A NEW NEOCOLONIAL THREAT: THE HARMFUL IMPACT OF EUROPEAN GMO POLICY ON AFRICAN FOOD SECURITY

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ABSTRACT

Africa is facing a new neocolonial threat—European dominance over African GMO policy. Introducing genetically modified organisms, or GMOs, into agricultural production has proven to greatly alleviate food security woes. Yet the European populace is staunchly opposed to GMO introduction. The European Union has responsively taken an anti-GMO stance, but not just towards its own member states—it has leveraged its political and economic power to prevent GMO introduction in Africa as well. While wealthy Europe can afford such a position, the lack of GMO production in Africa unnecessarily exacerbates food insecurity. To increase Africa's freedom to introduce GMO production, Europe must expand GMO cultivation and importation within its own boarders and lessen its grip on African policies. Doing so would allow for the large-scale introduction of GMOs in Africa and would in turn significantly aid in alleviating the food security crises which plague much of the continent.

I. INTRODUCTION

Much of Africa has long been under a food security crisis. As the need for more food resources grows from the continent's population explosion, Africa concurrently faces the devastating effects of climate change, which includes declining natural resources for agricultural production.[1] While Africa struggles to find solutions, much of the rest of the world has adopted the cultivation of genetically modified organisms (GMO/GMOs) to increase crop yields and fight environmental hurdles to crop growth.[2] Although genetic modification (GM) technology presents a major source of hope for Africa, its use is banned throughout nearly the entire continent.[3]

While the Americas, Asia, and Oceana have all largely adopted GM technology, Europe alone stands beside Africa in rejection, and the two continents' shared denunciation of the technology is not by happenstance.[4] As Europe has

1. FOOD & AGRIC. ORG. OF THE UNITED NATIONS, THE FUTURE OF FOOD AND AGRICULTURE: TRENDS AND CHALLENGES 46 (2017).

2. Kaiser Jamil, *Biotechnology – A Solution to Hunger?*, UNITED NATIONS: UN CHRONICLE (Oct. 5, 2021, 11:16 AM), https://www.un.org/en/chronicle/article/biotechnology-solution-hunger [https://perma.cc/Y6SA-K8HC].

3. Ray Ndlovu, *Zimbabwe Quietly Lifts Ban on Genetically Modified Corn Imports in Bid to Avert Famine*, TIME (Jan. 31, 2020, 5:33 AM), https://time.com/5775168/zimbabwe-genetically-modified-corn-famine/ [https://perma.cc/T8UY-U3QB].

4. Marian L. Tupy, *Europe's Anti-GMO Stance Is Killing Africans*, CATO INST. (Sept. 6, 2017), https://www.cato.org/commentary/europes-anti-gmo-stance-killing-africans [https://perma.cc/883Q-G64J].

banned GMO cultivation and its populace largely rejects GMO products, African leadership has been pressured to follow suit by direct European campaigning in the region, along with pressures through trade connections.[5] While wealthy Europe can sustain the negative impacts of a GMO ban, the effects have been far more devastating for Africa, which continues to struggle to feed its growing population.[6]

To aid in solving its food security crisis, African nations must break the yoke of European influence and adopt their own pro-GMO legislation. Europe must in turn lessen their GMO restrictions to allow for increased trade and support to African farmers, as well as join the scientific consensus surrounding GMO technology. Resulting changes will create more efficient agriculture in both regions and more food resources for malnourished areas in Africa.

II. DEVELOPMENT OF GMO CONTROVERSY

A. GMOs

Long before the advent of modern biotechnology, the mass mechanization of agriculture, and the dawn of agriculture itself, humans have "genetically modified organisms."[7] Around 32,000 years ago, hunter-gatherer communities in East Asia began to domesticate wolves.[8] Once domesticated, these communities began the process of artificial selection: "the intentional reproduction of individuals in a population that have desirable traits."[9] This artificial selection involved choosing wolves for breeding with traits favorable to life among humans, such as docility, body size, and hair length.[10] This process has continued through the millennia, resulting in our swath of modern dog breeds humans live with today.[11]

5. *Id.*

6. *Id.*

7. *See* Gabriel Rangel, *From Corgis to Corn: A Brief Look at the Long History of GMO Technology*, HARV. UNIV. SIGNAL TO NOISE SPECIAL EDITION: GMOS & OUR FOOD (Aug. 9, 2018), http://sitn.hms.harvard.edu/flash/2015/from-corgis-to-corn-a-brief-look-at-the-long-history-of-gmo-technology/ [https://perma.cc/PAD4-RUJ2].

8. *Id.*

9. *See id*; *Variation, Adaptation, and Natural Selection: A Closer Look*, ANNENBERG LEARNER (Sept. 9, 2021, 9:01 PM), https://learner.org/series/essential-science-for-teachers-life-science/variation-adaptation-and-natural-selection/variation-adaptation-and-natural-selection-a-closer-look/ [https://perma.cc/58PD-9D9D].

