SUSTAINABLE AGRICULTURE

CHALLENGES AND OPPORTUNITIES FOR A 21ST-CENTURY FOOD SYSTEM

WRITTEN BY

Bill Wirtz
Senior Policy Analyst at Consumer Choice Center

CONSUMER CHOICE CENTER

INTRODUCTION

From every available perspective, humanity has managed the phenomenal task of making food safer, more available, and more affordable over many centuries. Through agricultural intensification and modern machinery, innovation has catapulted most nations from peasant farming to the comforts of the modern world. Visiting a farm today leaves one mesmerised by the sheer amount of technological progress that would have been unfathomable for our ancestors.

But with new opportunities come new challenges. Climate change, as well as a political shift to more environment-conscious decision-making, has shifted the question of farming from "what" we produce to "how" we produce. Agriculture is at the centre-stage of a battle of ideas and political roadmaps, all too often moving away from the needs of farmers and consumers, and into the realm of ideology. It is getting harder to argue for evidence-based policy-making.

The European Union wants to create a sustainable food system, however, policy decisions at both the European and member state level have consistently lacked coordination. Europe is behind on innovation when it comes to new agricultural technology, while steadily phasing-out crop protection tools. Organic farming is becoming increasingly incentivised by public policy.

This policy paper explores the challenges of defining what sustainable agriculture should look like while dispelling many of the myths present in the debate surrounding conventional and organic farming. The Consumer Choice Center believes that we need a common base of facts and knowledge, and we must strive to work together to create the best system for farmers and consumers alike.

DEFINING SUSTAINABLE AGRICULTURE

The Farm to Fork Strategy of the European Union attempts to foster sustainability in the agricultural sector. While sustainability is a laudable goal in a general sense, it has a wide range of possible meanings and applications. The word has never been adequately defined by EU institutions. It is necessary to establish a clear and precise definition of what we mean by sustainability, as only this will allow us to set concrete goals and objectives and develop clear and precise metrics to track our progress in achieving them.

For instance, this policy note will address several practical criticisms of organic farming. The implication from the European Commission seems to be that organic agriculture is essentially synonymous with sustainable agriculture. But that is a mere assumption, made without reference to a host of practical concerns and obviating any real scientific examination of the facts. **The European Commission's web page for sustainable agriculture** lauds the improvements on sustainability made by the Common Agriculture Policy (CAP), yet it has not established a definition that matches the goals met by the policy. The Farm to Fork Strategy is a political roadmap that outlines certain numerical goals, yet the claim that these goals are sustainable is merely implied.

In order for European consumers to understand the objectives of the European Union in the realm of sustainable agriculture, we need to establish definitions that concisely describe what sustainable agriculture is. This will foster the necessary debates and exchanges of all partners, as we approach the year 2030.

FOOD SAFETY CANNOT BE COMPROMISED

All considerations of sustainability cannot compromise food safety standards in the European Union. We believe that the hazard-based approach to the approval process in Europe -- designed and claimed to protect consumers -- runs the risk of doing sometimes the exact opposite (e.g. in the area of **mycotoxin contamination**).

Hazard vs. risk

Risk-based regulation manages exposure to hazards. For instance, the sun is a hazard when going to the beach, yet sunlight enables the body's production of vitamin D and some exposure to it is essential to human health. As with everything else, it is the amount of exposure that matters. A hazard-based regulatory approach to sunlight would shut us all indoors and ban all beach excursions, rather than caution beach-goers to limit their exposure by applying sunscreen. The end result would be to harm, not protect human health. The same logic of hazard-based regulation is all too often applied in crop protection regulation, where it creates equally absurd inconsistencies. For instance, if wine was sprayed on vineyards as a pesticide, it would have to be banned under EU law, as alcohol is a known and quite potent carcinogen at high levels of consumption. All this is rationalized through an inconsistent and distorted application of the precautionary principle. In essence, hazard-based regulation advocates would endorse outlawing all crop protection methods that cannot be proven completely safe at any level, no matter how unrealistic -- a standard which, if applied consistently, would outlaw every organic food, every life-saving drug, and indeed every natural and synthetic substance. By ignoring the importance of the equation **Risk = Hazard x Exposure**, hazard-based regulation does not follow a scientifically sound policy-making approach.

