Food Research Collaboration

Does Sugar Pass the Environmental and Social Test?

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Summary

This paper explores the environmental and social implications of sugar consumption. It summarises global evidence on sugar's impacts – mostly negative on environmental grounds and only slightly more mixed on the social front. Concerns about land use, pollution, water, processing and labour are summarised. We consider attempts to create fairer and better sugar sources, too, and propose that this broader socio-environmental picture of sugar should be included by policy-makers alongside the strong evidence on sugar consumption's harmful impact on public health. That said, the political realities about sugar are complex. Many smallholder farmers, farm employees and sugar producing nations economically rely on its production and consumption. Just as consumers are too easily hooked on sweet diets, so are the politics. We see a need for more imaginative and tougher lines of thinking about sugar. In the coming food world of squeezed resources – land, inputs, ecosystems –serious questions should be asked about whether mass growth of sugar production is any more a good thing than is continued sweetening of the UK's (and the world's) diet. If not, societies need to begin experimenting with, and planning for, alternative land use and employment possibilities.

The paper had two starting points. The first was a belief that the UK's and EU's commitments to sustainable consumption and production ought to be applied to food. The reality is that EU consumers are given information about energy 'efficiency' of their cars or electrical goods but not their food. Despite this, consumers are urged rather vaguely to behave 'responsibly'. The health case for severely reduced sugar consumption is clear and has been confirmed, for example, by the UK's scientific advisory body in 2014 (1) and the WHO's guidelines in 2015 (2). We set out therefore to see what, if any, difference the addition of social and environmental data would make to the strong public health case for restricted consumption of sugar.

The second starting point was a concern about the realities of the political economy of sugar. The sugar trade has a long history and a strong grip on public taste. This is a powerful industry, but it is also a divided one, with vast wealth and poverty woven into the fabric of its culinary story. So, our concern was to see if a modern ecological public health case could be charted for sugar, one that links the environmental and social aspects of food with public health (3). Must we accept that former colonies should remain locked into cane sugar production (and be squeezed economically for their pains) any more than East Anglian sugar beet production should be assumed to be a good use of land here?

In an accompanying sister paper to the present briefing paper, another - "Should the UK be concerned about sugar?" – explores some of the wider politics of sugar and health in relation to trade, international obligations and changes in the EU sugar régime. In that paper, the current dilemmas for the UK and the EU are laid out: consumers are advised to reduce sugar intake for reasons of public health; the EU regulations on sugar are changing to semi-liberalise markets; these could lead to much reduced sugar prices on EU and world markets, increased volume of European beet sugar at the expense of imports, to the detriment of poor cane-producing countries that rely on sugar for a large proportion of national income, but almost certainly to greater incentives to processors to add cheaper sugar to foods and soft drinks.

Some observers may see the demise of the sugar industry in certain countries or regions as an environmental and social gain from the reduced environmental footprint and a reduction in the poor social conditions under which some sugar cane workers are employed. But others already argue that this is to consign weak actors in the sugar and food systems to a terrible fate. We share both views and argue that, surely, more attention ought to be given to chart a better form of employment and land use; better health and environment. Something needs to happen urgently: the earlier policy paper highlighted the fact the EU policy will be reformed from October 2017 and already sugar prices in the EU have crashed. Many smallholders and the communities they live in are facing a bleak future. We have little time between now and 2017 to transform rural economies in low income countries. We do not accept the inevitability of 'trade-offs' over sugar. We aspire to a food system with benefits all round. If policy makers return to basics – addressing what land is for, and positing how good diets require good food production and land use – we believe more sensible policies will emerge. This paper, and the accompanying one, is designed to contribute to that shared goal. As a country which led the spread of sugar, the colonial and post-colonial use of cane, the subsidies of production, and the sweetening of diets, the UK has much ground to catch up before it can claim to have a rational policy on sugar. But the terrain is certainly now more clear.

1. The problems

Sugar is a major food commodity - global production is 172m tonnes and it is grown on 30 million hectares across the world in 120 countries (4, 5). Although many of its environmental impacts are generic to large-scale intensive agriculture, some are distinct to sugar. Much of the literature on sugar production and environmental sustainability comes from CSOs, especially the wildlife organisation, WWF, and there is little independent, peer-reviewed research. WWF claims that sugar may be responsible for more biodiversity loss than any other crop, due to its destruction of habitat to make way for plantations, its intensive use of water for irrigation, its heavy use of agricultural chemicals, and the polluted wastewater that is routinely discharged in the sugar production process.

