

## **On Dr. Sanath Gunatilake's views regarding claimed “Toxic Effects of Glyphosate Based Herbicides (GBH) including CKD and Cancer - Sri Lanka Medical Association (SLMA) Newsletter, August 2018 - I**

by Chandre Dharmawardana, Ottawa, Canada.

The Sri Lanka Medical Association published (August 2018) a synopsis of the guest lecture by Dr. Sanath Gunatilake. He is listed as a lecturer in the CSU-Long Beach health department website: <https://webapps.csulb.edu/campus-directory//results.php>. Dr. Gunatilake has given his academic history and honours to justify his dealing with the current topic. The present writer invites his readers to judge the present material only on the strength of the evidence and the accuracy of the technical analysis, while noting his engagement in teaching and researching on food science and environmental sciences since the early 1970s. The author and his colleagues pioneered such courses at Vidyodaya university (now SJP university), during his tenure as a professor of chemistry and campus president. Currently the author is a (retired) Research Scientist in the Quantum Theory group of the National Research Council of Canada, Ottawa, and a Professor in the Dept. of Physics and Astronomy at the University of Montreal, Canada.

Dr. Gunatilake's lecture was given in June 2018. The published item carried the title “*Toxic Effects of Glyphosate Based Herbicides (GBH) including CKD and Cancer – The current Evidence and the Possible Implications of Using GBH within the Tea Industry*”.

The topic is of great importance to Sri Lankans, not only from a public-health point of view, but also from an economic point of view when a 2015 ban on GBH caused annual losses to the tune of 26 billion rupees according to the data presented by the Tea Trader's Association: ([http://www.island.lk/index.php?page\\_cat=article-details&page=article-details&code\\_title=184081](http://www.island.lk/index.php?page_cat=article-details&page=article-details&code_title=184081) ). It also triggered an abandoning of some small holdings where the land succumbed to housing developments and urban encroachment. Additionally, the ban all but wiped out maize (Indian corn) cultivation on which many rural farmers depend for their livelihood as reported in the newspaper *Ravaya*, and also in a detailed study (by Prof. L. M. Abewickrema et al, *Impact of Banning on Agricultural Sector in Sri Lanka.*, Faculty of Agriculture, University of Ruhuna, 2017).

Nevertheless, if GBH can be established as a serious public-health risk, then the use of GBH needs to be re-assessed; and the claimed scientific evidence *for and against* must be weighed carefully instead of taking knee-jerk actions.

**Everyone agrees that the smaller the amount of agrochemicals used, the better it is from the principle of minimally disturbing nature. However, there is an optimal minimal amount consistent with feeding humanity safely and maintaining the integrity and health of our environment. Furthermore, manual weeding (needed after banning herbicides) causes serious soil erosion. Going back on no-tillage farming to tilling and ground-digging is a very retrograde step. There is no longer a large pool of labour available for weeding ; this is very demanding in hot tropical climates where weeds grow rapidly and deep into the soil. The use of water to control weeds in rice paddies is possible, but unsound as it leads to erosion, loss of soil nutrients, and high demand for water.**

Here we present a comment on Dr. Gunatilake's presentation to make the material more balanced and take steps to correct some of the most important short-comings in his presentation.

- (i) Complete absence of any attempt to use systematic methods in establishing aetiology (even at the level of the simple Bradford-Hill criteria) to the manifestation of CKDu in certain regions of Sri Lanka.
- (ii) Failure to take account of highly acclaimed research findings of the US-government Dept. of Health, and other non-US studies on GBH and non-communicable diseases (NCD).
- (iii) Failure to note the distinctions between chronic toxicity, acute toxicity, and toxic hazard, resulting in a misinterpretation of the official position of the WHO, the FAO and the IARC.
- (iv) Focusing on parts per billion to trillion amounts of GBH in food that exceed Maximum Residue level (MRLs) as constituting a health risk, while ignoring other pollutants possibly found in much larger amounts, and probably incorrectly assuming that the MRLs indicate a health risk threshold.
- (v) Trusting reports of questionable studies which claim parts per trillion accuracy..
- (vi) An Erroneous estimate of the toxicity of surfactants and other adjuvants present in current GBH formulations. Neglect of relevant empirical field data.
- (vii) The use of hypothetical mechanisms which are contrary to established chemistry, and not established in the laboratory or in field experiments.

However, as Dr. Gunatilake claims to present “*The Current Evidence*” , let us examine what he presents.

**1. Dr. Gunatilake begins with a section titled “*The Difference between Glyphosate and Glyphosate containing Pesticides*”.**

The main point made in this section is that “Glyphosate is never used alone in agriculture, but almost always mixed with other chemicals known as adjuvants or additives ... we know that these adjuvants are up to a thousand times more toxic to human beings, animals and the environment” than ... glyphosate itself. Therefore, the agrochemical companies were deceiving us when they spoke only about the toxicity of glyphosate for the last 25 years ....

Here, when Dr. Gunatilake claims that the adjuvants are “thousands of times more toxic” than glyphosate, is he talking about chronic toxicity or acute toxicity, or both? Toxicity of either kind depends on exposure (which depends on dose, period of time used, and the mode of delivery of the toxin, e.g., by the gut or through the lungs).