10. *See id*; Rangel *supra* note 7.

11. *See* Rangel *supra* note 7.

As human communities transitioned from hunter-gatherer to agrarian societies around 10,000 BCE and began the process of crop cultivation and livestock domestication, they utilized artificial selection to modify the genetic makeup of their stock in the same manner hunter gather communities "created" the modern dog.[12] For crops, these traits included higher nutritional content, pest and drought resistance, and larger fruit sizes; for livestock, higher meat yield and greater milk production.[13] The result of humanity's artificial selection of crops and livestock is the variety of crops and animals we are accustomed to today—corn, rice, potatoes, milk cows, and pigs—all of which would be unrecognizable to our ancestors who began and continued the artificial selection process millennia, centuries, or even decades before us.[14]

As evidenced, humans have almost always been genetically modifying organisms, and the contemporary results are the crops and livestock that sustain the lives of nearly eight billion people. But the current discussion of GMOs does not surround the traditional use of artificial selection.[15] Rather, the focus rests on a specific form of artificial selection—the use of recombinant DNA technology.[16] This technology allows scientists to extract DNA that produces a favorable trait from a donor organism and transmit it to a recipient organism's genome, whether the recipient be of the same or different species.[17] The favorable trait produced by the DNA then manifests itself in the recipient organism, thus allowing

12. Ania Wieczorek & Mark Wright, *History of Agricultural Biotechnology: How Crop Development has Evolved*, KNOWLEDGE PROJECT (2012), https://www.nature.com/scitable/knowledge/library/history-of-agricultural-biotechnology-how-crop-development-25885295/ [https://perma.cc/P4ZE-8E3R] ("During the process of domestication, people began to select better plant materials for propagation and animals for breeding, initially unwittingly, but ultimately with the intention of developing improved food crops and livestock.").

13. *Id.* (explaining that through much of human history—before Gregor Mendel brought forth the modern conception of genes and inheritance—artificial selectors were not aware of DNA science behind their breeding, and the precision of selection increased dramatically with the rise of DNA science. "Mendel's work showed that genes separate during the formation of gametes, and unite randomly during fertilization; he also showed that genes are transmitted independently of one another to offspring. This understanding of the way that plants and animals acquire traits form parents created the potential for people to selectively breed crops and livestock.").

14. *See* Rangel, *supra* note 7.

15. *See id.*

16. Wieczorek & Wright, *supra* note 12.

17. *Id.*

agriculturalists to bypass the lengthy process of selective breeding,[18] and transfer favorable traits to new organisms in one generation.[19] The result of this process is the presently defined GMO, which contains an artificially altered genome that can then be reproduced through natural breeding techniques.[20]

B. GMOs and Food Security

The use of recombinant DNA technology and the introduction of GMOs to the global agricultural sector has led to substantial changes in food production that can significantly alleviate global food insecurity.[21] One of most direct impacts the introduction of GMOs has had on food security is an increase in crop yields. As GMOs frequently require less land, input, and time to produce, their introduction has accounted for large increases in volumes of staple crops produced worldwide.[22] Additionally, yield increases are not limited to a mass scale; some GMO crops—regardless of their production efficiency—are of higher nutritional value than their non-GMO counterparts.[23] Due to these production and efficiency gains, GMO introduction has also led to substantial increases in farm income, and while GMO

18. *Id.* (explaining that the term 'selective breeding' is synonymous with artificial selection and is used most frequently in reference to livestock and agriculture.).

19. *Variation, Adaptation, and Natural Selection: A Closer Look*, *supra* note 9.

20. *Id.*; Rangel, *supra* note 7 (explaining that the first patented genetically modified organism was a bacteria engineered to break down oil from oil spills, and that GMOs include livestock, pets, medicine, and bacteria for a host of purposes besides human consumption.).

21. *See generally* GRAHAM BROOKES & PETER BARFOOT, GM CROPS: GLOBAL SOCIO-ECONOMIC AND ENVIRONMENTAL IMPACTS 1996-2012, at 9-10, app. 1 (2014), https://www.pgeconomics.co.uk/pdf/2014globalimpactstudyfinalreport.pdf [https://perma.cc/QK4L-WBX8].

22. *Id.* at 9 ("The GM IR traits, used in maize and cotton, have accounted for 97.1% of the additional maize production and 99.3% of the additional cotton production. Positive yield impacts from the use of this technology have occurred in all user countries . . . when compared to average yields derived from crops using conventional technology . . . .").

