

## **Supporting Lankan Agricultural Scientists in facing microbial-fertilizer vendors.**

**[This appeared in the Island Newspaper, 4-Dec-2021]**

By Chandre Dharmawardana

It was mystifying to read Professor Kulasooriya's article “Don't deride Sri Lankan scientists”, (Island, 29/11/2021) because it is not clear who has derided Sri Lankan scientists. By "Sri Lankan" scientists, did he exclude expatriate Sri Lankan citizens, dual citizens and others as being fair game for derision?

For many decades Dr. Nalin de Silva derided Sri Lankan scientists as well as science itself. The media perhaps allowed such misinformation with the oddity of a “Science Dean” attacking science. I remember articles where Prof. Carlo Fonseka as well Prof. Amaratunge were the unfair targets. Keerthi Tennakoon, Bodhi Dhanapala and I wrote to provide some balance.

Dr. Channa Jayasuman published a Sinhalese book titled “Vakugadu Satana” where many scientists who pioneered research on chronic kidney disease of unknown aetiology were tar-brushed intolerably. A band of fringe “scientists” alleged that the scientists of the Department of Agriculture (DOA) “destroyed the use of traditional seeds”. Those involved in pesticides and agrochemicals were labeled as agents of international companies knowingly promoting poisons and “pocketing commissions”.

If Professor Kulasooriya read any of my newspaper articles going back to decades, he will find that I had consistently defended the scientists working on topics on food, agriculture and environment, when it was fashionable for “environmental militants” to attack not just local scientists, but the likes of Norman Borlaug.

I stated many a time that the rice breeders of Sri Lanka should be named national heroes. But the heroes of these zealots are the likes of Vandana Shiva, “Dr”. Mercola or Stephanie Senaff. So I am glad that Professor Kulasooriya has also at last come forward to defend local scientists.

However, what is not clear to me is who has “derided” what set of scientists? Prof. Kulasooriya mentions a debate where a Chris Dharmakirti had responded to one of my articles. Nothing like that ever happened. Instead, I responded to a group email by Dharmakirti where I felt that he was unfairly rebuking local scientists, asking why they do not embrace various technologies that use soil microbes for enhancing soil fertility.

I quote one of Dharmakirti's several rebukes directed at the DOA scientists:

A scientific paper published in peer reviewed journal as far back as 1987 (Nitrogen Fixation in some Rice Soils in Sri Lanka, published in the MIRCEN Journal of Applied Microbiology and Biotechnology), suggest the promotion of algae growth in the paddy field during the first 21 days of planting to obtain as much free nitrogen as possible. In fact the paper states the following: "*In situ measurements of nitrogenase activities in some rice soils, representing three different agroclimatic zones of Sri Lanka, demonstrated that there is a great potential for nitrogen fixation in these paddy soils, provided that they are continuously flooded and that nitrogenous fertilizer levels are relatively low. Under such conditions cyanobacterial (blue-green algal) fixation predominates. In certain areas of the wet zone, with highly organic soils, cyanobacterial fixation could probably meet a great part of the N-fertilizer input recommended. Heterotrophic rhizosphere fixation may also be significant, especially in the dry zone.*" **Thus it begs the question once again, as to why our department of agriculture does not make a concerted effort to utilize all available scientific knowledge and proven methods to reduce to application of artificial inputs, by pursuing a natural input maximization strategy and then FILL THAT MISSING PERCENTAGE and not waste public money on EXCESSIVE application of UREA ...**

I responded that using microbial fertilizers is NOT YET a proven method. Even the paper quoted by Dharmakirti talks of “great potential”. A 2016 review by Prof. Kulasooriya and Dr. Magana-arachchi (KMA) explicitly support my view.

So I was DEFENDING the local DOA scientists (who cannot respond except through their ministry spokesman). Has Dharmakirti recently returned from the West and derided the local DOA scientists, and perhaps Dr. Kulasooriya is complaining about it? If so, Prof. Kulasooriya's write up is completely misleading.

This gives an opportunity to ask WHY microbial enhancement of soil fertility

does NOT have wider adoption.

In an Island news item (Saman Indrajith , 20-Feb-2017) Dr. Gamini Seneviratne, Prof. Kulasooriya and others are acclaimed for developing a microbial bio-filmed bio-fertilizer (BFBF) that allegedly gives the same yield as with 100% chemical fertilizers, by merely using 50% of chemical fertilizer mixed with BFBF made by a company linked with local scientists.

The 50% reduction in chemical fertilizer was explicitly claimed for tea, rice, maize, radish, cabbage, bitter gourd, aubergine, okra, chili, wax pepper, tomato and pole beans. However, these claims given in the *Commonwealth Agricultural Bulletin Journal* (CABJ, 2016) or in the newspapers are WITHOUT foundation, as the reported harvest data seem INCORRECT and unrealistic.

The tests done by DOA scientists (independently of the work of Professor Kulasooriya's colleagues) show NO IMPROVEMENT in harvests on adding BFBF. So, the farmer pays extra for BFBF and has to use the same amount of chemical fertilizer, (and not 50% of it as claimed) to get the same yield, as shown in Figure 1.