But, for many countries, sugar it is one of the most important sources of national income (6). In 2011, the world trade in raw sugar was worth $47bn, up from $10.2bn in 2000. Of that total, $33.5bn of exports was from developing countries, with $12.2bn from developed countries (7).

However, most producers in low-income countries do not capture any added value from sugar and they rarely capture the additional value when prices increase (8), as raw sugar is usually shipped in bulk to refineries. Once refined, sugar is converted into a high-value product and governed by Codex standards (9).

This is maintained because trading houses are the only true global players in the sugar industry, they are highly integrated, often controlling both production and processing; 80% of EU sugar-beet processing capacity and the majority of the EU sugar market is controlled by five companies (10).

2. Environmental Considerations

2.1 Environmental problems associated with cultivation of beet and cane

Production and processing of sugar worldwide has severe environmental consequences. Environmental impacts include loss of natural habitats, heavy use of water and agro-chemicals, fertilizer run-off, water and air pollution; entire ecosystems are threatened (5). Due to population growth and urbanization in sugar cane producing countries, its production is increasingly being transferred to traditionally biodiverse land such as rainforests, floodplains, and mangroves for monoculture (11). Approximately 5-6 million hectares of soil is lost every year due to intensive sugar cultivation and land degradation (5). Water and wind erosion

account for part of this loss. Eroded soil enters water streams and destroys marine habitats by increasing levels of suspended sediments. It can also cause flooding of sugar cane fields due to coastal soil deposition (11, refers to Queensland, Australia).

2.1.1 Loss of biodiversity, habitat destruction

Cane production has contributed to deforestation and habitat destruction including wetland habitat loss due to damming, which has altered the pattern of freshwater flows, for example, in Australia, the sugar industry has been a significant player in the damming of major rivers, which has altered the pattern of freshwater flow into the Great Barrier Reef lagoon.

Although the greatest land clearance for sugarcane cultivation is historic, the area under cultivation in some countries has continued to expand and therefore has probably caused a greater loss of biodiversity on the planet than any other single crop.

In Andalucia, Spain, beet irrigation has contributed to lower water levels in rivers, limiting the water reaching wetlands during the summer and there has been some wetland habitat loss due to altering freshwater flow (5).

2.1.2 Use of water

Both cane and beet are described as thirsty crops; they have contributed to water scarcity, low-lying areas have been drained for sugarcane cultivation, while one fifth of the world's beet cultivation area is irrigated (5). The water footprint of 1kg of sugar from cane and beet is 1,500 and 935 litres respectively (12). Water usage for the production of sugar cane is comparative to the water usage of rice and cotton production.

2.1.3 Run-off (wind and water erosion)

The WWF reported that 5-6 million hectares of cropland is lost annually due to soil erosion and degradation (5) due to the heavy planting of sugar cane known as mono-cropping. Erosion is a significant issue in areas under sugar cane or beet cultivation, particularly in tropical areas, since erosion rates in tropical agroecosystems are usually greater than the rate of soil formation (13,14). Cane and beet fields are prone to water and wind-generated erosion. Worldwide estimates of soil losses to water erosion under sugarcane range from around 15 to over 500t/ha/year (16). Beet fields in particular are vulnerable to wind erosion, since they are often left bare over winter. Estimates of soil losses from wind-generated erosion under sugar beet range from 13-49 tonnes/acre/year in the US (5). Both crops are also prone to soil loss at harvest; 10-30% of the total beet harvest weight is soil and 3-5% of cane (5, 16, 17).

This causes many problems as it affects future yields and the sustainability of sugar cultivation threatening the livelihoods of farmers and those who work the farms.

2.1.4 Pollution from fertilisers, herbicides, pesticides

With the erosion of soil also comes the threat of sediments being washed into water systems and ruining ecosystems and affecting livelihoods (18, 19, 20, 21, 22, 23, 24, 25, 26). With the modern day use of stronger and an increasing amount of chemicals to kill pests, these sediments have been poisoning the waters and surrounding water resources for drinkable water causing illness. 15 out of 24 of the world's ecosystem services are being degraded or used unsustainably according to the Millennium Ecosystem Assessment (27). The decline of the Everglades has been largely caused by phosphorus-rich runoff from sugarcane fields in Florida (5).