The adjuvants found in glyphosate are similar or identical to the adjuvants found in many common household detergents, shampoos etc. The GBH formulations usually contain less than 5% of adjuvants, and the GBH is diluted (possibly a hundred times with water) in the spray used in the field. Hence the amount of adjuvant applied to the field, or absorbed accidentally from the spray by the farmer may be at a concentration of  $5 \times 10^{-4}$  (that is, less than 0.5 parts per thousand. Later we will show using field data that only a few parts per billion or less get into the blood of farmers who use the GBH).

The justified lack of concern about adjuvants for over 25 years is simply because anyone can do this calculation and conclude that the resulting concentrations in the environment or in the blood are far below any likely toxicity levels. Instead, Dr. Gunatilake hastens to accuse the industry of “deceiving” the public. Some of us who have taught environmental science even in the 1980s did these simple calculations and found no reason to engage in public scaremongering or becoming false heroes in the battle against “big agro-business”. There are valid grounds to accuse big agro-business where they twist the arm of farmers or mislead the public (e.g., see the writings of Marion Nestle – the most recent being “*Unsavory Truth*”, Basic Books, 2018 ), but the use of adjuvants in GBH is not one of them.

These adjuvants react rapidly with leaves and get further diluted into the water in the environment. Consequently the ambient concentrations become less than parts per billion. NO EVIDENCE what so

ever of environmental ill effects have been shown, except for aquatic creatures whose eyes may be affected in cases when the concentrations become high due to accidental run off from concentrated containers etc. This effect on eyes is similar to the action of soapy water and it is a well understood phenomenon – not something held in secrecy for 25 years by “industry”. The detection of such highly concentrated run-off of GBH in waterways is easy because such run off kills all green algae and aquatic weeds when it occurs. So, if there are green algae and weeds, there are no glyphosate residues.

Naturally occurring saponifying agents are found in the environment in plants and in soil minerals. The GBH adjuvants are no different. In fact, rapeseed-based adjuvants can be used in GBH, as found in some GBH formulations used in North America by consumers frightened by publicists who hold sway over the public imagination. They use various media outlets funded by the anti-GMO-food lobby, organic-foods lobby and the “alternative medicine” lobby.

People wearing goggles that *look like poison-gas masks* while spraying pesticides are shown in news reports, even though GBHs are safe enough to be used without protective clothes. Big spray machines are routinely shown “in the act of poisoning” the environment by “big agro-business”. Green algae blooms caused by excess phosphate from fertilizers and detergents are shown as if caused by GBH where as glyphosate should remove such algae if present in the environment!



### **BOX 1**

The best approach against fake news is to look at field data instead of taking knee-jerk reactions against spraying GBH. In a well regarded study (Acquavella et al, 2004, *Environ Health Perspect* volume 112(3) pages 321–326), urine samples from farmers in South Carolina and Minnesota were found to have a mean glyphosate level of 3 parts per billion (ppb), with higher values in farmers who used no gloves, with a maximum of 233 ppb. Thus the adjuvants (less than 5% of this) will be less than 1.5 parts per trillion (ppt). The WHO/FAO considers that the safe threshold for daily ingestion of glyphosate is 1 mg per kg of body weight, i.e., 70 mg for a 70 kg farmer ( see the report, 16-May 2016, Geneva, by *The Joint Committee on Pesticide Residues*, WHO/FAO) . Hence, assuming that the farmer's blood volume is about 5 liters, the tolerable daily maximum concentration in blood that is safe from chronic toxicity is 70/5 mg/litre, or 14 parts per thousand. Even if we assume that only a tenth is absorbed by the gut, the analysis given below remains valid. Dr. SG says the adjuvant is a thousand times more toxic than glyphosate. Then its threshold is 1.4 parts per thousand. But the amount of adjuvant found in the blood will be no more than 1.5 parts per trillion., i.e., a billion times smaller. **So there is no reason for Dr. SG to cry Wolf, unless he is armed with field data to the contrary. He has presented no such data.**

A comprehensive study of non-communicable diseases inclusive of some 200 types of cancer, using a sample of some 90,000 farmers who used GBH continuously and intensely for nearly 25 years, was carried out by the US government department of health.

## BOX 2

This huge study is known now as the “**agricultural health study**”. The results were reported by Prof. Andreotti et al. in the J. Natl. Cancer Inst. 2017, DOI: 10.1093/jnci/djx233 . This showed in detail the ABSENCE of any significant correlation what so ever with any type of cancer including Non-Hodgkin lymphoma.

While the *presence* of correlations does not imply aetiology, the *absence* implies lack of a causative role for GBH. The results were also reviewed by independent expert on health risk. One of them was Prof. David Spiegelhalter, FRS, and Professor at the University of Cambridge who also confirmed that this large and careful study showed “ no significant relationship between glyphosate and cancer”. And yet, Dr. Gunatilake, writing in June 2018, i.e., six months after this study, seems to be ignorant of it. Of course, as far as we know, *ThruthOut.Org* and *Dr. Mercola* also ignore it. Furthermore, other large cohort or case control studies have come to the same conclusion and Dr. Gunatilake should have heard of them. A meta-review (a comprehensive statistical data review of high significance in the hierarchy of biomedical research) was led by Prof. Mink of the Emory University. The results, published in *Regulatory Toxicology and Pharmacology*, 2012; vol 63(3), p 440-452, came to the sane conclusion that there is no correlation between GBH use and cancer.