23. Matin Qaim & Shahzad Kouser, *Genetically Modified Crops and Food Security*, PLOS ONE, June 2013, at 1; Dan Charles, *In a Grain of Golden Rice, a World of Controversy Over GMO Foods*, NPR (Mar. 7, 2013), https://www.npr.org/sections/thesalt/2013/03/07/173611461/in-a-grain-of-golden-rice-a-world-of-controversy-over-gmo-foods [https://perma.cc/KA4H-2G5N] ("There's a kind of rice growing in some test plots in the Philippines that's unlike any rice ever seen before. It's yellow. Its backers call it 'golden rice.' It's been genetically modified so that it contains beta-carotene, the source of vitamin A. Millions of people in Asia and Africa don't get enough of this vital nutrient, so this rice has become the symbol of an idea: that genetically engineered crops can be a tool to improve the lives of the poor.").

crops frequently originate in production in developed countries, nearly half of farm income gains have occurred in developing countries.[24]

As GMOs may be resistant to pests, insecticides, and herbicides, they require the use of fewer insecticides and less potent and harmful herbicides, which has "contributed to a significant reduction in the environmental impact associated with insecticide and herbicide use."[25] The environmental impact of the introduction of GMOs is compounded by the substantial decrease in greenhouse gas emissions associated with their use, as they require less input from carbon-emitting machinery.[26] While the impact of GMO introduction on the environment is indirect, it is nonetheless significant. Two major concerns for farmers worldwide are the loss of arable land and global warming, two interconnected issues which lessen the total amount of cultivatable crops. Preserving what land is presently available for cultivation while mitigating the effects of global warming must be a part of any food security strategy.

Each of these benefits of GMO usage can have direct implications on global food security. As GMOs limit harmful impacts on the environment—while increasing yields and food production—their introduction can lead to an overall greater amount of available sustenance in food insecure locations.[27] Because "an estimated 50% of all undernourished people worldwide are small-scale farmers in developing countries[,]" the increase in income associated with GMO production can increase access to food for the communities in the most need.[28] While there is

24. BROOKES & BARFOOT, *supra* note 21, at 9 ("Since 1996, farm incomes have increased by $116.6 billion. . . . [O]ver the seventeen years, 1996-2012, the cumulative farm income gain derived by developing country farmers was 49.9% ($58.15 billion).").

25. *Id.* at 13 ("GM IR cotton has contributed a 25.6% reduction in the volume of active ingredient used and a 28.2% reduction in the EIQ indicator (1996-2012) due to the significant reduction in insecticide use that the technology has facilitated, in what has traditionally been an intensive user of insecticides.").

26. *Id.* at 15-16 (explaining that the reduction of greenhouse gas emissions has primarily been attributed to "[r]educed fuel use from less frequent herbicide or insecticide applications and a reduction in the energy use in soil cultivation" and "[t]he use of 'no-till' and 'reduced-till' farming systems.").

27. *Id.* at 13*; see also* Qaim & Kouser, *supra* note 23, at 1 ("GM technologies could make food crops higher yielding and more robust to biotic and abiotic stresses. This could stabilize and increase food supplies, which is important against the background of increasing food demand, climate change, and land and water scarcity.").

28. BROOKES & BARFOOT, *supra* note 21, at 17; *see also* Qaim & Kouser, *supra* note 23, at 7 ("[T]he income gains through Bt cotton adoption among smallholder farm households in India have positive impacts on food security and dietary quality.").

no single solution to solve the global food security crises, there is little doubt that the increased use of GMOs can play a part in alleviation.[29]

C. Scientific Consensus Surrounding GMOs

Despite the concrete benefits derived from GMO production, the practices and consequences of producing and consuming GMOs have been a controversial issue worldwide. Notwithstanding the controversy, the use of GMOs has been consistently and widely supported in the scientific community. In 2016, the National Academies of Sciences, Engineering, and Medicine undertook the task to "conduct a broad review of available information on GE crops in the context of the contemporary global food and agricultural system" and come to a definitive consensus on the effects of GMOs.[30] The study, which consisted of a comprehensive review of scientific material published within the past two decades, confirmed the numerous benefits GMOs confer to farmers and affirmed the safety of GMOs for animal and human consumption.[31]

Indeed, well over 200 scientific organizations support the safety of GMO crops, including the European Commission, the American Medical Association, the Food and Drug Administration, the World Health Organization, and the Food and Agriculture Organization of the United Nations.[32] The FDA, which is the

29. Qaim & Kouser, *supra* note 23, at 7 ("Complex problems require multi-pronged solutions. But the evidence suggests that GM crops can be an important component in a broader food security strategy."); *see* BROOKES & BARFOOT, *supra* note 21, at 106.

30. *See* THE NAT'L ACADS. OF SCIS., ENG'G, & MED., GENETICALLY ENGINEERED CROPS: PAST EXPERIENCES AND PROSPECTS (2016); *see also* Mark Lynas, *GMO Safety Debate Is Over*, ALL. FOR SCI. (May 23, 2016), https://allianceforscience.cornell.edu/blog/2016/05/gmo-safety-debate-is-over/ [https://perma.cc/K2HA-KK9U] (explaining that this study best represents the scientific consensus on GMOs, as it not only required within itself a consensus of scientists, but also reviewed the bulk of work done on GMOs, giving close attention to those in the community opposed to GMO introduction. Indeed, it was said this study should "end debate" on the safety of GMOs.).