Pollution run-off can expose local populations to environmental pollution. The WHO reports that 3 million people suffer acute pesticide poisoning every year, causing 220,000 deaths, a figure that does not account for the impacts of chronic exposure (19, 20). Newly developed chemicals also have increased the varieties, potencies, and quantities of chemicals that are available to humans and released into the air, soil, and water. These chemicals have increased ecosystem pollution and caused serious disease problems in humans. Worldwide, an estimated 100,000 different

chemicals are used each year (19). The United States uses over 2,700 billion kg of chemicals each year, of which at least 20 billion kilograms are considered hazardous (28). Bilharzia - a parasitic disease contracted through water - is also a problem for workers.

Hess et al (29) say the cultivation and processing of sugar crops has been shown to have an adverse impact on water quality and aquatic ecosystems in a number of locations around the world, including Brazil, India and Nepal where discharge of improperly treated water from two sugar factories rendered the stream's water unfit for drinking, bathing or irrigation.

2.1.5 Burning cane prior to harvesting – air pollution

Much of the world's sugar cane crops need to be burnt before harvesting. Burning of the sugar cane crop produces large amounts of particles and toxic gases (carbon monoxide and ozone) into the air and increases the surface runoff where it may carry suspended soil particles, dissolved inorganic nutrients, and other materials into adjacent streams and lakes reducing water quality (30).

Additionally, during the burning season, smoke covers huge areas of the Amazon where sugar cane is vastly grown, warming the cloud layer and reducing the updrafts which form clouds. Smoke has a lower albedo than the clouds, allowing more solar energy to enter the Earth's atmosphere, affecting the climate (30). Burning has also resulted in soil degradation and reduced the quality of sugar recovered as well as reduced the quantity of cane retrieved by as much as 5% (5). It should be noted that there are initiatives in some parts of Brazil, however, to move away from cane burning to fully mechanized harvesting by 2017 (31).

In humans, the burning of sugar cane crops has been linked to; irritation of the airways (e.g. coughing or difficulty breathing), decreased lung function, aggravated asthma, development of chronic bronchitis, irregular heartbeat, heart attacks, and premature death in people with heart or lung disease (30).

Genetically modified cane sugar poses additional concerns for safety and loss of biodiversity.

2.2 Advantages for the environment of beet and cane cultivation

Unlike cane production, crop rotation is often used for sugar beet and thus does not have a significant impact on soil erosion and nutrient depletion (11). In the UK, beet's role as a break crop in arable rotations is contributing to a reduction in pesticide and fertiliser inputs during other rotations, by contributing organic matter to the soil in the form of root fragments and beet tops ploughed in following habitat (5). Habitat destruction for beet cultivation is substantially smaller than for cane and in many cases it has been grown on previously cultivated land: in some areas beet farming has increased biodiversity (32).

A positive environmental impact of sugarcane is that it is an efficient crop in terms of its photosynthetic capacity to produce biomass. Sugarcane produces more biomass dry matter per hectare than any other crop species. It can, therefore, have a strong positive influence on the environment and so can provide food and/or energy in a sustainable way (33). In addition, although it takes a lot of water to grow cane, little is used in processing.

2.3 Environmental issues in the transport of beet and cane

Sugar is a heavy commodity that needs to be transported. Nearly all raw sugar trade is conducted by sea, while a large part of refined sugar trade is based on land transport (34). In the EU the average distance from beet field to factory is 45 km as factories are located in rural areas. However, the transport of raw cane sugar to EU refineries involves greater distances. Transportation of sugar beets to processing plants causes noise and pollution; this became more problematic when distances travelled to processing plants increased following the closure of smaller plants in the wake of the EU Sugar Reform in 2007 (35).

Overall, transport and refining represents approximately 45-61% of the total emissions of cane sugar consumed in the EU. For beet sugar, the Product Carbon Footprint (PCF) values ranged from 610g CO2eq/kg for German sugar to 1040g CO2eq/kg for US beet sugar (36). While, for cane sugar values vary significantly, from 210g CO2eq/kg for Brazilian cane raw sugar up to 630g CO2eq/kg for cane white sugar from the US(34). Nevertheless, smallholder processing houses in low-income countries tend to be energy inefficient and may lead to over-exploitation of fuel wood supplies and local deforestation (37).

