

Kuwait Biochar Initiative (KBI)

Dr. Hana'a A Burezq, Founder & Chairperson

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From the Desk of Chairperson Kuwait Biochar Initiative



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Biochar

Biochar is a carbon-rich porous material, produced by thermal decomposition of potential feedstock biomass with deficit-oxygen conditions at temperatures between 250 - 700 °C. It is charcoal, but when it is used as a soil amendment, it is called Biochar. Its use as soil amendment offers both agricultural and environmental benefits. In Kuwait, biochar production and research have been started, and the benefits of its use to improve crop production has been realized under greenhouse conditions.

Novel Thinking: Sustainable Management of Sewage Sludge in Kuwait

Huge quantities of sewage sludge are produced from the water treatment plants in Kuwait and end up in landfill. The question is; does sewage sludge has an alternative use as a useful resource?

The answer is very simple; it can be used as a soil amendment, not directly, but through recycling into biochar, where sewage sludge feedstock is bulked with other materials before adding into a biochar-producing unit. This practice will minimize the volume of sewage sludge in Kuwait in the form of landfill and spare land for other uses. The technology of biochar production from sewage sludge is still immature, and the full-scale applications are very few around the world. This will open new research for its use in farmlands. However, it may be safe to use in desert rehabilitation projects to maximize moisture retention to cope with droughtiness. Considering the importance of sewage sludge biochar as a soil amendment, the 1st Swedish Conference on "Sewage Sludge Biochar" will be held on 11–12 October 2022 in Malmö, Sweden, with a study visit to a full-scale sewage sludge drying and pyrolysis facility in Denmark on the 13th of October 2022.

Investing in Soils of Kuwait for Food Security

Kuwait should invest in sustainable soil management to assure continuous food supply within national boundaries. In Kuwait, soils are dominantly sandy and are low in organic matter contents, which ultimately jeopardizes the productive capacity of soils. Biochar has shown great promise for use in the soils of Kuwait to intensify crop production and save water. Investing in soils indirectly through recycling plants and animal-based waste "feedstock" to biochar not only improves soil quality but also increases soil carbon sequestration, thus mitigating climate change. In addition to soil management, the farmers should also use inputs timely based on crop needs. These inputs, such as fertilizers, should be used at the right time, source, amount, and place (4R nutrient stewardship). Soil testing is necessary before making the decision on fertilizer uses to understand what nutrients are deficient for a specific crop.

Natural Climate Mitigation Solution and Impact of Recent Drought

Arid land rehabilitation with native plants and afforestation are the natural climate mitigation solutions that ultimately reduce GHG emissions and increase carbon storage "soil carbon sequestration". The prolonged-drought-induced due to climate change and heat buildup can reduce the growth of vegetation. Also, under extreme conditions, complete failure of crop growth and a significant reduction of carbon sequestration happened. Desert soils are infertile and moisture deficient, the use of biochar in plant beds at certain depths can improve soil moisture status and sustain plant life. This is valid in the desert environment because a sandy layer at the surface serves as a buffer between moisture retained in soil beds through biochar and sun heat, reduces evaporation, and maintains soil moisture for plants.

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Welcome Suggestions to Improve KBI Newsletter

Thank you for the overwhelming response from KBI's quarterly Newsletter readers. I welcome feedback on how to further improve the newsletter so that we can share with you the latest news in the biochar industry and research results from the globe. Please share your views, ideas, and questions by email (haborizq@kisar.edu.kw).

Quote from International News about Biochar Use

Biochar (a form of ecological charcoal) has been called the "Third Green Revolution". When used in fine granular form (less than 2mm) and combined with organic fertilizers like camel or cow dung, it could be applied to different soil types across a variety of climatic conditions. The poorer the soils, the more the effect of biochar is spectacular (www.pronatura.org)

News from Kuwait and International Biochar Research to Increase Crops Yield

- Use of biochar @ 1 kg/m² increased 93% yield of rice (Indonesia)
- Use of biochar @ 0.7 kg/m² increased 177% yield of tomato (Ghana)
- Use of biochar @ 10 kg/m² increased 750% yield of cabbage (Cambodia)
- Use of biochar @ 0.8 kg/m² increased 71% yield of maize (Colombia)
- Use of biochar @ 1.5 kg/m² increased 150% yield of maize (Japan)
- Use of biochar @ 1.5 kg/m² increased 170% yield of wheat (Australia)
- Use of biochar @ 2.0 kg/m² increased 43% yield of barley (United Kingdom)
- Use of biochar @ 1.0 kg/m² increased 42% yield of radish (Australia)
- Use of biochar @ 0.8 kg/m² increased 79% yield of sweet pepper (Israel)
- Use of biochar @ 1.0 kg/m² increased 50% yield of onion (Senegal)
- Use of biochar @ 0.5 kg/m² increased 22% yield of barley and saved 40% water (Kuwait).
- Use of biochar @ 0.50, 0.75, and 1.0 kg/m² increased 64, 33, and 43% yield of maize forage, respectively, and saved 40% water (Kuwait) compared to control treatment at 100% water application, as shown in Figure 1.

Figure 1. Intensification of maize forage production using manure-based biochar in greenhouse trial (from left to right: control treatment 60% irrigation water (IW), control 100% IW, biochar @ 5 tons/ha (60% IW), biochar @ 7.5 tons/ha (60% IW), and biochar @ 10 tons/ha (60% IW).

Drought in Europe: A Worrying Episode

The severe drought in Europe is caused due to the lack of rainfall and severe heat waves from May to August 2022. The heat waves increased evapotranspiration and enhanced the drought severity. The wider impact was realized on the reduced river discharge, energy sector for both hydropower generation and cooling systems of other power plants. Soil moisture anomalies remain markedly negative in most of Europe due to the lack of precipitation and heat waves. This significantly affected the yield of summer crops (grain maize, soybean, and sunflower). The use of biochar in soil beds of forest trees and summer crops may be a viable solution to increase soil moisture to cope with the drought and heat that can continue providing ecosystem services and maintenance of crops. These are the initial thoughts that should be tested in various geographical locations before upscaling.



World Soil Day 2022

Soils: Where food begins

Soil erosion is the soil degradation process threatening nutrition and is recognized as being among the most important problems recognized globally due to its effect on food security and sustainability all around the globe. World Soil Day 2022 and its campaign «Soils: Where food begins» aim to raise awareness of the importance of maintaining healthy ecosystems and human well-being by addressing the growing challenges in soil management, increasing soil awareness, and encouraging societies to improve soil health. The World Soil Day (WSD) is held annually on 5 December as a means to focus attention on the importance of healthy soil and advocating for the sustainable management of soil resources. In Kuwait, we will celebrate WSD-2022 on Monday, December 5 at Kuwait Institute for Scientific Research by sharing the ways to make soil healthy using soil amendments. As Kuwait's National Focal Point at the United Nations, and under the sponsorship of the Food and Agriculture Organization and the Global Soil Partnership, I welcome interested KISR staff to join us on the celebration of WSD-2022.



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