Recent articles published by Chinese Journals

The following abstracts were collected from Chinese journals published since 2011, with little edition work.

01 Antioxidant Enzyme Characteristics of Vetiveria zizanioides to Heavy Metal Lead Stress under Control of EDTA

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Abstract [Objective] The study aimed to discuss the exogenous chemicals EDTA on the physiological effect of Vetiveria zizanioides under the heavy metal Pb stress. [Method] Using solution culture method, the V. zizanioides seedlings with consistent growth were selected to make for the Pb stress treatment after preculturing with the 1 /4 Hoagland nutrient solution for 1 month. In the Pb stress, with Pb (NO) 3 in the salt solution, 4 treatment concn. were set up as 0,2,4,6mmol /L, and 2 treatment concn. for EDTA were set up as 0.5 and 1 mmol /L to study the effects of Pb²⁺ stress with different concn on the physiologic and biochemical of V.zizanioides. [Result] Under the single Pb stress, when Pb²⁺ concn. was less than 2 mmol /L, the SOD, POD and CAT activities of V. zizanioides was higher than the control group. When the Pb2 + concn. was greater than 2 mmol /L, the above indices was decreased. With the increase of Pb²⁺ concn, the SOD, POD and CAT activities of V.zizanioides showed the effect relationship of first high and than low; the relative membrane permeability and MDA content in the leaf was increased obviously. After adding the EDTA, the plant cell membrane permeability and membrane lipid peroxidation level caused by the Pb could be recovered and the SOD and CAT activities was also enhanced. [Conclusion] EDTA exogenous chemical substances could alleviate the toxic effect of Pb to V. zizanioides to some extent.

Key words EDTA; Lead; Vetiveria zizanioides; Phytoremediation

02 Effects of EDTA on the Growth and Lead Accumulation of Vetiver Under Lead Stress

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(1. College of Fife Science and Technology, Yulin Normal University, Yulin, Uuangxi 537000; 2. Yulin Environmental Monitoring StationYulin, Uuangxi 537000) Abstract: The effects of EDTA on the growth and lead accumulation characteristics of vetiver under lead stress were studied in solution culture experiment. The results showed plant growth of Vetiveria zizanioides was obviously inhibited by the simple lead treatment, the concentration of Pb in vetiver plant increased with Pb concentration in solution, and Pb contents in roots was higher than that in shoots. Compared with the simple Pb treatment, the growth of Vetiveria zizanioides was in a certain extent inhibited by EDTA adding to the Pb contaminated solution. Pb accumulations in the shoots and roots of Vetiveria zizanioides were significantly increased by EDTA treatment, the ratio of Pb contents in shoots and roots increased by EDTA treatment. It indicated that EDTA treatment improved Pb absorption and accumulation of Vetiveria zizanioides, and also promoted the Pb transportation to the shoots.

Key words: EDTA ;Vetiveria zizanioides ; lead stress

03 Influence of Different Zinc and Copper Levels on Cadmium Accumulation Physiological Characterization in Vetiveria zizanioides L.

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Abstract:Hydroponic experiments were carried out to investigate the influence of different(Zn)on and copper (Cu) levels(10, 40 mg. L⁻¹) on the growth, malondialdehyde(MDA) content, root

activity, soluble protein, contents of chlorophyll a and b, and accumulation of cadmium (Cd) in Vetiveriar Zizanioides L. when they exposed to different Cd(15,30 mg. I L⁻¹)levels. The results showed that except the low level Cu treament, the combination of Zn-Cd and Cu-Cd exhibited synergistic decreasing effects on root activity, chlorophyll, protein contents, whereas made the MDA increase in experiments. The effects of Zn and Cu on the plant assimilating Cd were complex. The combination of Zn-Cd or Cu-Cd on Cd accumulation in shoots may have antagonism effects, and on the absorbing of Cd in roots it may have synergistic or addition effects.