Risk = Hazard x Exposure

In a recently released policy paper, titled "**Essential food safety: preventing mycotoxin contamination in Europe**" we laid out key aspects to this threat to consumer health, and what we believe needs to be done to prevent its spread.

Three key takeaways from this paper:

- Mycotoxins are highly toxic chemicals naturally produced by fungi, or mould, that are estimated to contaminate some 25% of the world's crops.
- Up to 28% of all liver cancers worldwide can be attributed to aflatoxins, a type of mycotoxin.
- The BIOMIN research centre in Austria found that approximately 20% of Central European grain feed and almost 12% of Southern Europe's grain feed exceeded EU safety limits. 2018 data showed that 6% of the field and 15% of French silo maize samples were contaminated with aflatoxins.

In line with the aforementioned paper, we are concerned with the structural phasing-out of fungicides, which are a critical defence against mycotoxin contamination. For over a decade, the European Union's hazard-based approach has led crop protection tools to be banned without proper risk or impact assessments, designed to answer two questions:

- Risk assessment: What is the level of exposure of consumers to harmful substances?
- Impact assessment: Which health & safety precautions will be reduced through a ban, and do producers have access to viable crop protection alternatives?

Regulatory bodies and political institutions cannot afford to jeopardise the health of consumers in an effort to fulfil arbitrary reduction targets. 58 active substances will be subject to a hazard-based evaluation in the near future, making their renewal unsure. With half of them being fungicides, we see immediate urgency in the effort to complete thorough risk- and impact assessments before new decisions should be made. €70 billion (in 2016) in food imports to the EU will be subject to hazard-based MRLs (Maximum Residue Limits), which represents 60% of the 2016 imports to the European Union, according to research from 2017. In essence, this means that our agricultural trading partners would need to eliminate the use of these critical crop protection tools on the food they export to the EU, potentially exposing consumers to a significantly heightened risk of mycotoxin poisoning for this source as well. This is particularly concerning, as food imports from some of the EU's main trading partners already shows high rates of mycotoxin contamination[1].

According to the plant-science industry, there are 50,000 diseases that get inside crops and poison or kill plant cells. In an effort to protect food safety, producers need access to adequate crop protection tools to fight these pests.

PESTS, DISEASES, AND CROP PROTECTION ARE NOT POLITICAL

In the previous chapter, we elaborated on the problematic nature of a hazard-based chemical approval process. We have witnessed with growing concern that the approach to crop protection has become political, and is the opposite of evidence-based policy-making. A number of civil society campaigning groups have set out to reduce the total amount of crop protection tools, all too often for ideological reasons. In that process, certain actors have chosen to misinform consumers about the nature of chemical compounds, or their effect on insects, soil quality, or human health.

In order to set the record straight, we would like to outline a number of facts:

