B.F.A. Basnayake <benb@pdn.ac.lk>

Dear All,

I like to give my views in the light of statistical clarity needed for any fertilizer trials done on tropical soils. As you are aware, the continued use of urea more than natural formations reduces carbon content in soils (FAO, 2017). Moreover, the formation of sesquioxide on the application and precipitation of phosphorus from the plant is well known (Panabokke, 1963, Panabokke et al., 1964, Gamage et al., 2015). Therefore, the yield responses to inorganic fertilizer are erratic giving yields from about 3 to 6 tonnes/ha in ferruginous derivative soils. It should be noted that high yields are obtained from Non-Calcic Brown (NCB) soils. Once the soils are depleted of essential nutrients, particularly carbon, yields could be 16-20% less in the first year without any tillage and fertilizer application practices (Prof. Mowjood, MI findings). These yields were better than inorganic fertilizer applications in some of the farmers' fields. It is because of the need to lower the pH by the application of high content of urea for phosphate mobility in the absence of carbon. Therefore, it is extremely difficult to have isolated controls in large-scale trials. The simple statistical analysis over a longer period is much desired than postage stamp field plot findings with controls. The live organic fertilizers take considerable time to overcome toxicities and inhibitions left behind in these difficult soils.

NIFS trials have been undertaken for a long-time and I witnessed farmers demanding for BFBFs, because we are promoting biochar use to these farmers. Several of my former students involved in promoting organic fertilizer are mixing BFBFs and we should strengthen NIFS efforts.

There are many publications on biochar use to overcome toxicities and inhibitions, including POPs. Inevitably, most of the reputed journal publications on inorganic fertilizer are now invalid because of the new findings. Also, Sri Lanka is much ahead in the biochemical transformation kinetics (Ariyawansha, et al., 2018), thus able to compare and provide interventive measures to increase yields, unlike restricted to the statistical analysis. We can identify inhibitive conditions and observe phosphorous and nitrogenous cycles during the growth of the plants using this advanced mathematical tool.

The data available with NIFS could be very valuable to develop site-specific biofertilizers and I look forward to Prof. Kulasooriya, Prof. Senevirathne, and Prof. Perera's advice and directives in combining BFBFs with biochar and treated compost including bio-stimulants.

I just like to make it very clear that organo-metallic compounds (formed at very high temperatures) in urea, perhaps could be the major culprit in most of the health issues faced in the world. The overall rates of biochemical reactions must be very rapid in these compounds, although having very low concentrations, particularly in the absence of iron (ferrous).

We also must accept that the use of inorganic fertilizers did not allow farmers to become rich. They were always kept poor and subdued to follow the politicians because they were made dependent on subsidies without giving them assured pricing for all the products like in India. Inorganic fertilizer was the weapon used to control the farmers and the country.

I have kept this narration short, but if you like more information we will publish a review jointly because you would not like to be associated from now on with commercial inorganic fertilizer or even imported organic fertilizers. You will also question some of the reputed journal publications indirectly supporting inorganic fertilizer like "Arsenic and Cadmium and Associated Risk in Farm Soils of the Dry Zone Sri Lanka where Chronic Kidney Disease of Unknown Etiology (CKDu) is Endemic"

Gunadasa et al., 2021., as opposed to “Chapter One - Managing cadmium in agricultural systems”. I have attached the abstracts for your information.

Thanking you

Kind regards,

Ben Basnayake

November 26, 2021 12:27 PM, "Siri Munasinghe" <sirimuna39@gmail.com> wrote:

Prof. B.F.A. Basnayake
Emeritus Professor
Department of Agricultural Engineering
University of Peradeniya

Abstract mentioned in the text.

Arsenic and Cadmium and Associated Risk in Farm Soils of the Dry Zone Sri Lanka where Chronic Kidney Disease of Unknown Etiology (CKDu) is Endemic

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Abstract

This study reports on a wide-scale, systematic sampling program over two consecutive years investigating As and Cd and associated implications for human health in farming areas of the dry zone, Sri Lanka, where chronic kidney disease with unknown etiology (CKDu) is endemic. Surface soil (0–15 cm), fertilizer and rice seed samples were collected in 2017 and 2018 from three CKDu affected areas [Medawachchiya (M), Padaviya (P) and Giradurukotte (G)], and a non-affected control site [Hambanthota (H)]. All inorganic fertilizer samples showed low As (< 30 mg kg^{-1}) and Cd (< 1.25 mg kg^{-1}) concentrations, less than European Union guideline values, and no correlation with soil concentrations. Arsenic (≤ 3.8 mg kg^{-1}) and Cd (≤ 3.0 mg kg^{-1}) in the 400 soil samples analyzed were low at all four locations, and soils were considered suitable for sensitive and agricultural use. A human health risk assessment demonstrated the As and Cd concentrations in surface soil provided no concern for non-carcinogenic risk, and negligible or acceptable carcinogenic risk for all locations sampled. The As and Cd in rice seeds harvested were also less than detection limits (< 0.1 mg kg^{-1}). This work provides clarity around As and Cd baseline values in certain farm soils of the dry zone Sri Lanka, and no substantive evidence that the levels of As and Cd in the surface soils contribute to CKDu in local agricultural populations. Additional sampling of subsurface soil and water resources would satisfy some uncertainties with the risk assessment described.