What sort of data does Dr. Gunatilake use? Who are his collaborators? Dr. Gunatilake is the second author of the “paper” where Ms. Senanayake, the Kelaniya psychic who claims to communicate with God Natha is also a co-author. Dr. Channa Jayasumana is the first author. The paper has no data. It appeared in a predatory publication that poses as a “science journal”. Most academic departments shun such “journals” which have no peer-review process. While the journal (maintained by a Chinese businessman) may have improved a bit, its “ill-repute” during Dr. SG's use of it is documented in: <https://scholarlyoa.com/2014/02/18/chinese-publishner-mdpi-added-to-list-of-questionable-publishers/#more-3072>

The major studies that Dr. Gunatilake and Dr. Mercola ignore were on GHB *containing* the adjuvants and not just on pure glyphosate. When Dr. Gunatilake stated in a Daily Mirror article (27 June 2018) that it is the adjuvants in glyphosate that cause the problem, the present author answered his claims in much more detail than given in this response. Hence please see: <https://www.lankaweb.com/news/items/2018/06/28/dr-gunathillakes-daily-mirror-article-about-glypohosate-adjuvants-and-their-toxicity>

[END OF PART-I ]

## **On Dr. Sanath Gunatilake's views regarding claimed “Toxic Effects of Glyphosate Based Herbicides (GBH) including CKD and Cancer (SLMA newsletter, August 2018) - II**

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### **2. Section two of the article by Dr. Gunatilake is titled “Rapid Global Spread of the Use of Glyphosate based Pesticides”.**

Here Dr. Gunatilake remarks on the rapid adoption of glyphosate by farmers, and claims that this adoption was due to (a) introduction of GMO foods, (b) false advertisements by Monsanto that the pesticide was safe and also that it is bio-degradable. He refers to a lawsuit in 1996 in New York where

Monsanto was fined \$50,000 and subject to withdrawal of the advertisements. Dr. Gunatilake also alludes to similar lawsuits in Europe.

Dr. SG does not allude to the false propaganda of zealots, or the holding of Kangaroo courts in various capitals of the world, including the one in the Hague attended by Ven. Ratana, claiming that GBH manufacturers are guilty of “Ecocide”, where as in reality big agro-companies were important to feeding the world population that rose rapidly in the 20<sup>th</sup> century.



A protest outside the Monsanto Tribunal, which heard testimony for two days in October. (Photo: Monsanto Tribunal/flickr/cc)

Thus, already 36 years ago when the New York court (rightly or wrongly) fined Monsanto, what Dr. Gunatilake considers to be “facts” about Roundup became explicitly available to the farmers, agricultural scientists and regulatory bodies. Nevertheless the popularity of GBH did not diminish at all and no regulatory body banned it. In effect, the scientific community and farmers who actually use the product see no merit or validity in the conclusions of the New York Jury who in 1996 concluded adversely against GBH. As recently as June 30, 2016, a press release signed by 108 Nobel Laureates was published by *The Washington Post* condemning “Green-Activist” organizations against their false propaganda against GMO products (whose mainstay is the use of Glyphosate). The usual claim that scientists who speak in favor of GBH have been “Bribed by Industry” is simply a preposterous claim, especially when leveled against the authors of the recent *Agricultural Health study* or these Nobel Laureates.

The massive *agricultural health study* (see Box 2) of 90000 farmers during a period of 23 years by Andreotti et al (2017), the meta-data study by Mink et al (2012), and the field studies by Acquavella et al (2004), see Box 1, are just a few of the many independent studies (including from countries other than the US) that confirm the erroneous nature of the conclusions of the 1996 New York Jury. They confirm the inaccuracy of the statements made by Dr. Gunatilake about the alleged chronic toxicity of GBH products. The author has already discussed the recent California judgment (August 2018) elsewhere. Please see:

(a) <https://www.colombotelegraph.com/index.php/can-a-california-jury-decide-if-a-pesticide-caused-gardener-johnsons-cancer/>

(b) <https://www.colombotelegraph.com/index.php/how-can-one-sleep-hearing-holy-inquisition-style-sri-lankan-discourses/>

## **2a. A subsection of Dr. Gunatilake's article is entitle “Glyphosate residues in Food”.**

This is a headline catching strong claim of the anti-agrochemicals lobby because it frightens the consumer into believing that his/her plate of food is toxic. Today's food is safer than ever and much better regulated than even a few decades ago.

Given the widespread use of GBH, there is surely NO SURPRISE in finding utterly miniscule traces of GBH at the level of parts per trillion or parts per billion. One part in a billion is like locating one specific Indian in the whole of India with a population of one billion. The ability to detect such trace amounts is a tribute to the ingenuity of analytical chemists, and such amounts are utterly irrelevant to environmental toxicology. It is not possible to discuss the effect of such trace amounts without considering the effect of multiplicity of active substances, also in trace amounts. If such small amounts individually have an adverse or favorable physiological effect, then they are on par with magic, placebo or nocebo-like action!

Some French wine makers have complained of the presence of GBH in wine, in parts per billion. Wine contains roughly 11% (i.e., 11 parts per hundred) of ethyl alcohol which is a class-I carcinogen! This is like a person having the Ebola virus worrying about a slight increase in his/her cholesterol levels.

In the following we present amounts of glyphosate found in common foods, using figures from a variety of sources as indicated. We have also included the amounts given by Dr. Gunatilake in his SLMA newsletter synopsis; they are marked as SG. Canadian Maximum Residue Limits (MRL) are usually similar to US MRLs.