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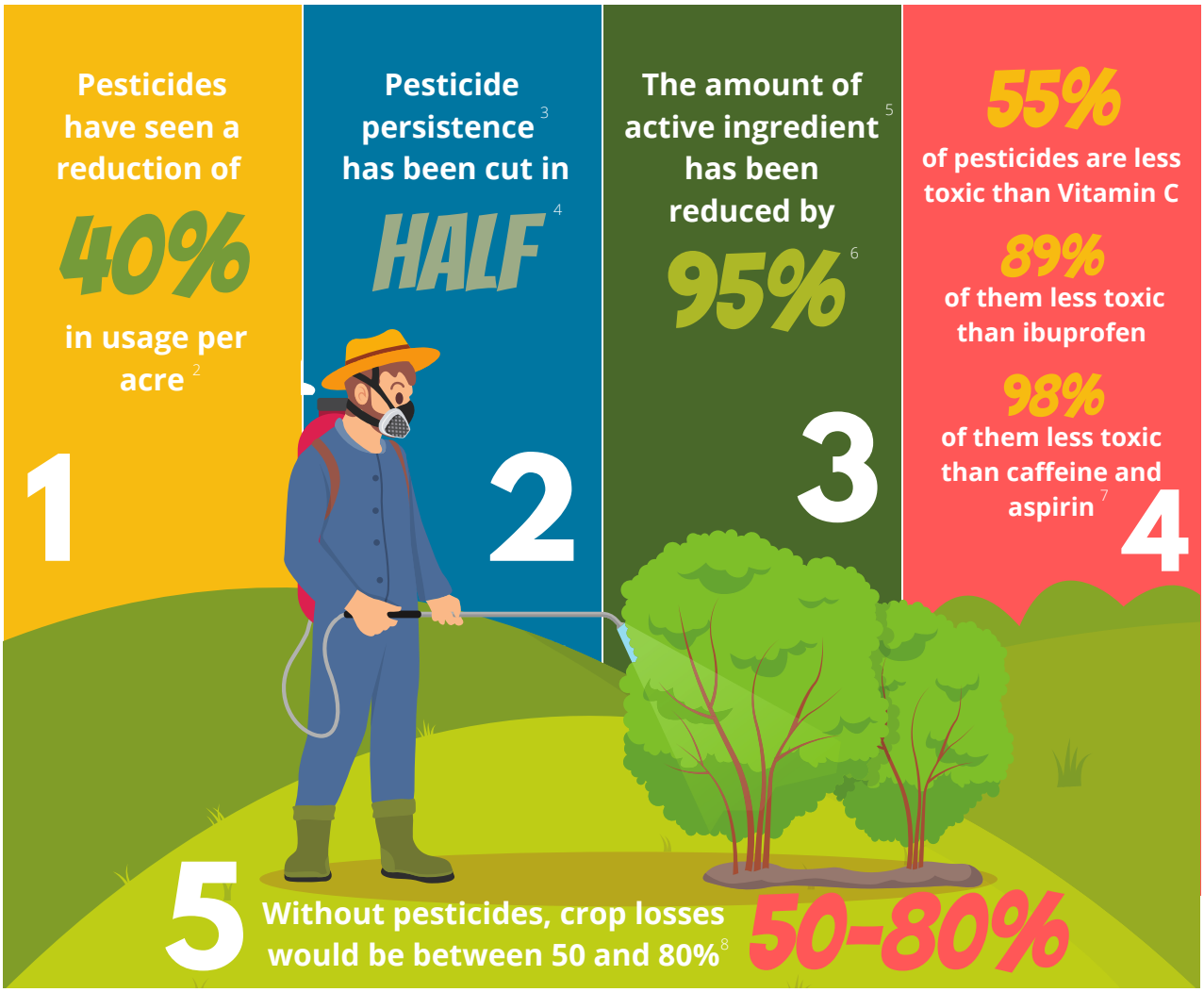