31. THE NAT'L ACADS. OF SCIS., ENG'G, & MED., *supra* note 30, at 17-18 ("[Some are] concerned that GE food consumption may lead to higher incidence of specific health problems including cancer, obesity, gastrointestinal tract illnesses, kidney disease, and disorders such as autism spectrum and allergies. . . . The committee found no evidence of differences between the data from the United Kingdom and western Europe and the data from the United States and Canada in the long-term pattern of increase or decrease in specific health problems after the introduction of GE foods in the 1990s.").

32. Daniel Norero, *More than 280 scientific and technical institutions support the safety of GM crops*, SI QUERO TRANSGENICOS (June 19, 2017), http://www.siquierotransgenicos.cl/2015/06/13/more-than-240-organizations-and-scientific-institutions-support-the-safety-of-gm-crops/ [https://perma.cc/TQ3W-C679] ("284 technical

primary regulator and determiner of the safety of GMOs in the United States, requires a stringent process of health evaluation before releasing GMOs into the market.[33] By the time GMOs enter the market, the FDA has already determined that the approved GMOs are safe for human consumption, do not pose a long-term health risk, are no less nutritious than traditionally bred plants, and are no less likely to cause allergies than traditionally-bred plants.[34] With such a wide scientific consensus in support of GMOs, "[t]he GMO debate is over[.] . . . [T]he truth is that there is no more of a debate on the safety of G[M] crops than on reality of climate change[.]"[35]

D. Science Skepticism Surrounding GMOs

Despite widespread scientific consensus, GMO skepticism remains a powerful political force.[36] Organizations like Greenpeace and Fair Trade International have exacerbated skepticism of GMOs, raising concerns through campaigns decrying the health and environmental impacts of GMOs.[37] Despite the scientific evidence to the contrary, much of the public remains skeptical of GMOs, as these anti-GMO campaigns are "intuitively appealing."[38] Because DNA is

and scientific institutions recognize that GM crops are not riskier than those produced by conventional breeding, and/or the potential benefits of these crops.").

33. U.S. FOOD & DRUG ADMIN., QUESTIONS & ANSWERS ON FOOD FROM GENETICALLY ENGINEERED PLANTS 1 (2013), https://www.fda.gov/food/food-new-plant-varieties/questions-answers-food-genetically-engineered-plants [https://perma.cc/UM4N-3KYZ].

34. *Id.* at 3.

35. Lynas, *supra* note 30 (explaining there is still legitimate concern that "[t]he overuse of GE crops has indeed led to the evolution of resistance, both in weeds and insects, it finds. Also, industry domination of the technology might restrict access of small farmers in poorer countries to improved seeds," and these concerns are important and should not be ignored, but they are not unique to GMOs, and should not overshadow the overwhelming support for GMO consumption.); *see also* Stefaan Blancke, *Why People Oppose GMOs Even Though Science Says They Are Safe*, SCI. AM. (Aug. 18, 2005), https://www.scientificamerican.com/article/why-people-oppose-gmos-even-though-science-says-they-are-safe/ [https://perma.cc/435A-GLNX].

36. Lisa Cornish, *Understanding the continued opposition to GMOs*, DEVEX (Jan. 22, 2018), https://www.devex.com/news/understanding-the-continued-opposition-to-gmos-91888 [https://perma.cc/HK4S-MHRQ]. These organizations often additionally express concern for the monopolization of the GMO industry and work to aid farmers in gaining independence in the use of GMO crops. *See generally id*.

37. *See id.*

38. Blancke, *supra* note 35 ("By tapping into intuitions and emotions that mostly work under the radar of conscious awareness, but are constituent of any normally functioning human mind, such representations become easy to think. They capture our attention, they are easily processed and remembered and thus stand a greater chance of being transmitted and

viewed as part of the essence of an organism, individuals are concerned that the transfer of DNA will lead to "Frankenfoods," as the popular trope goes, which include a distasteful mix of all the traits of each organism.[39] Because DNA transfer may be viewed as a contaminant, individuals are apt to respond to GMOs with disgust and concern for the natural order.[40]

Skepticism of this sort has been especially prevalent in Europe, where a majority of persons believe GMO foods should not be supported.[41] The prevalent anti-GMO sentiment of constituents, along with strong lobbying efforts by non-governmental organizations (NGOs), has led to stalwart anti-GMO political positioning and legislation by European leaders.[42] The vehement efforts of anti-GMO campaigners and NGOs have gone so far as to stall research on GMOs and prevent stores from risking their legal introduction to the market.[43]

becoming popular, even if they are untrue. Thus, many people oppose GMOs, in part, because it just makes sense that they would pose a threat.").

39. *Id.*

40. *Id.* ("These assumptions are part and parcel of religious beliefs, but in secular environments they lead people to regard nature as a beneficial process or entity that secures our wellbeing and that humans shouldn't meddle with. In the context of opposition to GMOs, genetic modification is deemed 'unnatural' and biotechnologists are accused of 'playing God.'").

