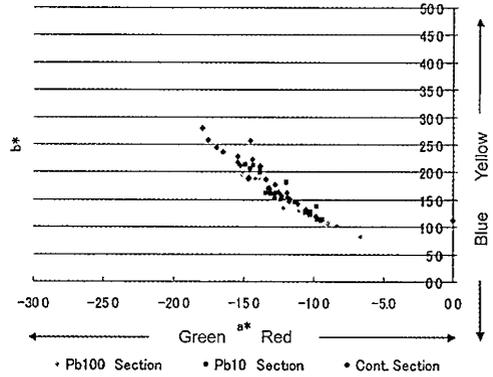
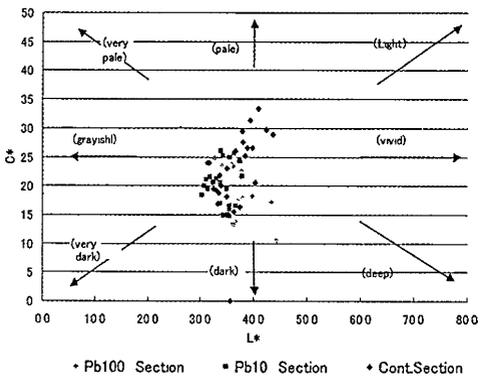
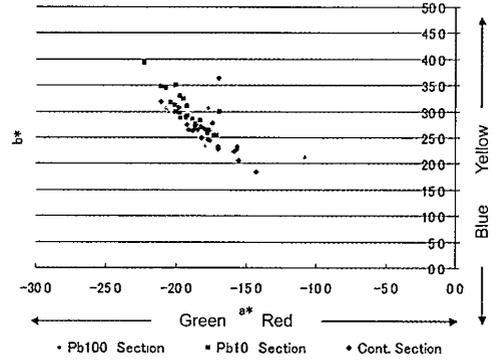
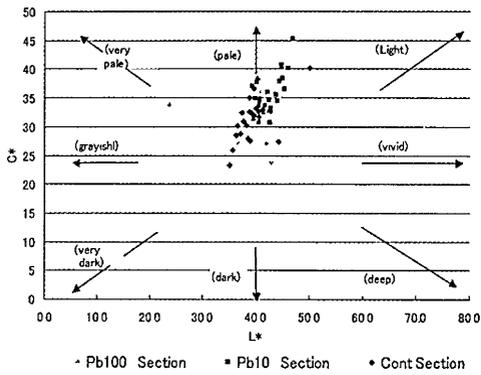


Fig.9 Coler tone of *Chenopodium album* var. *centrurbrum*

Fig.10 Coler degree of *Chenopodium album* var. *centrurbrum*

division in Pb division from the second half of July. The increase in the number of branches of 80 percent was seen. As for stem length, in the second half of September, the increase was seen by the the decuple unit divisions of Pb. However, leaf thickness was about 28%

in the centuplicate of about 18%Pb at he division of Pb.

The leaf thickness fall was seen. On the whole, the big difference was not looked at by You's color.centuplicate of the Pb of Pb content is higher as a result of analysis. It