<b>TABLE 1</b>			
<b>Food type</b>	<b>GBH Residues detected</b>	<b>MRL (country specific) .</b>	<b>Max. Daily intake (60 mg GBH, 60kg person)<sup>§</sup></b>
Fruits (Apples)	< MRL in 93% samples (Canada) <sup>a</sup>	0.2 ppm (USA and Canada)	Eat 3,000 apples/day everyday if MRL is present
Vegetables (Cabbage)	< MRL <sup>a</sup> ,,	0.2 ppm (USA)	Eat 300 kg Cabbage daily if MRL is present
Bean,, Mung	< MRL in 65% samples (Canada) <sup>a</sup>	5 ppm (USA)	Eat 12 Kg Mung daily if MRL is present
Lentils, chick peas	4 ppm (Canada) <sup>a</sup>	8 ppm (USA)	Eat ~15 Kg lentils/day at 4ppm presence
Soy bean	20 ppm	20 ppm (USA)	Eat 3.0 Kg Soya/day
Rice (grain), popcorn	<0.1 ppm	0.1 ppm (USA)	Eat 600 kg rice/day at 0.1 ppm presence
Honey	16 ppb	50 ppm (EU)	Eat 1.2 kg honey/day
Tea (dry tea for export) Biglow Green tea <sup>b</sup>	~0.1 ppm 0.38 ppm (dry) <sup>b</sup> undetectable (brewed)	1.0 ppm (Japan, US) 2.0 ppm (EU)	Consume 600 kg of tea leaves/day everyday at 0.1 ppm presence.
Oates, Wheat Nature Valley Granola <sup>c</sup>	<2 ppm 0.45 ppm	30 ppm (USA) <sup>d</sup>	Eat 133 kg of Nature Valley granola every day
SG <sup>e</sup> -Quaker Oates	~1.8 ppm	1 ppb (Taiwan, SG)	Eat 60,000 kg Quaker Oates @ 1 ppb daily
SG- eggs	<1.327 ppb	0.05 ppm (USA)	Eat 45,210 kg Eggs/day
SG-Bagel, cereal, bread	< 1.327 ppb	30 ppm (USA)	Eat 45,210 kg Bagels/day
SG-Organic eggs	169 parts/trillion	~50 ppt (c.f., SG)	Eat 355,000 kg eggs/day
SG-Breast milk	166 parts/trillion	75 ppt (c.f., SG) quantification limit	3 kg baby needs 18,070 kg of milk @166ppt

<sup>§</sup> Report of the Joint Committee on Pesticide Residues, WHO/FAO, 16-May 2016 Geneva

<sup>a</sup> [http://static.producer.com/wp-content/uploads/2017/04/CFIA\\_ACIA-9123346-v1-FSSD-FSSS-Glyphosate-Final-Report-15-16\\_0184101.pdf#\\_ga=1.196489061.892407858.1492107204](http://static.producer.com/wp-content/uploads/2017/04/CFIA_ACIA-9123346-v1-FSSD-FSSS-Glyphosate-Final-Report-15-16_0184101.pdf#_ga=1.196489061.892407858.1492107204)

<sup>b</sup> <https://www.ecowatch.com/bigelow-tea-glyphosate-2519130266.html>

<sup>c</sup> [https://www.organicconsumers.org/sites/default/files/2016\\_08\\_24\\_nature\\_valley\\_dc\\_court\\_stamped\\_complaint.pdf](https://www.organicconsumers.org/sites/default/files/2016_08_24_nature_valley_dc_court_stamped_complaint.pdf)

<sup>d</sup> <https://www.fas.usda.gov/maximum-residue-limits-mrl-database>

<sup>e</sup> SG- All entries marked SG are from Sanath Gunatilake's Lecture. When a number like 1.327 ppb is given, four significant figures are claimed. Since the unit is a ppb, this requires a measurement accuracy of **one part in a trillion**. Similarly, parts *per trillion* amounts taken from advocacy-NGO sources like the “Alliance for Natural Health” (ANH) are quoted, even though the usual reliable limit of detection of glyphosate by chemical analysis is ~2 ppb. Hence SG's numbers should be taken *cum grano salis*.

Since Sri Lankans eat lentils, soya products etc., originating in Canada, the Canadian data are indeed relevant to Sri Lankan consumers as well. However, the amounts of GBH found in Sri Lankan fruit and vegetables tend to be much smaller owing to the action of monsoonal rains, and due to a large increase in degradation rates for glyphosate in a hot climate. This is due to the “Arrhenius Factor”,  $e^{-E/KT}$ . Here  $E$  is a typical activation energy for a degradation reaction while  $T$  is the ambient temperature. The ambient temperature at harvest times in Canada is 10-20 degrees (Celsius) less than in Sri Lanka.

In looking at column 3 on MRLs, it is clear that Dr. Gunatilake, and the public who read the websites and newsletters of *EcoWatch*, *Organic Consumers Association*, *Dr. Mercola*, *Moms across America*, *Whole-Food consumers*, *Beyond Pesticides*, *Detox*, *Food democracy Now*, *Avaaz team*, *Alliance for Natural Health*, etc., simply DO NOT KNOW what the MRL implies when they talk of “**alarmingly dangerous levels of pesticides in food**” after comparing pesticide residues with the MRLs.

Contrary to what seemed to be assumed by Dr. Gunatilake, and by most members of the public including various Jurors who pronounce on lawsuits, MRLs are NOT directly related to the health risk from consuming the food, but to good agricultural practice (GAP) ! When Dr. SG claims that Taiwan set a limit of 1 ppb in Oates, while Quaker Oates has 1.9 ppm of Glyphosate, he should ask why America allows 30 ppm of glyphosate in Oates, i.e., 30,000 times more! It clearly cannot be a matter of toxicity of the glyphosate residue to human health! Sometimes MRLs are mere weapons of trade wars.