41. Jan M. Lucht, *Public Acceptance of Plant Biotechnology and GM Crops*, 7 VIRUSES 4254, 4258 (2015) ("23% of respondents from the EU 27 states thought that GM food should be supported, while 61% disagreed with this view. There seems to be a slight downward trend: five years earlier, in 2005, support still was somewhat higher at 27%, with 57% disagreeing. In fact, GM food has been described as the 'black sheep' of biotech.").

42. *Id.* at 4258, 4264 ("While NGOs traditionally play a less powerful role in the U.S., they have been very successful in Europe in framing GMOs as threat to biodiversity, farmer autonomy, and food safety. . . . In response to the perceived consumer's skepticism and efficient lobbying by environmental NGOs, a very strict authorization system for GM crops and feed/food was introduced in Europe. . . .").

43. *Id.* at 4264-66 ("[R]etailers want to avoid negative publicity from environmental NGO protests against GM food products, who send 'gene detectives' into supermarkets to look for GM labels, and then put strong pressure on shops to immediately remove these legal, authorized and correctly labeled products. . . . In this general climate of distrust against biotech crops, also research suffers. Regular destructions of field trials of GM plants by vandals have made field research with GM plants virtually impossible in many European countries, the once strong number of field trials is dwindling, and scientists' willingness to publicly support plant genetic engineering is decreasing.").

IV. GMO REGULATIONS

A. European Union GMO Regulations

1. Cultivation of GMOs

Regulation of GMO cultivation in the European Union is extremely tight, resulting in a nearly complete ban of GMO cultivation, which has left only 0.1% of worldwide GMO crop production in Europe.[44] A large reason for the stringent nature of Europe's cultivation ban is that it is rooted in the precautionary principle.[45] The precautionary principle is a policymaking guideline for new technologies to protect the public from uncertain health and environmental risks.[46] The principle assumes the introduction of a particular method, policy, or technology is harmful to human health or the environment and shifts the burden of proof of safety to the proponents of the activity.[47] It further supports the exploration of a wide range of alternatives before the implementation of the potentially harmful activity.[48]

Due to a number of food crises in the European Union (EU) during the 1990s, the introduction of GMO crops for cultivation in Europe has been lumped with food safety guidelines with the precautionary principle becoming "the central tenet for [GM] food regulation."[49] The Directive on the Deliberate Release into the Environment of Genetically Modified Organisms (the Directive)—the legislation which governs the release of GMOs for cultivation—explicitly bases the

44. *Id.* at 4256.

45. Directive 2001/18, of the European Parliament and of the Council of 12 March 2001 on the Deliberate Release into the Environment of Genetically Modified Organisms and Repealing Council Directive 90/220/EEC, 2001 O.J. (L 106) 1, 2.

46. David Kriebel et al., *The Precautionary Principle in Environmental Science*, 109 ENV'T HEALTH PERSPS. 871, 871 (2001).

47. *Id.* (There exist "four central components of the principle: taking preventive action in the face of uncertainty; shifting the burden of proof to the proponents of an activity; exploring a wide range of alternatives to possibly harmful actions; and increasing public participation in decision making.").

48. *Id.*

49. Jessica Lau, *Same Science, Different Policies: Regulating Genetically Modified Foods in the U.S. and Europe*, HARV. UNIV. SIGNAL TO NOISE SPECIAL EDITION: GMOS & OUR FOOD (Aug. 9, 2015), http://sitn.hms.harvard.edu/flash/2015/same-science-different-policies/ [https://perma.cc/FG42-9AGC].

legislation's writing and its created regulatory systems in the precautionary principle.[50]

With the precautionary principle as the regulatory basis for the Directive, individuals seeking the introduction of GMOs for cultivation face a daunting task. Before a GMO may be released for cultivation, its proponent must first submit a notification, which includes an environmental risk assessment that outlines not only the GMO's potential effects on the environment but also how the proponent will mitigate any negative effects, to the primary EU member state in which it intends to propagate the GMO, as well as the Commission.[51] Once notification has been submitted, the Directive requires consultation between the Commission and interested public groups, which is a de jure requirement that science-skeptic NGOs prevalent and powerful in Europe be allowed to exert influence.[52] The member state to whom the notification was sent must then create and send an assessment report to the Commission, which in turn releases the report to all other member states for comment.[53] If just one EU country poses a preliminary objection to the

50. Directive 2001/18, of the European Parliament and of the Council, *supra* note 45, at 2 ("The precautionary principle has been taken into account in the drafting of this Directive and must be taken into account when implementing it.").

51. *Id.* at 46-49. The information required includes:

I.GENERAL INFORMATION . . .

II. INFROMATION RELATING TO THE GMO

A.Characteristics of (a) the donor, (b) the recipient or (c) (where appropriate) parental organism(s):

B. Characteristics of the vector . . .

C. Characteristics of the modified organism . . .

III. INFORMATION RELATING TO THE CONDITIONS OF RELEASE AND THE RECEIVING ENVIRONMENT

A.Information on the release . . .