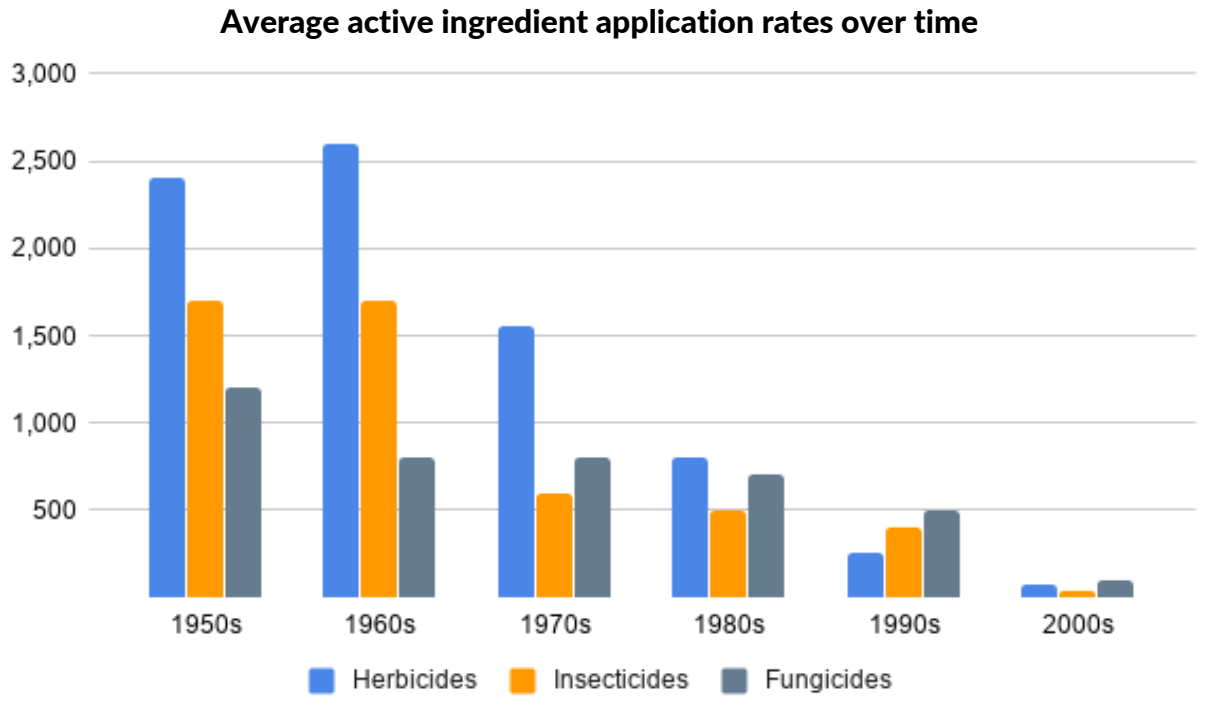

Source: Phillips McDougall, 2017

According to the Food and Agriculture Organization of the United Nations (FAO), farmers globally would lose 30 to 40 per cent of their crops due to pests and diseases. The importance of crop protection is thereby emphasised, however, it is equally important to address the chemical approval process that guides food safety in Europe.

We would like to emphasize that we believe in the integrity of the European Food Safety Authority (EFSA), to determine the safety of a crop protection tool. However, this has not been a shared feeling within the European Union's institutions. The European Parliament has cast doubt on the scientific integrity of EFSA, particularly as it related to the approval of the herbicide compound glyphosate. In 2017, EFSA was forced to respond to allegations of conflict of interest that had not been substantiated. It writes in its response: "The review papers in question [those suspected of having been influenced by the manufacturer] represented only two of approximately 700 scientific references in the area of mammalian toxicology considered by EFSA in the glyphosate assessment."

The European Parliament subsequently created the Special Committee on the Union's authorisation procedure for pesticides (PEST), which further questioned the integrity of EFSA, and has cast a shadow over the work of EFSA and the European Chemicals Agency (ECHA), in a report released in 2018.

Scientific facts should not be subject to political interpretation. The scientific method is supposed to be a means of acquiring knowledge that adapts to the introduction of new information. Political institutions need to be careful not to create an environment in which food safety assessments favourable to the political majority are approved, while those rejecting the premises of the political majority are investigated.

A CRITICAL PERSPECTIVE ON ORGANIC FARMING

Organic farming benefits from special derogations in public discourse -- it in fact does not face the same scrutiny as other methods of farming. However, organic farming presents many downsides that are not at all compatible with sustainability, by any reasonable definition of that term. For a number of reasons, including its low yields and consequent need to bring more land into agricultural production, organic farming is particularly detrimental to biodiversity. All these problems are compounded when organic farming is subsumed in the broader social and cultural agenda of "agroecology".

Increases in GHGs

Credible research has established that moving all current farming to organic farming would increase greenhouse gas (GHG) emissions by up to 70%[9]. Researchers analysed the hypothetical move of Welsh and English farm production to organic, and found that reduced crop yields in organic farming increased the need to import food from overseas. Including the GHGs emitted growing that food abroad -- a part of the equation often ignored advocates of organic agriculture -- otal GHGs emitted would increase between 21% in the best-case scenario to an astounding 70%, depending on how much natural habitat and forest had to be cleared to make up for the decline caused by England's and Wales' switch to organic production.

For the European Union, which aims at a 25% organic production target in Europe, the impact of overseas imports would be even more considerable. While the study assumed England and Wales would import the majority of the extra food they needed from Europe, a 25% organic EU would be making up its production deficits by importing food grown in less developed countries with considerably less efficient farming methods, which would significantly increase emissions.

Where is the oversight on organic pesticides?

A common misunderstanding that consumers have when it comes to organic agriculture, often perpetuated by political discourse, is that organic food is not treated with pesticides. However, organic farming uses a large range of pesticides.

In 2016, France announced a pesticide reduction target of 50% by 2025, which is similar to the 50% reduction by 2030 target outlined in the Farm To Fork strategy of the European Union. However, both targets are threatened by the increase of pesticide sales in the organic farming industry. In France[10], said sales have risen considerably in the past years -- sulfur (used in organic farming) is the most heavily used pesticide in France. Copper sulfate is the second most used pesticide in organic agriculture, and has been put on a list of "candidates for substitution" after EFSA (European Food Safety Authority) and ECHA (European Chemicals Agency) determined health hazards for soil organisms, farm workers, birds, and mammals[11].