In Sri Lanka the maximum allowed level of Cadmium (a notorious toxin) in phosphate fertilizer is set at the absurdly low level of 3mg/kg while the EU and USA allow higher values. See: *Environ Geochem Health* <https://doi.org/10.1007/s10653-018-0140-x> where cadmium in fertilizers, soils and food is re-examined and it is shown that much of the hysteria is unjustified. There is NO cadmium build up in the soil from fertilizers containing even ten times the maximum allowed Sri Lankan limit. Some US states allow even 400 mg of Cd per kg of phosphate fertilizer.

The maximum allowed limits are dependent not only on good GAP, but also on the prevailing psychological fear in communities fanned by various advocacy NGOs who depend on public fear for their donations. Furthermore, by insisting on tight restrictions (e.g., fertilizers with low-Cd content), only very expensive fertilizers or expensive GBH (with special adjuvants) can be imported into the country. Then higher commissions accrue to bureaucrats and politicians who facilitate the licenses.

Looking at Column 4 of Table 1 we see that the MRL, if interpreted as done by Dr. SG would imply an absurd daily consumption of such a product when judged against the daily threshold for chronic

toxicity. Thus the MRL should not be used as a toxicity threshold. If the detected residue level is higher than the MRL, it does not mean that the food is unsafe, but that good agricultural practices have not been followed. But, even when the residue levels are at parts per billion Dr. SG is not happy. *He seems to want them to be at absolute zero.* Dr SG has forgotten that centuries ago Paracelsus already taught medical students that the physiological action of a substance manifests only when it exceeds a threshold.

As far as we can see, Dr. SG has not discussed MRLs of commodities like rice or Tea relevant to Sri Lankans, but quotes data about Quaker Oates etc. obtained from a US NGO. He quotes amounts like “parts per trillion”, which are beyond the reliable glyphosate testing range, and **quotes no error bars.**

In consuming food, one does not just eat Quaker Oates or Organic egg. A daily meal will contain possibly rice, potatoes, lentils, cabbage, meat etc. Hence if MRLs are to be constructed on the basis of the maximum allowed daily intake corresponding to the chronic toxicity associated with a given pesticide, then a calculation based on the typical diet of each country or region should be used. Thus we see that Dr. Sanath Gunatilake's exposition not only mis-represents the MRLs, but also follows some intuitive notion of “toxicity” rather than scientific ones - perhaps of the sort followed by “Mothers-Across-America, Avaaz team, Ecowatch” and other fear-mongering Green-mobs like the ANH.

[END OF PART-II]

### **On Dr. Sanath Gunatilake's views regarding claimed “Toxic Effects of Glyphosate Based Herbicides (GBH) including CKD and Cancer (SLMA newsletter, August 2018) – III**

by Chandre Dharmawardana, Canada

#### **3. The third section of Dr. SG's lecture synopsis is titled “Global Concerns about Glyphosate Toxicity”.**

Here Dr. S. G claims that “Most countries are seriously concerned about the contamination of their food supply because we are far more aware of the multiple toxic effects of glyphosate formulations at various concentrations”, and presents Figure 1.

In box no. 4 associated with our reproduction of his figure (Fig. 1) we explain why much of what Dr. SG claims as “*multiple toxic effects*” is nothing but hype. Of the 195 countries listed as “countries” in the UN, a large number of them, especially in Africa and Asia are grappling with the problem of how to **feed their people** rather than **issues of contamination** as claimed by Dr. SG. Only two countries (Sri Lanka and El Salvador) banned GBH, and they both reversed the ban soon enough. California has taken no steps to ban BH even after the verdict against Monsanto awarding the gardener Johnson nearly \$300 million in damages.

The motivation for the hype against GBH is explained in the publication on fake news about GBH.

See: <http://dh-web.org/green/NatuNewsFake-8.html>

Unlike Africa or Asia, California where Dr. SG lives is a very prosperous place. It uses a very large amount of glyphosate for agriculture. Its well-fed people have the luxury of making a choice among what they consider are clean food, organic food, and contaminated food. But this is not true for much of Africa and Asia.

When Californians talk of contaminated food they mean, for instance, Quaker Oates containing ~1.8 ppm of GBH, or 1.327 ppb. Compare this to the food eaten by Sri Lankans, usually stored on the floor in open gunny bags in roadside shops with resident cockroaches and rodents, subject to a barrage of motor and diesel exhaust fumes with high amounts of class-I carcinogens, and particulate dust up to thousand times higher than WHO-allowed amounts.



Butcher shops in Colombo usually have a hover of crows and flies, offal thrown on the ground, with exposed meat without refrigeration, butchers without gloves, aprons or head cover, at a level of un-hygiene illegal in California. Yet, Dr. SG is implicitly imposing Californian food standards in the Lankan context on just one context – agrochemical residues in food. Plastic garbage is burned in Sri Lanka's side-streets close to many shops, emitting dangerous acrolein-like products. Unsurprisingly, 100% of all CKDu patients were found to have naphthalene like substances (in the biopsies) while only 3% had any significant traces of GBH (Jayatilleke et al, WHO-NSF report on CKDu, 2013).