B.Information on the environment (both on the site and in the wider environment): . . .

IV.INFORMATION RELATING TO THE INTERACTIONS BETWEEN THE GMOS AND THE ENVIRONMENT . . .

V.INFORMATION ON MONITORING, CONTROL, WASTE TREATMENT AND EMERGENCY RESPONSE PLANS . . . . *Id.*

52. *Id.* at 12 ("Member States shall, without prejudice to the provisions of Articles 7 and 25, consult the public and, where appropriate, groups on the proposed deliberate release. In doing so, Member States shall lay down arrangements for this consultation, including a reasonable time-period, in order to give the public or groups the opportunity to express an opinion.").

53. *Id.* at 16 ("In the case referred to paragraph 3(b), the competent authority shall send its report, together with the information referred to in paragraph 4 and any other information on which it has based its report, to the Commission no earlier than 15 days after sending the

introduction of the GMO, the Commission requests an additional risk assessment report from the European Food Safety Agency.[54]

After receipt and review of all reports, the Commission makes a recommendation on the release of the GMO in approved member states by qualified majority of member state representatives in the Regulatory Committee.[55] Once the Commission and Regulatory Committee have approved a GMO for cultivation, member states are required to allow cultivation.[56] However, two procedures allow member states to bypass this legal obligation.

The first is the safeguard clause.[57] Upon approval for cultivation, if a subsequent member state has detailed grounds for concern for the public health and environmental effects of the GMO's cultivation, they may relay those concerns to the Commission and prohibit cultivation within their state.[58] The second avenue created was by an amendment to the Directive in 2015,[59] drafted because

assessment report to the notifier and no later than 105 days after receipt of the notification. The Commission shall, within 30 days of its receipt, forward the report to the competent authorities of the other Member States.").

54. *Id.* at 16; *GMO Authorisations for Cultivation*, EUR. COMM'N (Sept. 10, 2021, 1:11 PM), https://ec.europa.eu/food/plant/gmo/authorisation/cultivation_en [https://perma.cc/P83V-ZNXJ]. ("The competent authority of the notified EU Member State prepares an assessment report and sends it to the Commission and the other EU Member States for comments. The Commission requests the opinion of the European Food Safety Agency (EFSA) if at least one EU Member State or the Commission raises an objection as regards the risks, or where the assessment report indicates that the GMO should not be placed on the market.").

55. *GMO Authorisations for Cultivation*, *supra* note 54.

56. Directive 2015/412, of the European Parliament and of the Council of 11 March 2015 Amending Directive 2001/18/EC as Regards the Possibility for the Member States to Restrict or Prohibit the Cultivation of Genetically Modified Organisms (GMOs) in Their Territory, 2015 O.J. (L 68) 1, 2 ("Once a GMO is authorised for cultivation purposes in accordance with the Union legal framework on GMOs and complies, as regards the variety that is to be placed on the market, with the requirements of Union law on the marketing of seed and plant propagating material, Member States are not authorized to prohibit, restrict, or impede its free circulation within their territory, except under the conditions defined by Union law.").

57. *See* Directive 2001/18, of the European Parliament and of the Council, *supra* note 45, at 21.

58. *Id.* (explaining while the safeguard clause requires a sound scientific basis for the statewide ban of an approved GMO, some countries have defied EU Court orders, which found their scientific basis for disapproval wanting. Countries illegally kept their bans of MON810 Corn in place, showing that the clause has often been used on a political, rather than scientific basis.); *see also* Lau, *supra* note 49.

59. Directive 2015/412, of the European Parliament and of the Council, *supra* note 56, at 2.

"[e]xperience has shown that cultivation of GMOs is an issue which is more thoroughly addressed at Member State level."[60] Under this Directive, any member state may withdraw its territory from cultivation approval during the renewal of consent process for any GMO.[61]

Presently only one GMO, MON810, a pest resistant variety of maize, has successfully managed through the Directive's regulatory process and gained Union-wide approval for cultivation.[62] Despite its approval, several member states have utilized the opt-out procedures and banned cultivation of MON810.[63] Even among the member states that allow the cultivation of MON810, only Spain and Portugal have dedicated a significant portion of farmland to its cultivation.[64] The result of this Union-wide regulatory process, which has banned all but one GMO from cultivation and allowed member states to opt-out of cultivation of even this crop, has resulted in a practically complete ban of GMO cultivation in Europe. In short, "the method of systematic obstructionism has worked."[65]

60. *Id.*

61. *Id.* at 3 ("During the authorisation procedure of a given GMO" or during the renewal of consent/authorisation, a Member State may demand that the geographical scope of the written consent or authorisation be adjusted to the effect that all or part of the territory of that Member State is to be excluded from cultivation.).

