

A Low-Cost and Easy-To-Operate Remediation Technology of Heavy Metals Contaminated Agricultural Soil

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Abstract : High-cadmium pollution in rice is a serious problem in many parts of China. Many kinds of remediation technologies have been tested and applied in many farmlands. Because of the productive function of the farmland, most technologies are inappropriate due to their destruction to the tillage soil layer. And the large labours and expensive fees of many technologies are also the restrictive factors for their applications. The conception of 'Root Micro-Geochemical Barrier' was proposed to reduce cadmium (Cd) bioavailability and the concentration of the cadmium in rice. Remediation and mitigation techniques were demonstrated on contaminated farmland in the downstream of some mine. According to the rule of rice growth, Cd would be absorbed by the crops in every growth stage, and the plant-absorb efficiency in the first stage of the tillering stage is almost the highest. We should create a method to protect the crops from heavy metal pollution, which could begin to work from the early growth stage. Many materials with repair property get our attention. The materials will create a barrier preventing Cd from being absorbed by the crops during all the growing process because the material has the ability to adsorb soil-Cd and making it losing its migration activity. And we should choose a good chance to put the materials into the crop-growing system cheaply as soon as early. Per plant, rice has a little root system scope, which makes the roots reach about 15cm deep and 15cm wide. So small root radiation area makes it possible for all the Cd approaching the roots to be adsorbed with a small amount of adsorbent. Mixing the remediation materials with the seed-raising soli and adding them to the tillage soil in the process of transplanting seedlings, we can control the soil-Cd activity in the range of roots to reduce the Cd-amount absorbed by the crops. Of course, the mineral materials must have enough adsorptive capacity and no additional pollution. More than 3000 square meters farmlands have been remediated. And on the application of root micro-geochemical barrier, the Cd-concentration in rice and the remediation-cost have been decreased by 90% and 80%, respectively, with little extra labour brought to the farmers. The Cd-concentrations in rice from remediated farmland have been controlled below 0.1 ppm. The remediation of one acre of contaminated cropland costs less than \$100. The concept has its advantage in the remediation of paddy field contaminated by Cd, especially for the field with outside pollution sources.

Keywords : cadmium pollution, growth stage, cost, root micro-geochemistry barrier

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