In this image Venerable Ratana is threatening to take the “fight to the streets” using people brought even from Trincomalee to impose the glyphosate ban. Although the country has failed to even deal with urban garbage, Ven. Ratana launched a political program claiming to **rid the country of all toxins and agrochemicals**, and use **only organic farming** within traditional practices – “as was done by the ancient kings of Sri Lanka”.



It is normal to see birds flocking to eat earth-worms and other soil organisms. These fields have been treated with agrochemicals, GBH, for decades, and if the the soil has become “**awash with toxins**” as claimed by Ven. Ratana and the anti-GBH lobby, we should NOT see such flocks of birds. Also, if there are significant amounts of glyphosate in the water, there should be no aquatic weeds or green algae in our waterways - but they are full of weeds.

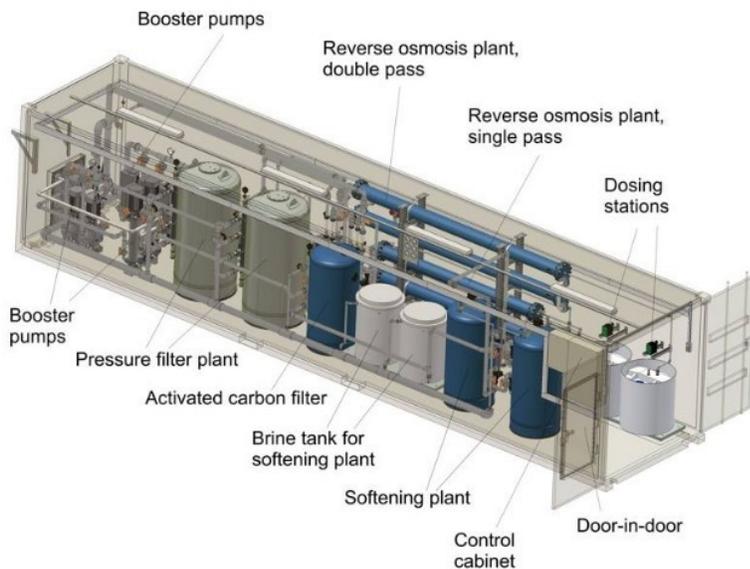
(Mahalluppallama, Photo courtesy Dr. Chamal Perera, & Dr. Amarasiri.)

### BOX 3

The analysis of soil, water and food stuffs by the WHO study (Jayatilleke 2013), and many other independent studies (e.g., Nanayakkara et al 2014, Pathmakumara Jayasinghe et al 2016) have shown that there are no significant amounts of heavy-metal toxins (As, Cd, Hg etc) or pesticide residues in the Rajarata environment where CKDu is endemic.

**Dr. Jayasinghe's work showed that most of the Reverse-Osmosis plants have been installed to purify water from rivers and agricultural water sources which were already safe with levels of metal toxins below threshold! These RO plants sell water to farmers at rates like Rs1-3 a litre! The RO plants need to be replaced every five years, while filters need to be changed perhaps every month. But they are mostly not needed as rain water use, or pumping from the nearest canals, work well.**

**Plastic rain water tanks last about 25 years and provide water at less than a few cents/litre.**



Reverse Osmosis Plant.

Only 3% of patient biopsies revealed any significant amounts of glyphosate. So, neither the arsenic, nor the glyphosate needed for the validation of the CKDu theory of Jayasumana, Gunatilake and Senanayake (the clairvoyant) seem to be present in the CKDu areas. We can also conclude that Ms. Senanayake has no clairvoyant capability either.

BOX 4 and Fig. 1

Contd. from page 06

Toxic Effects of...

Cum Grano Salis ?

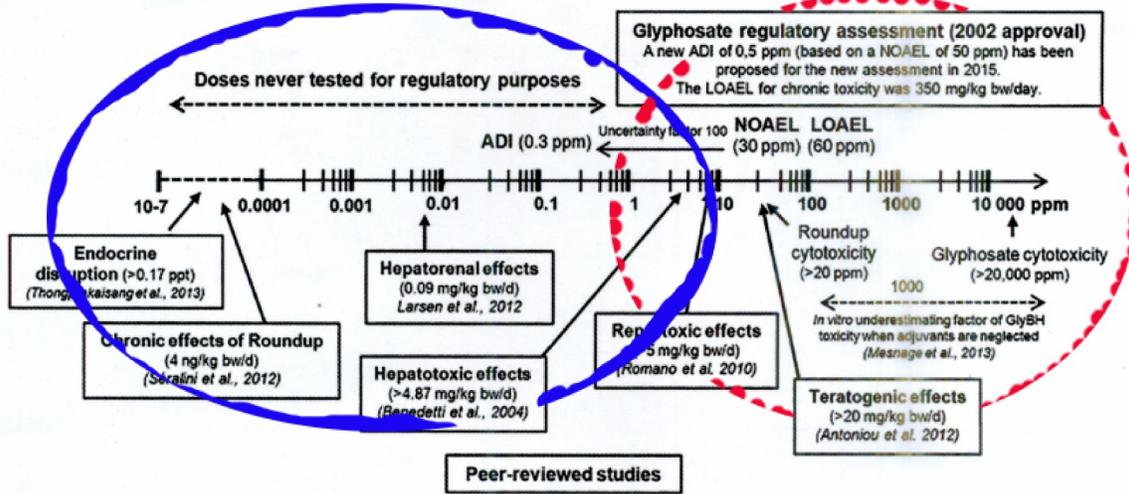


Fig. 1 This figure is taken from Dr. SG, page 6, and we have added the caption (*Cum Grano Salis* – with a grain of salt). We have added the blue and red ellipses. The region enclosed in blue in this figure contains claims of studies at levels of glyphosate below 2ppb. In effect, results in this regime are effectively beyond standard analytical techniques, and so great care must be taken in quoting or using such “data” unless they have been confirmed by several laboratories having the protocols and capacity to do analytical work with “picogram” accuracy.