2.4 Environmental impacts of sugar processing

Environmental impacts of sugar processing are related to water use and carbon emissions. Both beet and (to a lesser extent) cane factories use large amounts of water to wash off the considerable quantity of soil removed with the roots at harvest (5).

Perhaps the most significant impact from cane and beet factories is related to polluted effluent, which has public health, environmental and socio-economic implications. In some countries, factories release effluent straight into streams, which tend to be relatively rich in organic matter, and the decomposition of this matter reduces the oxygen levels in the water, affecting the environment. Pollution of streams in the Gorakhpur district of Nepal, rendered the stream's water unfit for drinking and irrigation (5).

2.5 Environmental issues in the processing of sugary drinks and sweets

The production of sweets and sugary drinks is resource-intensive because of the processing required to create the final product; since sugar has no nutritional value, it represents a waste of embedded resources (38). Though sugary foods are low in greenhouse gas (GHG) intensity, they are otherwise resource-intensive at every step of the supply chain, including production, cultivation, primary and secondary processing, packaging and transportation (39).

2.6 Overcoming environmental issues

There is significant potential to increase the productivity of water use in sugar crop production by increasing crop productivity. Plant breeding for water use efficiency and drought tolerance can increase yield without increasing water use, whilst good agricultural practices—including soil, water and nutrient management as well as pest and disease control—can help close the gap between actual and potential yields; reduce the water use per unit of output; and reduce crop losses (29).

2.6.1 WWF Better Management Practices

The World Wildlife Fund (WWF) recommends the implementation of Better Management Practices (BMP) to reduce impacts of sugar production without loss of profit (5). BMP incorporates principles of sustainable agriculture into every step of sugar cane and sugar beet production. For example, efficiency of water use can in fact be increased through BMP. In addition to better management practices, efficient use of by products (to produce paper, alcohol, yeast, fuel, etc) can improve financial returns for farmers. There are opportunities to support sustainable sugar production through national support schemes, civil society organization-facilitated networking with market actors and research centres, sugar associations, international sugar markets, and ethical corporations (5). 'Green harvesting' techniques have been legislated and implemented in certain countries like Colombia, where sugar cane is harvested all year long, to eliminate negative environmental effects of pre-harvest burning (11). Integrated Pest Management (IPM) is another technique proposed to limit environmental impacts of sugar cane production. IPM is an alternative to heavy pesticide use and promotes managing pest populations rather than eradicating them.

2.6.2 Bonsucro

In 2008, Better Sugarcane Initiative (later rebranded as Bonsucro) was established as a private sustainability certification scheme by sugarcane producing industries (40). Bonsucro is a global multi-stakeholder non-profit organisation dedicated to

reducing the environmental and social impacts of sugarcane production while recognising the need for economic viability; "Bonsucro links its name to a product or process that has been certified by an independent certification body as being in compliance with the Bonsucro Standard. It is the first global metric standard for sugarcane" (40). The current certification scheme is based on 69 social and environmental indicators for industry activity that cover 93% of WWF's Sustainability Standards (41), however only 3.32% of global sugarcane production is certified by the scheme.

Bonsucro has a growing membership of over 100 members from 27 countries representing all areas of the supply chain, and is committed to being a robust, transparent and democratic organisation that has the resources and commitment to bring about its vision: "A sugarcane sector that is continuously improving and verified as sustainable" (40). As there is a growing influential power within NGO's and civil society, this offers hope that there is still a form of control that can help reign in the power of industry to better accommodate for concerns over the health and well-being of people as well as the environment.

2.6.3 Fairtrade

Fairtrade work with over 62,000 sugar cane small holders in 17 countries. Fairtrade works in countries with low and medium development status.

Fairtrade standards are based on core requirements that are then built upon through a development model. The standards cover environmental development, labour conditions, business and development. Fairtrade certified smallholders are supported by Fairtrade's Producer Support Relation programme through Fairtrade Liaison Officers. The smallholders are audited against the standards (42).

2.6.4 Organic Sugar

Organic sugar has established itself as a niche market in high demand in Europe and North America; Brazil currently supplies a large majority of organic cane sugar globally (35) and British Sugar has began producing organic beet sugar (11). Organic beet production however may not be able to sustain itself as it has very small profit margins due to the high costs of production and processing.