Agro-ecology

According to its original definition, agroecology is simply the study of ecological practices applied to agriculture. What started out as science, however, has morphed into a political doctrine that not only rules out modern technologies such as genetic engineering, pesticides and synthetic fertilizer, but explicitly extols the benefits of "peasant" and "indigenous" farming and in many cases discourages mechanization. Add on to a hostility to international trade and intellectual property protections for innovators ("seed patents," which are standard in all advanced crops, not just GMOs, are a frequent cause of complaint), and the claim that "transformative agriculture" is indeed correct, if not desirable.

We should remember that not all "transformations" are good. A study by pro-agroecology activists found that applications of their principles in Europe would decrease agricultural productivity by 35% on average, which they considered a positive, as in their view Europeans eat too much anyway. It's hard to see how a 35% drop in productivity among the world's rural poor – a large percentage of the 800 million people who currently suffer from malnutrition – would be anything other than a calamity.

Recent research has found that this way of farming did not improve yields in cotton, cowpea, rice, sorghum or soybean, and that a 4% increase in maize yields were only achieved with glyphosate pre-emergence herbicide treatments, which are incompatible with agro-ecology[12].

Social sustainability for the farming sector

Farmer representatives have criticised the Farm to Fork Strategy's ambition for a 25% organic production target, for the possibility of severe market imbalance. They have the Commission that without increased consumer demand, incentivising organic agriculture could considerably reduce market prices for organic products, due to excessive supply[13].

We believe that a socially sustainable food system takes into account the situation of farmers, as they are essential to the well-being of consumers. Overburdening the agricultural sector with unachievable and unsustainable targets contradicts the objectives of the European Union.

"PRODUCERS' SUPPLY SHOULD FOLLOW CONSUMER DEMAND AND NOT POLITICAL PLANS"

On the issue of agro-ecology, we also see a huge problem that incentivising these practices leads to greater social inequalities, particularly worsening the situation of women in developing nations. Without the use of herbicides, farmers need to weed by hand, a heavily physically demanding task often fulfilled by women[14].

The German Research Institute for Organic Agriculture (FibL) published the results of a study conducted for the German Federal Environment Agency (UBA) in March 2020. The following deficits of organic agriculture are being highlighted[15].

- Lack of protection against plant diseases in the special crops of fruit, wine, vegetables and potatoes.
- Lack of protection against pests in individual arable crops.
- Can lead to higher raw material consumption and higher production costs.
- Leads to a negative attitude towards technological innovations.
- Significantly more expensive than conventional agriculture
- Lowers productivity

Preserving biodiversity

Land use of agricultural sector

Agriculture has changed the landscapes of Europe considerably, and has affected biodiversity. That said, we need to take into account that the sector has made enormous advances over the course of the last decades. Stanford University researchers have found that if we farmed in the same manner as 60 years ago, an area equal to the entire land-mass of Russia -- three times the area of the Amazon, or four times the entire area of the European Union -- would have to be cleared of forest and natural habitat and brought into agricultural production:

"*In the first alternative world scenario (hereinafter AW1), we assume as a first approximation that population, the global economy, and sociopolitics evolved exactly as in the real world (hereinafter RW), but that agricultural technology and farm practices remained as they were in 1961. In the AW1 scenario, an additional 1,761 Mha of cropland (an area larger than Russia) would have been needed to achieve the same production levels since 1961 while holding yields and fertilizer intensities constant, or 1,514 Mha more cropland than in the RW.*"

There is another way to illustrate this point, which shows the gravity of this fact : In 2016, the surface used on Earth to grow crops was almost 1.6 billion hectares. The additional landmass, as indicated in the aforementioned study, that would be necessary if we farmed the same way as in the 1960s, is 1.7 billion hectares. This means that we would require a doubling of the currently used cropland. This additional cropland represents 45% of existing forests on the planet, which is currently at 3.9 billion hectares.

We therefore know that the aforementioned agro-ecological practices would damage biodiversity in Europe, and are therefore, contrary to high-yield farming, counterproductive to the objectives of sustainable farming.