Key words:combined pollution; Vetiveria zizanioides; Cd accumulation; physiological characterization

04 Efficiency of Different Vegetative Restoration Settings Deployed on Wastelands of Zijinshan Gold-copper Mine in Fujian Province

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Abstract: The aim of this study was to evaluate the efficiency of different vegetative restoration settings on mining wasteland. Vegetation species, quantity, coverage, species diversity and biomass were surveyed by standard plots on different treatments deployed on the mining wasteland of Zijinshan gold-copper mine in Fujian Province. The results showed that the number of vegetation species was rapidly increased at almost all the treatments, and the species number of the herb layer were significantly greater than the control after 5 year restoration. Species quantity at Pinus massoniana+Lespedeza bicolor+Vetiveria zizanioides+local flood turf (mode B) was the most. There was 25 species of those. Diversity index at Liquidambar f ormosana+local beach turf (mode D) and Eucalyptus robusta+local flood turf (mode E) were bigger than others, these two vegetation allocation modes could rapidly increased the species diversity of the community. Thevegetation coverage also increased greatly. There were above 85% apart from Pinus massoniana +Lespedezabicolor (mode A). The biomass of herb layer at Pinus massoniana+Lespedeza bicolor+Vetiveria zizanioides+local beach turf(mode B) was the largest, it was 15.81 times to the control. The treatments of Pinus massoniana zLespedeza bicolor zVetiveria zizanioides+local beach turf(B), Liquidambar f ormosanu+local beach turf(D) and Eucalyptuszlocal beach turf(E) performed considerably better than the other ones and therefore can be promoted for larger areas in the vegetation restoration of the mining wasteland.

Keywords: Zijinshan gold-copper mine; mining wasteland; vegetation allocation modes; recovery effect

05 Photosynthesis Response to Cadmium in Vetiveria Zizanioides(L.)Nash.

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Abstract: Vetiveria zizanioides(L.) Nash are subjected to different kinds of Cadmium treatment(0 mg/kg, 2 mg/kg, 20 mg/fig and 80 mg/kg), and their biomass, pigment content, net photosynthesis rate (Pn)and chlorophyll fluorescence parameters are investigated at Od, 50d and 100d. The results show in the following. ΦAt 50 d, Cadmium conditions have facilitation on net photosynthetic rate (Pn), PS Π photochemistry (ΦPSΠ), the electron transfer rate of PSΠ(ETR) and photochemical quenching coefficient(qP) of Vetiveria zizanioides(L.) Nash especially under 20 mg/kg. Cadmium conditions could not effectively influence the biomass, photosynthetic pigment, the potential efficiency of primary conversion flight energy of PSΠ (Fv/Fm)of Vetiveria zizanioides(L.)Nash. 2At 100d, net photosynthetic rate(Pn)goes up significantly under 2 mg/kg and 20 mg/kg but decline significantly under 80 mg/kg, PS Π photochemistry (ΦPSΠ), the electron transfer rate of PS PSΠ (ETR)and photochemical quenching coefficient(qP)all decrease but it drops significantly only under 80 mg/kg. The above results prove that Vetiveria zizanioides (L.)Nash could not only tolerate Cadmium stresses with low concentration for a long time, but also endure Cadmium stresses with high concentration for a short time.