62. *Pocket Guide to GM Crops and Policies*, EUROPABIO (Sept. 9, 2021, 10:02 PM), https://www.yumpu.com/en/document/read/19573995/pocket-guide-to-gm-crops-and-policies-europabio [https://perma.cc/3YFK-CVRB]; *see also* Charlie Dunmore, *EU Court Annuls Approval of BASF's Amflora GMO Potato*, REUTERS (Dec. 13, 2013), https://www.reuters.com/article/eu-gmo-potato/eu-court-annuls-approval-of-basfs-amflora-gmo-potato-idUSL6N0JS1TH20131213 [https://perma.cc/JJS5-8V9X] (showing that a second GMO, the Amflora GMO Potato, used for paper production, was also approved in 2010 and cultivated in the EU for two years, but its approval was removed by an EU Court in 2013).

63. *See Pocket Guide to GM Crops and Policies*, *supra* note 62.

64. *See* Graham Brookes, *Twenty-One Years of Using Insect Resistant (GM) Maize in Spain and Portugal: Farm-Level Economic and Environmental Contributions*, 10 GM CROPS & FOOD 90, 90-21 (2019) (showing that approximately 30-35% of maize production in Spain and 7-9% of maize production in Portugal is of MON810).

65. *See* Giovanni Tagliabue, *The EU Legislation On "GMOs" Between Nonsense and Protectionism: An Ongoing Schumpeterian Chain of Public Choices*, 8 GM CROPS & FOOD 57, 59-61 (2016).

2. Importation and Use of GMOs

While the EU remains in staunch refusal to GMO cultivation, it has not yet imposed a complete ban, but still heavily restricts the importation of GMO crops and products..[66] The Regulation No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on GMO food and feed (the Regulation) determines the introduction of GMOs into the market for human consumption or livestock feed.[67] Because the EU and its member states ban cultivation of GMOs, the Regulation applies nearly exclusively to GMOs that are imported to the EU.[68]

Under the Regulation, if a proponent seeks to introduce a GMO into the EU market, they must submit to an EU member state an application for introduction that, much like the notification procedure for GMO cultivation, requires a comprehensive analysis of the GMO's makeup and a monitoring plan to ensure its safety.[69] The application is then sent to the European Food and Safety Agency to conduct a risk assessment, which is carried out by the agency's GMO panel.[70] This process also requires consultation with NGO interest groups.[71] Once the agency has completed its assessment, it reports to the Commission, which ultimately decides on the introduction of the GMO into EU member states.[72]

A notable distinction from the Directive, the Regulation does not allow member states to opt out of the approval and instead requires all member states to accept approved GMOs into their markets.[73] Furthermore, the Regulation does not

66. *Id.* at 60.

67. Commission Regulation 1829/2003 of the European Parliament and of the Council of 22 September 2003 on Genetically Modified Food and Feed, 2003 O.J. (L 268) 1, 1.

68. Tagliabue, *supra* note 65, at 60 ("Therefore, a clear double standard is evident in EU "GMO" politics: on the one hand, the persistent refusal to allow the cultivation of DNA-recombinant crops and vegetables has been ongoing for many years; on the other, there is a regular, huge stream of importation.").

69. Commission Regulation 1829/2003 of the European Parliament and of the Council, *supra* note 67, at 7.

70. *GMO Authorisations for Food and Feed*, EUR. COMM'N (Oct. 8, 2021, 1:17pm), https://ec.europa.eu/food/plant/gmo/authorisation/food_feed_en [https://perma.cc/8VES-NE6K].

71. *See id.*; *see also* Commission Regulation 1829/2003 of the European Parliament and of the Council, *supra* note 67, at 9 ("The Authority, in conformity with Article 38(1) of Regulation (EC) No 178/2002, shall make its opinion public, after deletion of any information identified as confidential in accordance with Article 30 of this Regulation. The public may make comments to the Commission within 30 days from such publication.").

72. *GMO Authorisations for Food and Feed*, *supra* note 70.

73. Tagliabue, *supra* note 65, at 65-66. ("It is a sort of parallelism: on the one hand, Directive 2015/412 has given Member States the possibility to prohibit, totally or partially, the

mention the stringent precautionary principle.[74] Partially as a result of these burden-lessening distinctions, a total of 88 GMOs have been approved for use in the EU, which, although notably higher than the number of approved crops for cultivation, is around half the number of approved GMOs in North America.[75] The vast majority of these approved products are maize, soybean, and cotton,[76] which will mostly be used for fiber or livestock feed as opposed to human consumption.[77]

The EU further imposes stringent traceability and labeling requirements for GMOs once approved for use within its member states in the Regulation concerning the traceability and labelling of genetically modified organisms and the traceability of food and feed products produced from genetically modified organisms (Labeling Regulation).[78] The purpose of the additional regulations is to provide "information and safeguards" to potential consumers.[79] The Labeling Regulation requires that "at every stage in the production and distribution chain," a seller of an approved GMO: (1) "inform trade buyers in writing that a product contains GMOs[;]" (2) "communicate the unique identifiers assigned to each GMO under the regulation[;]" and (3), for food, "identify each ingredient produced from

cultivation of 'GMOs' on their territories for non-scientific reasons; on the other, a new amended Regulation would give the same power to limit or ban the 'use' (importation) of 'GMOs' to be consumed as food or feed."). The European parliament has attempted to correct this double standard, but this proposal failed, and the double standard remains. *Id*.