Dr. SG has presented a figure claiming essentially that the effect of very low doses (below few parts per billion) of glyphosate has not been tested. Taking such trace amounts in isolation, without including the effect of a multiplicity of other substances and ions is nothing but simple falsification of biochemistry. It is no different to the claims of homeopaths about “just the memory of a drug in water is enough to cure a disease, even without the drug being present”.

Dr. SG gives several boxes indicating “Endocrine disruption at 0.17 parts per trillion, chronic effects of Roundup at 4 parts per trillion, Hepatorenal effects at 90 parts per trillion. *These are simply an exercise in gullibility.* Furthermore, claims of highly questionable individuals like Seralini (2012) are listed and presented as “Peer-Reviewed” research. In fact, Seralini et al were forced to retract their research publications from peer-reviewed journals, and they have a habit of “publication by press release”.

*The region in the figure enclosed in the RED ellipse involves GBH toxicity claimed to be caused by the presence of adjuvants which are “a 1000 times more toxic” than glyphosate. In box 1 we showed that these adjuvants may be present in the blood at mere parts per trillion.*

Dr. S. G. refers to the work of Mesnage et al (2013) and claims that if adjuvants are included, then the toxicity increases by 1000 fold. Is he talking of chronic toxicity or acute toxicity? Is he talking of ingestion via the gut or via the lungs? Toxicities differ in all different cases. What has been presented in Dr. SG's figure has no connection with what happens in the field-environment. But artificial *in-vitro* situations can be created where *only* glyphosate and adjuvants are present in a test tube at the ppb levels, together with a few victim cells. Even then the results remain inconclusive! Has Dr. SG or Dr. Mesnage tested common detergents and shampoos (containing similar adjuvants) at parts per trillion level for their “toxicity”?

Dr. SG does not mention anywhere how the opposition to GBH has been whipped up by anti-GMO activists, and how Rudolf Steiner's "organic food movement" which rejects such "non-natural" inputs, for ideological reasons (similar to those of religious groups who reject treatments using stem cells). Although organic agriculture has existed since the 1920s, it produces less than 2% of the world's food needs. The Organic-food enthusiast and Swiss researcher **Adrian Mueller** considered how to feed the world by organic means, and concluded that we need to (i) reduce the world population (ii) make the population vegetarian to free up land from reduced livestock farming, and (iii) vastly extend the area under farming (cutting into forests) and use more water to produce more food. Hence organic agriculture will not solve our problems.

See: <http://dh-web.org/place.names/posts/CD-Mueller-OrganicL.pdf>

Dr. SG does not mention how a two-tier food system is being created, i.e., one for the rich elite in western societies, and one for the poor. The latter, catering to the "developing" counties has to rely on modern agriculture to feed the demographic bulge of poor people who cannot afford "organic food", and do not in any case eat Quaker Oates (with or without 1.8 parts per million of GBH). They manage with a slice of bread taken with a *Mouture* of salt and chili ("**Lunu Miris**")! If GBH and other agrochemicals are banned, as demanded by Ven. Ratana, it is the poor who will starve. You may read more about the two-tier food system and the fake fear-mongering news about GBH created by Dr. Mercola at: <http://dh-web.org/green/Mercola-Organic.html>

Dr. SG mentions how "most countries" are restricting the use of GBH from trivial uses, e.g., to keep the front lawn free of dandelions. In fact, the "most countries" that Dr. SG refers to are **just a few** rich countries. This is mostly empty promises by local politicians to appease voters who are rich enough to have lawns. When such restrictions are applied, this is done with no limitation on agricultural use. Even when "total bans, or progressive bans starting in 5 years", etc., are promises (e.g., Emmanuel Macron in the French Presidential election), the "*demarche apres le scrutin*" is very different. When some French "green" MPs demanded that the promise (of banning GBH in three to five years) be written at least into the proceedings of the legislature, the Macron government categorically refused!

The European Union is the only set of nations which determines such questions as the use of GBH through a political process (say, every five years). Most other countries leave the matter to technical committees. In Sri Lanka too, such decision making has become politicized, and placed in the hands of Venerable Ratana and his followers who claim to make Sri Lanka "*a nation free of toxins*" even while urban garbage dumps have become monstrous mountains which explode now and then due to methane buildup and kill people! This monk claims (in an **Ada Derana** TV interview, April 2018) that according to the WHO, glyphosate formulations contain arsenic making it nephrotoxic, and that 3% of the deformed births in the Rajarata, mutations in frogs etc., are caused by the use of GBH by farmers.

That such 3% deformities is the world-wide norm, attributed to the effect of cosmic and solar radiation seems to be unknown to Ven. Ratana and his associates. When Dr. SG says that "Genotoxicity and Endocrine disruption by glyphosate formulations also lead to chronic health and developmental effects", he is making the same statement as what Ven. Ratana stated. Dr. Jayasumana and Ven. Ratana made the same claims when they attended the kangaroo court organized by a French Journalist at the Hague, Holland. There they, and Latin American activists, claimed that GBH caused birth deformities in children.