3. Socio-economic Considerations

3.1 Socio-economic problems associated with cultivation of beet and cane

3.1.1 Land grabs for cane cultivation

Oxfam has documented numerous land conflicts and 'land grabs' associated with sugar production. Since 2000, at least 4m hectares of land were acquired through 100 large-scale deals by sugar industries. Many deaths have occurred due to land conflicts; in 2008, Brazil saw 1,067 land conflicts in 2012, when 36 deaths and 77 attempted murders were linked to conflicts. While not all of these disputes are linked to sugar, key sugar-producing states have experienced high levels of conflict (43).

3.1.2 Downstream livelihood impacts of water harvesting

Another socio-economic impact of sugar production is loss of downstream livelihoods, due to abstraction of water for irrigation (43). About 80% of the five million people who once earned a living from fishing or river boat work in Pakistan have left in search of work in Karachi (5).

3.1.3 Health and safety of cane producers

Sugar is produced on 31 million hectares of land globally (44). To cultivate this vast amount of land, the industry relies on a massive workforce. Sugarcane cultivation is thought to be one of the most dangerous of any in agriculture (45). Workers have a high level of occupational accidents; most injuries occur during cane-cutting. Data

from Mauritius showed a level of more than 10,000 injuries per year since 1982 (46). Repetitive use of heavy machetes can cause musculoskeletal injuries, while unprotected eyes are vulnerable to cuts and injuries from cane stalks. In north-east Brazil, sugar cane cutters have the lowest life expectancy, and their children the highest mortality rate, of any group (6).

A 2002 report (47) into the health of sugar farmers in Fiji suggested their health is negatively affected by herbicides used in sugar cane production. One concerning mystery surrounding male sugar cane workers in Central America is the high, and as yet unexplained, incidence of Chronic Kidney Disease (CKD). Thousands of men have died from it, although there is some dispute over actual numbers, there is concern that CKD is directly caused by exposure to chemicals used in the sugarcane fields. Research from Boston University (48) into CKD and sugar-workers in Nicaragua has not been conclusive and failed to identify a single cause for the outbreak. It suggests that heat stress, caused from working long hours in strong sunshine, may increase vulnerability to exposure to chemicals. More research is planned, but it is a good example of how environment and public health overlap.

Workers are also exposed to the toxicity from pesticides, causing damage to skin, eyes, reproductive and mental health (49). They may also have an increased risk of lung cancer (50, 51)due to burning foliage at the time of cane-cutting. A FairTrade Foundation report said burning back the cane once the crop was harvested caused air pollution and respiratory diseases in workers, although independent research is needed to verify the scale of the problem.

The risk of infection from water-borne parasites is higher for cane workers (52). In the South Coast Irrigation System in Puerto Rico, the prevalence of water-borne infections rose from zero before 1910, to around 25% by 1930 due to irrigation systems for sugarcane cultivation (53).

In the case of children working the plantations, they are not only at risk of injuries, stress, exhaustion and abuse, but are also at risk of long-term respiratory disorders from inhaling smoke from cane burning, and contact with pesticides can cause damage to children's skin and eyes and be detrimental to respiratory function and reproductive health over time (6).

3.1.4 Low wages in production and harvesting of cane

Wages for cane cutting are low and in some cases, do not even cover the calories a worker burns on the job (54). Farm workers are one of the most exploited segments of the working class (55), with low wages, poor quality and segregated living conditions and limited benefits, and little protection from toxic work environments (56, 57, 58).

3.2 Problems of cane and beet processing

Evidence concerning the direct public health impact of processing and refining of sugarcane is limited but bagassosis due to exposure to bagasse (a by-product of sugarcane) and noise due to old machinery have been researched (46). As for beet refining, airborne fungi is thought to cause asthma in workers (59). Evidence concerning the direct public health impact of processing corn to HFCS was not found.

3.3 Positive socio-economic aspects of sugar production

Despite the environmental impact of sugar production, it is a major source of employment in many countries. The opening of plantations and processing plants has offered positive benefits to countries such as Columbia where the sugar mills are a great driving force of the Colombian economy, especially in employment, taxes and GDP (60).

It is estimated that each one million tonnes of production in a low-cost and high-cost country creates about 55,500 and 8,000 direct jobs respectively, plus jobs in transportation and related industries (62). Belize relies on the sugar industry for socio-economic support as it provides foreign exchange earnings and employment

to 15% of the population (62). The situation is similar in many low-income countries. However, ownership, land and profit conflicts are major socio-economic problems (63). Private investment can contribute to inclusive growth, environmental sustainability and poverty reduction.