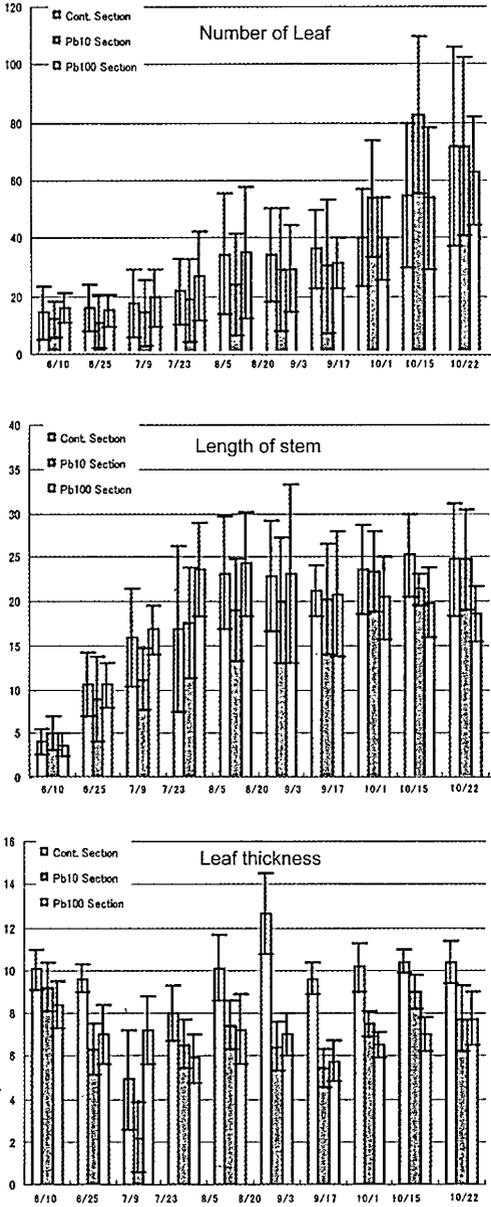


Fig.11 The growth situation of *Zoysia japonica*

turned out that the amount of absorption becomes high in proportion to the amount of content-among soil Pb by this.

*Zoysia japonica* (Fig.11 ~ 13) : In Pb division, reduction of about an average of 30% of leaf thickness was seen.leaf color on August 26 changed in the deep direction in

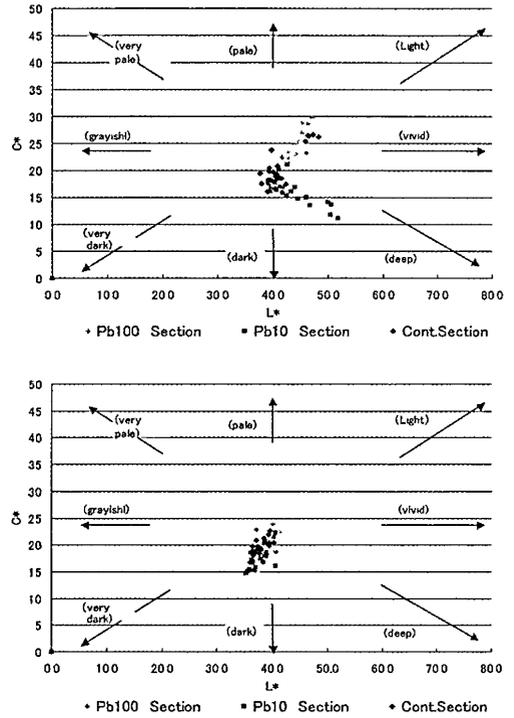


Fig.12 Coler tone of *Zoysia japonica*

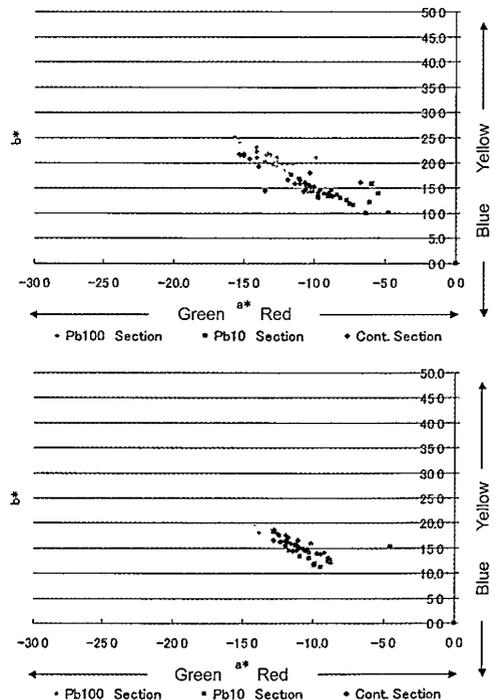


Fig.13 Coler degree of *Zoysia japonica*

the color tone of the 10th divisions of Pb. In the centuplicate of Pb, it was changing in the bright direction. Compare with a Cont. division about the degree of color. The deviation to the blue-red direction was seen in the decuple of Pb. The deviation to the direction of yellow was seen in the centuplicate of Pb. There were few amounts of absorption to terrestrial root as a result of analysis. Moreover, the amount of absorption had more Pb of the centuplicate than decuple as many Pb.

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