Furthermore, Ven. Ratana has politicized the scientifically absurd, empirically unsubstantiated claim published by Dr. Jayasumana, Dr. Sanath Gunatilleke and the God-Natha Clairvoyant Ms. Senanayake implicating GBH in CKDu. Thus we need to appreciate that Dr. SG is a front-line flag-bearer and

activist of the anti-GMO campaign where they have attempted to link GBH with CKDu, cancer etc to serve a political purpose. One may see this in the manner in which “TruthOut.org”, a California internet Tabloid fanned out the news about the “ Jayasumana-Sanath-Gunatilleke & God-Natha-Clairvoyant” publication giving it a life and making it an **internet truth, even if it be fake news**. See: <http://dh-web.org/health/RitterTruthout.html>

Dr. SG says “glyphosate is a glycine phosphate where a hydrogen atom is replaced with a phosphate group. Therefore the two molecules glycine and glyphosate are very similar to each other”. (This is sheer nonsense. If this is so, glycine should also kill weeds, act as a chelating agent etc.). Then Dr. SG says, it is hypothesized that misincorporation (of glyphosate) during protein synthesis could cause a cascade of metabolic and homeostatic changes.

This hypothesis of Dr. SG is a matter of pure fantasy. If Dr. SG believes in it, he should demonstrate the misincorporation in a laboratory protein synthesis. If glyphosate present at parts per billion in food or human tissue could force such a reaction, then it should be trivial to demonstrate it at an *in vitro* one-mole concentrations of glyphosate in a protein synthesis. Why has no one seen this misincorporation in any lab? It is because such reactions do not happen that Dr. SG is forced to continue to make hypotheses, just as Jayasumana, Gunatilake and the Clairvoyant made a hypothesis some four years ago, with no demonstration what so ever of its validity so far. Dr. SG no longer talks of the need for hardwater and arsenic, but claims that it is this misincorporation of glyphosate for glycine in protein synthesis that causes a “cascade of metabolic and homeostatic changes that result in kidney injury”, finally causing CKDu.

**BOX 5.**

*Why doesn't this kidney injury from GBH proposed by Dr. SG happen in other parts of the country where GBH is extensively and regularly used (e.g., in Tea plantations, vegetable gardens), while it is used only for a few days in each paddy season in the Rajarata? Why does one Rajarata village – e.g., Badulupura get CKDu while its very neighbour does not? Does the protein synthesis change from geographic location to location? Bizarre!*

*Why didn't this “kidney injury” action of GBH show up in the 90,000 farmer study run for 23 years where the farmers were intense GBH users containing adjuvants etc?*

Unfortunately, Dr. SG is no protein chemist and certainly fails to realize that glycine and glyphosate are two very different chemicals in their chemical action, energetics, molecular size and stereo-specificity. **This theory is plainly and simply wrong and on the same (lack of) footing as their previous theory involving hard water, arsenic and GBH.** It is clear from Dr. SG's write up that he readily accepts unsubstantiated theories like those of Dr. Stephanie Seneff about Autism and other illnesses. In fact, Dr. Seneff links ALL non-communicable diseases to GBH use, and commercializes a life-style regime where she claims that the user will live to 111 years!

Hence there is no further need to attempt to analyze Dr. SG's views and unsubstantiated hypotheses which are well outside those of mainstream medicine, and of protein-chemistry as understood by chemists and physiologists.

#### **BOX 6.**

The work of Dr. Wasana et al (*Nature Report*, 2017 <http://doi.org/10.1038/srep42516> ), and independently of Dr. Thammitiyagioda et al (*Ceylon Medical Journal*, 2017, <http://doi.org/10.4038/cmj.v62i1.8428> ) have shown that:

**hardwater in combination with fluoride found in stagnant waters of household wells away from the agricultural water table cause CKDu.**

That it is the magnesium ions present in hard water which join with fluoride ions to become nephrotoxic is shown on theoretical grounds (Dharma-wardana, 2017, *Env. Geochem. & Health*, <https://doi.org/10.1007/s10653-017-0017-4> ) and confirmed empirically from the field work of Dr. R. M. G. Rajapaksa in Moneragala, and from other workers. The relevance of fluoride to CKDu was insightfully conjectured by Chandrjith, Dissanayake and Illeperuma around 2005.

Hence, providing clean drinking water is the most important step for preventing CKDu.

#### **Dr. Gunatillake's conclusion and our comment.**

In Dr. Gunatillake's conclusion he makes a plea for the continued banning of GBH based on the so-called “*precautionary principle* (PP)”. He seems to understand this in the sense of **ban-and banish** (BB) elimination of the suspected substance.

But this approach to the PP has been rejected by societies as a failure ever since the Al Capone days in Chicago where an attempt to ban alcohol sales was made. All pharmaceuticals are far more dangerous substances than GBH. Yet they are NOT banned; even narcotics and radio-nucleotides are available to those who need them through medical prescriptions and licensed pharmacists. This approach to the precautionary principle is known as the **control and constrain** (CC) precautionary principle. It is the CC-PP that is used nowadays, and not BB-PP.

The ban on Glyphosate in Sri Lanka engineered by Ven. Ratana was an utter failure, as it became available in the black-market, just as black-alcohol became freely available during the Chicago ban. If technical committees are convinced that there is a significant danger from GBH, then they can use the CC-PP, where GBH formulations are released only under the supervision of licensed agricultural technicians who will come to the field and apply the substance according to specifications and safety guidelines. That is, the public at large will have no access to it and wonton usage will be eliminated.