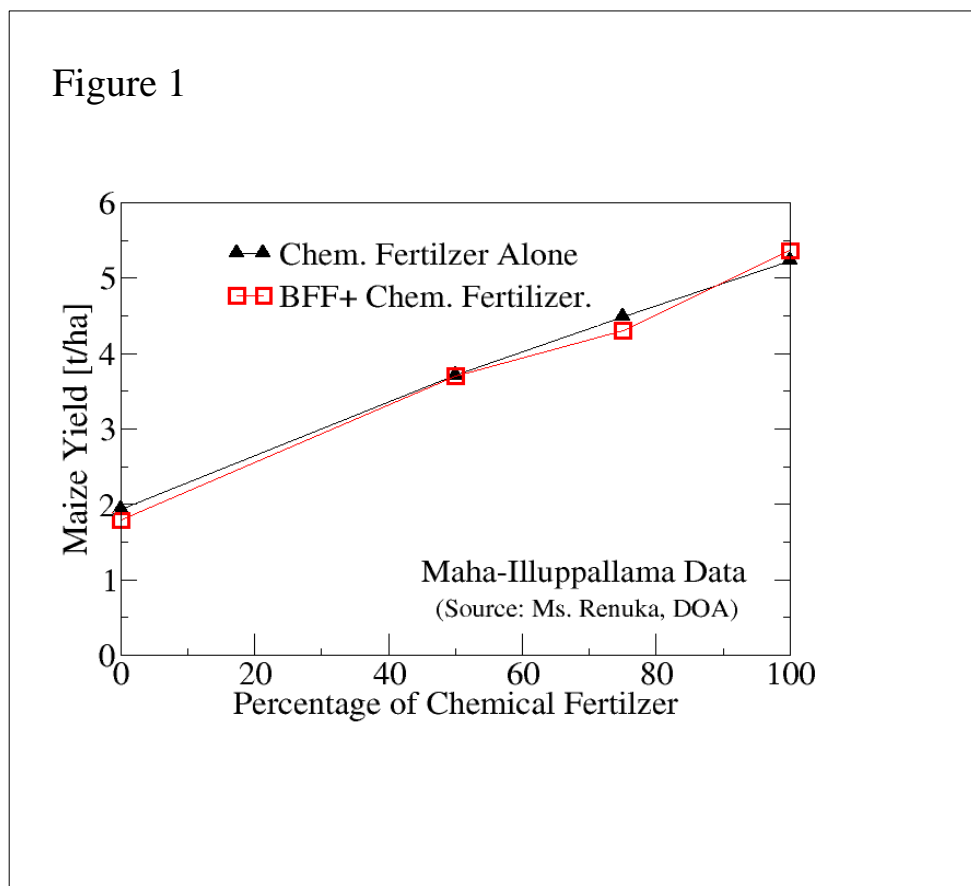


Figure 1 data are for maize. The BFBF results for all crops (for trials done around 2014) can be compared with independent data given in the 2014 DOA Report titled “*Cost of Cultivation of Agricultural Crops*”. We give typical examples to show that the marketing claims for the BFBF fertilizer are UNSUBSTANTIATED. This remains true even today, in 2021.

The yields claimed by BFBF for rice (Ampare, Yala season) with 100% fertilizer is 3580 kg/ha while DOA gives 6059 kg/ha without BFBF, i.e., a DECREASE of the harvest to almost half! Cabbage is given as 980 kg/ha while DOA says it should be around 27,945 kg/ha. The same mismatch is found for all the crops.

However, recovering full harvests with 50% fertilizers on using BFBF is the astonishing 2016 claim, repeated in fertilizer handouts of the Yahapalanya Presidential Secretariat in 2019, and in current websites of BFBF marketeers and scientists, even in 2021. The prestige of the Institute of Fundamental Studies, as well as social links of senior academics prevent the public or concerned scientists from open critical appraisal of BFBF. Was a comment on BFBF submitted to the Sri Lanka National Science Foundation Journal by Dr. Waidyanatha suppressed?

We should also look into the claim by Professor Kulasooriya et al., that they have proven techniques of using microbial inoculants (rhizobia microbes) for enhancing soil fertility. Let us quote Professor Kulasooriya.

In adopting this technology for Sri Lanka, we have gone through several years of study. .... These have been authenticated and screened under greenhouse conditions... field tested in small plots in collaboration ... at HORDI and other research stations. ... The most promising strains were used in large-scale field trials, ... conducted with ... farmers under our strict supervision and those of the field officers of the **Plenty Foods company**.

Where have the results of these greenhouse tests etc., been published? The rhizobia technology has been given to farmers since 2010. Hence the research and development must have appeared during the 2000-2010 period.

Searching through (e.g., Google scholar for S. A. Kulasooriya) we find no results showing harvest comparisons for soils with and without inoculants, or establishing increased bio-available nitrogen in inoculated soils. Although the technology had been marketed by 2010, only pot experiments on green gram appear even in 2011 (Ariyaratne et al) , but not much beyond previous work (e.g., Nieuwenhove et al 2000, Wijesundara et al 2000, Bandara et al 2006). An abstract dated 2019 (Sumudumali et al) says that:

“However, **further studies are needed** to confirm the effects of Rhizobial inoculants for groundnut with the strain isolated from the control to evaluate their performances with the other strains in different field conditions”.

That this rhizobia microbial technology has been sold to innumerable farmers since 2010 does NOT prove that the product meets what is claimed. While the BFBF people have published some data (which actually disprove their claims), the rhizobia inoculation people haven't done even that?

The scientific or marketing claims of the BFBF or microbial-inoculant purveyors remain unproven from the data available in the public domain. The international experience confirms the fickle nature of these techniques, as seen in a recent *Nature Report* (<https://doi.org/10.1038/s41598-019-56954-2>). Perhaps we should thank Chris Dharmakirti for his unwitting role of whistle blower.