06 Effects of Vetiveria Zizanioides L. Growth on Chemical and Biological Properties of Copper Mine Tailing Wastelands

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Abstract: Vetiveria zizanioides L. is a Gramineae herbaceous perennial with rapid growth and is highly adaptable to its environment. It is often found in wasteland and lead /zinc mining abandoned soil. V. zizanioides is also strongly adaptable to copper mine tailings. The criteria for determining successful phytoremediation focus on both aboveground vegetation and substrate characterization. To understand the effects of artificial revegetation on the remediation of wastelands associated with the Tongling copper mine tailings in Anhui Province, we studied the dynamic changes in chemical properties, microbial biomass, enzyme activity in the tailings, and the relationships between these factors. The tailings were collected under V. zizanioides communities constructed on copper mine tailing wastelands at different times: JX (V. zizanioides communities were established in the recent stage); ZX zizanioides communities were established in the middle stage); and OX (V. zizanioides communities were established in the early stage). The results showed that the tailings under the ZX and OX communities, had higher pH values and lower electrical conductivity and available Cu and Pb concentrations than the tailings under the JX community, indicating that the process of tailings acidification slowed down after the establishment of the V. zizanioides community. As the V. zizanioides community developed over time, the total N and available P in the tailings at 0—5 cm and 5—20 cm depths increased; with the total N and available P in the tailings at 0—5 cm under the OX 4. 64 and 22. 44 times higher, respectively than at the same depth under the JX. The total N accumulation at 0-5 cm was significantly higher than at the 5-20 cm depth, indicating the effect of the phytoremediation on improving the substrate chemical properties. With increased plantation time, the dehydrogenase, catalase and urease enzyme activities and the microbial biomass C and N contents also gradually increased at the 0—5 cm and 5—20 cm depths, but the alkaline phosphatase activity did not increase. dehydrogenase and catalase activities and the microbial biomass C and N contents were all either extremely significantly or significantly negatively correlated with the electric conductivity. However, the microbial biomass N contents and all soil enzyme activities were significantly positively correlated to the total N content, indicating that total N was a dominant influence on soil enzyme activities. The microbial biomass and most soil enzyme activities decreased with increasing Cu and Pb contents, and the dehydrogenase and catalase activities were most sensitive to Cu, but less sensitive to Zn. The V. zizanioides has shown a significant ability to improve the chemical properties of tailings, and also to increase microbial biomass and soil enzyme activities. It is an adaptive plant species, and is recommended for the ecological rehabilitation of copper mine tailing wastelands.

Key Words: Vetiveria zizanioides L.; copper mine tailings; chemical properties; microbial biomass; enzyme activities

07 Growth Stress and Photosynthetic Characteristics of Vetiveria zizanioides by Direct Landfill and the Content Dilution of Used Batteries

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Abstract The influence on the cell membrane, proline content (Pro), chlorophyll content (Chl), photosynthetic rate (Pn), transpiration rate (Tr) and stomatal conductance (Gs) of Vetiveria zizanioides from two different used batteries stress treatments were studied by pot experiment. The results showed that as the amount of direct landfill and the concentration of content dilution of used batteries increased, the leaf growth rate, Chl content, Pn, Tr and Gs of V. zizanioides declined, and Pro content, membrane permeability increased. There was no significant difference

effects on the stress of V. zizanioides between direct landfill and the contents dilution of the used batteries. When the diluted solution was 14.44% or less of the soil and the landfilled amount was 2.70% or less of the soil, V. zizanioides could grow, while that was 20.20% or more, 4.00% or more, respectively, V. zizanioides would die. **Key words** Vetiveria zizanioides; Used batteries; Dandfill; Dilution doi 10.3969/j.issn.1000-2561.2011.07.011

08 Vetiveria Zizanioides Adaptability of Lead-zinc Mine Tailings on the Growth

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Abstract: The paper studies the NPK fertilizer and humus (corrupted platycodon grandiflorum) affect on growth of vetiveria zizanioides in lead-zinc mine tailings though a pot experiment. The results show that vetiveria zizanioides growing on the mine tailings which are added the NPK fertilizer and humus, have the higher index than the vetiveria zizanioides both on pure tailings and on the mine tailings only added the NPK fertilizer, and these index include biomass, morphological traits, resistance index, photosynthetic rate, transpiration rate, stomatal conductance and water use efficiency other indicators. Studies have shown that the integrated utilization of NPK fertilizer and humus can increase vetiveria zizanioides adaptability of Lead-zinc mine tailings.

Keywords: pot experiment; mine tailings; vetiveria zizanioides; adaptability