Insect species

In recent years, conventional agriculture has also been criticised for causing or accelerating insect species decline. A number of media outlets have fostered the perception that farmers are to blame for a biodiversity disaster. However, it has been established that urbanisation is the major threat to insect species, and that crop cover has actually benefited insect populations[17]. A 2020 Van Klink assessment of 166 long-term studies, performed at 1,676 sites around the world between the years 1925 and 2018, finally introduced the necessary nuance to existing studies on the issue of insect decline. While establishing the existence of insect population decline, the decline was found to be six times lower than predicted by previous studies. In a groundbreaking switch, we have discovered through the Van Klink meta-analysis that modern agriculture is not responsible for insect decline, but rather that habitat destruction has had this impact on insect species.

With reference to the inaccurate reporting, outlined later by major news publications, on the then alleged "Beepocalypse" at the beginning of the century, we need to reconsider accepted narratives on the effect of modern agriculture on the environment.

We believe that the conclusion that biodiversity is significantly under threat from the agricultural sector is not substantiated.

Avoiding carbon dioxide emissions

Unlike what existing presumptions about modern agriculture would suggest, innovation is not responsible for an increase in carbon dioxide emissions. In fact, high-yield farming practices have reduced CO2 emissions[19]. Research that has sought to "identify cost-effective ways to avoid emissions of greenhouse gases (GHGs)[20]" revealed that "while emissions from factors such as fertilizer production and application have increased, the net effect of higher yields has avoided emissions of up to 161 gigatons of carbon dioxide (GtC) (590 GtCO2e) since 1961." The researchers concluded that yield improvements ought to be a prominent tool in reducing GHGs.

We therefore believe that a move away from intensive agriculture would jeopardise the objectives of reducing carbon dioxide emissions.

Adding to that point, we also emphasise the importance of new agriculture technology in the fight against climate change. Projects like the Harnessing Plants Initiative use the gene-editing technology CRISPR-Cas9 to design plants that absorb more carbon dioxide. Another example would be the Grønt Udviklings- og Demonstrationsprogram (GUDP) supported by the Danish Ministry of Environment and Food, which genetically engineers grass in order to reduce methane emissions stemming from cows.

As we have mentioned in a previous policy paper on mycotoxin contamination, the immense benefits provided through technologies such as CRISPR-Cas9 and other gene-editing procedures are not available to European farmers. It is necessary to reform Directive 2001/18/EC of the European Parliament and of the Council of 12 March 2001 on the deliberate release into the environment of genetically modified organisms.

This legislation led to European Court of Justice ruling Case C-528/16, Confédération paysanne and Others v Premier ministre and Ministre de l'agriculture, de l'agroalimentaire et de la forêt, which found "techniques/methods of genetic modification conventionally used and deemed to be safe" and the "concept of 'genetically modified organism'" to necessitate banning the use of new breeding technologies in European agriculture.

The ECJ ruling is based on outdated legislation, which indiscriminately rules on the basis of a technology, as opposed to advocating for a case-by-case safety assessment, which would be more in line with a reasoned application of the precautionary principle. We endorse the joint statement of the German National Academy of Sciences Leopoldina, the Union of German Academies of Sciences, and the German Research Foundation, which in 2019 called for a "scientifically justified, differentiated regulation of genome edited plants in the EU".

CONCLUSION

The challenges of modern agriculture are palpable, and have real-life consequences on consumers and their choice of products, as well as their health and purchasing power. Existent crop protection tools are necessary for the protection of these multivariate factors, and modern agricultural technology such as gene-editing should be available for European farmers to access the full potential of modern farming technology. In this context, the Consumer Choice Center also reminds readers of the existence of our 2020 released **Gene Editing Regulation Index**, co-established with the Genetic Literacy Project, which outlines the worldwide differences in the regulatory rigour applied to new breeding technologies.

Given this policy note, the Consumer Choice Center has the following recommendations to policy-makers and regulators:

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- Clearly define the meaning and objectives of sustainability in agriculture.
- Shift from a hazard-based to a risk-based chemical approval process in the European Union.
- Conclude thorough impact-assessments for the phasing-out of existing crop protection tools, in order to evaluate the impact on consumer purchasing-power
- Incentivise high-yield farming.
- Rework existing incentives for organic farming, and cease support for "agro-ecology" programmes.
- Initiate legislative change on genetic engineering, thus allowing agricultural innovation.

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info@consumerchoicecenter.org
www.consumerchoicecenter.org