KenGro BioSorb as an Enhancer of Bioremediation

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The Wood treatment industries have been in operation in the United States for more than 100 years. Two of the more potent and most commonly used wood preservatives are pentachlorophenol (PCP) and creosote. These preservatives are used to treat wood products such as crossties, utility poll, marine piles, and structural lumber.

Before federal and state laws regulated the use of these preservatives, misuse in the handling, accidental spillage, and improper disposal of creosote and PCP led to large areas of contaminated soils and water. Industrial sites contaminated by past use of PCP and creosote are being cleaned up by nature's own bacteria and fungi.

Research by the Environmental Biotechnology Group of the Mississippi Forest Products Laboratory (MFPL) is identifying microorganisms and methods of carrying out this process, which is called bioremediation. During this process contaminants (such as PCP, creosote, and petroleum products) can be converted to harmless by products (such as carbon dioxide and water). Bioremediation is far less expensive when compared to other cleanup methods, and it does not require transport of hazardous wastes through cities and communities. The soil itself is not destroyed, and unlike incineration, bioremediation does not produce hazardous ashes. Bioremediation has been approved by the Environmental Protection Agency (EPA) as the cleanup method for more than 20 abandoned wood-treatment facilities.

One problem encountered when using bioremediation on contaminated soil is the soil environment often does not encourage the bacteria and fungi to degrade the pollutants. Pollutants often absorb to soil particles in such a way that the microgamisms cannot come in contact with them. This makes the pollutants unavailable for breakdown. Other environmental factors that greatly influence breakdown rates include temperature, oxygen, nutrient availability, pH, moisture content, light intensity, and organic matter. Many of these environmental factors can be controlled by a process called land-farming. Land-farming is the treatment of contaminated soil using conventional soil management techniques such as tilling, irrigation, and fertilization to enhance microbial degradation of pollutants.

Researchers at the MFPL have been looking at different ways to speed bioremediation of contaminated soil by altering the soil environment. On way to alter the soil environment, and hopefully enhance pollutant breakdown, is through the addition of organic matter. KenGro BioSorb has been shown to have an excellent ability to absorb oil, equal to the best synthetic organic products. KenGro BioSorb also contains many pores, which will not only absorb the oil but also allows for less leakage or release of oil once absorbed. These pores will allow much greater contact between the oil and the microorganisms. KenGro BioSorb is also biodegradable, is high in protein, and contains very large numbers of natural microorganisms.

Preliminary studies at the MFPL have found thatKenGro BioSorb absorbed more than 55% of the oil from oil contaminated soil. Removal of pollutants from soil particles by the KenGro BioSorb should make the pollutants more available to the microorganisms, thus enhancing pollutant breakdown. In addition, the leaching potential of KenGro BioSorb appears to be low, with only 0.02% of the oil leaching from contaminated KenGro BioSorb. This mean that once the pollutant is absorbed to the KenGro BioSorb, only a very small amount will leach from the KenGro BioSorb into the groundwater.

Microorganisms native to KenGro BioSorb were able to biodegrade 55% of the oil from contaminated BioSorb. Thus, the KenGro BioSorb itself may provide more microorganisms to assist in the bioremediation. We believe that KenGro BioSorb has a great potential as an effective enhancer of bioremediation of organic wood treating wastes because of its biodegradability, excellent absorbent , cost, size, and environmental friendliness. Because of these capabilities, researchers at the MFPL are exploring the use KenGro BioSorb to enhance microbial degradation of soil contaminated with PCP and creosote.

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