4. Why does this matter to civil society?

It is not possible to portray sugar in simplistic terms. This is a commodity which comes from diverse sources – developing world cane, European & UK beet, US maize and artificial sweeteners – and is put into vast quantities of processed foods and drinks. As the classic social anthropological study by Sidney Mintz made clear, sugar has mostly been about power over land, workers, slaves, taste buds, countries, and consumers (64). Its ubiquity is one reason it can be viewed through many a lens: labour, ecosystems, finance, politics, culinary traditions, marketing, health, and more. Each of these perspectives has champions or watchdogs in civil society and is studied by academics. Today, policy attention is being demanded to address public health concerns and the impact of EU sugar régime change which threatens yet another round of price and trade instability for small country producers. But as this paper has shown, there are other demands waiting in the wings such as pollution and land use.

The analysis offered by this Food Research Collaboration briefing paper and its accompanying sister paper is one which suggests it is time that civil society (and academics) took stock of the big picture about sugar.

We see a situation of unnecessary policy 'lock-in'. From a health perspective, the world needs less sugar, yet thousands of lives depend on sugar work. Equally, fairly traded sugar is marketed as being better for those at the bottom of the economic supply chain, but the focus of the Fair Trade movement is clearly on the value and fairness of the sugar supply chain, rather than the important health concerns about the product itself. Is a good sugar possible, we ask, one with zero health burden and only positive environmental footprints? What is the way forward for civil society? Can work, health and the environment be given a truly virtuous linkage in the case of sugar? We doubt it. We understand and respect those who attempt to nudge the virtuous elements, but the principles of good food systems surely require optimal harmonisation of production and consumption, of ecosystems and public health, of markets and social justice, of education and action. In that respect, sugar always suffers major impediments. This briefing paper is a reminder that health is not the only problem sugar has.

Can civil society chart a way out of these contradictions? We think it can and should. But it requires some courage and a preparedness on all sides to think the unthinkable. Instead of accepting a growth in sugar production to 'feed' the food processing and soft drinks industries' insatiable demand, perhaps civil society and academics should model and plan for its phased reduction. The questions we ask are:

- How could developing world economies be helped to create alternatives to sugar?
- What could East Anglian UK beet fields grow if not sugar beet? How could these lands produce for health rather than ill-health?
- How could civil society help build consumers support for a 'de-sweetening' of diet? What arguments, prompts, incentives and evidence would help that process?
- What agri-food system could create better and fairer paid work along ecological public health lines?
- Could horticulture replace sugar culture?

We see a positive role for civil society if its various strands now come together to consider the big picture we have begun to sketch. NGOs representing diverse interests - health, development, social justice, ethics, environment, conservation, consumers and animal welfare – all have positions on sugar. For some this is already a mainstream concern (e.g. health, fairtrade, development); for others it's less central (e.g. animal welfare); and for others it is becoming so (e.g. consumers, conservation, organics). We think this mix has both dangers and opportunities for civil society; dangers if divergence is not addressed; opportunities if clearer targets and common goals are set. Too often, divisions in civil society can be exploited by powerful commercial interests. 'Don't go too hard on health, as it will threaten jobs' or 'Don't raise pollution standards, as they'll be undercut by another country somewhere' or 'Don't mention labour pay rates, or we'll drop the preferred status.' Or 'Don't stop sugar beet as it'll affect tourism brought by geese feeding on sugar beet tops in winter'.

Such horse-trading happens in *realpolitik*, of course, but we think now is the time to take the sugar debate back to ecological public health basics: land, labour, capital, health and culture. A food world which is being softened up for drastic changes in production to meet an anticipated food security crisis – how to feed 9 billion people by 2050 on less land and resources yet eating more like the West - should surely dare to think the unthinkable, to accept rather than downplay sugar's many contradictions, and to lead a process of radical rethinking.

We see this future food world as one where less not more sugar is produced and consumed, and land use and labour are liberated from the folly of sugar production. This is hardly a vital product. It has been injected into culinary culture on a scale it does not deserve. Nor should a sugar reduction strategy be compensated for by a growth in use of artificial sweeteners which industry constantly seeks. Artificials, whether relatively 'old' such as aspartame or 'new' such as stevia, merely normalise the sweetening of diet as well as maintain the processing industries' option to sweeten a product to sell it.

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