74. Commission Regulation 1829/2003 of the European Parliament and of the Council, *supra* note 67, at 1.

75. JORDAN PAINE, PURDUE POL'Y RSCH. INST., GLOBAL GMO POLICY: A CASE OF DIVERGENCE 2-3 (2018), https://docs.lib.purdue.edu/cgi/viewcontent.cgi?article=1011&context=gripb [https://perma.cc/AKM9-SVFS].

76. *GM Crop Events Approved in European Union*, INT'L SERV. FOR THE ACQUISITION OF AGRI-BIOTECH APPLICATIONS (Sept. 9, 2021, 10:14 PM), https://www.isaaa.org/gmapprovaldatabase/approvedeventsin/default.asp?CountryID=EU [https://perma.cc/S4W7-Q72Q].

77. *See GMO Import Bans Would Be Both Unnecessarily Costly and Pointless*, EUROPABIO (Sept. 9, 2021, 10:18 PM), https://www.europabio.org/sites/default/files/gmo_import_bans.pdf [https://perma.cc/BF2Y-PVWZ] ("Not all soy in feed can be replaced by alternative protein sources. Substituting GM soy with non-GM soy would lead to an increase in feed costs of around 10% for the livestock sector . . . .").

78. *See* Commission Regulation 1830/2003 of the European Parliament and of the Council of 22 September 2003 Concerning the Traceability and Labelling of Genetically Modified Organisms and the Traceability of Food and Feed Products Produced From Genetically Modified Organisms and Amending Directive 2001/18/EC, 2003 O.J. (L 268) 24, 25-27.

79. *Genetically Modified Organisms – Traceability and Labeling*, EUR. COMM'N (Apr. 4, 2016), https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=LEGISSUM:l21170&from=EN [https://perma.cc/A4YS-S978].

GMOs, if an ingredients list exists."[80] It also requires that all products containing GMOs must be labeled informing consumers of the presence of GMOs.[81]

The EU's labeling and traceability requirements—influenced by public science-skepticism—act to reinforce negative attitudes toward GMOs.[82] Thus, there is a high social cost to introducing GMO labelled items, and manufacturers and retailers have put their own de facto bans in place.[83] Furthermore, the EU remains far behind much of the world in GMO approval for use, which causes significant friction with countries seeking to export GMOs to Europe.[84]

3. Motivations for Regulations

GMO regulations in Europe now stand as some of the harshest in the world, a testament to Europe's unique motivations in strictness.[85] One primary factor in the strictness of the regulations is placation of public opinion. The growing anti-GMO sentiment among the EU populous has not gone unnoticed by lawmakers or regulators and has influenced their decision-making on these matters.[86] With public concern at such high levels, GMO regulatory debates have remained highly

80. *Id.*

81. Commission Regulation 1830/2003 of the European Parliament and of the Council, *supra* note 78, at 26 ("[F]or pre-packaged products consisting of, or containing GMOs, the words 'This product contains genetically modified organisms' or 'This product contains genetically modified [name of organism(s)]' appear on a label . . . .").

82. Justus Wesseler & Nicholas Kalaitzandonakes, *Present and Future EU GMO Policy*, *in* 2 EU BIOECONOMY ECONOMICS AND POLICIES 322, 328 (Liesbeth Dries et al. eds., 2011) ("Consumer attitudes towards GMOs have been used by a number of NGOs to campaign successfully against GM food products in Europe. Similarly, the EU has implemented labelling regulations to provide consumers with the opportunity to choose between GM and non-GM food products. . . . Negative consumer attitudes towards GMOs increase the social costs of introducing GM food products.").

83. *Id.* at 324.

84. *Id.* at 328 ("EU policies cause frictions in international trade and can result in temporary or sustained disruptions in feed imports, in particular, harming EU livestock farmers and consumers . . . .").

85. Lau, *supra* note 49; *see* PAINE, *supra* note 75, at 3-4. ("The existing regulatory polarization between US and EU biotechnology approaches has not forced a convergence around either of these two international models. Rather, the polarization among two leading nations have appeared to cause diversity in world-wide GMO policy instead of convergence or following one of the two binary approaches.").

86. Wesseler & Kalaitzandonakes, *supra* note 82, at 328. ("[N]egative consumer attitudes can play an important part in regional, national, and the EU Parliamentary elections and, without doubt, have influenced EU policies.").

politically charged in Europe, often focused on politics and public hysteria, while ignoring important scientific evidence.[87]

The heightened presence and activity of NGOs has also been a significant motivating factor in the drafting of GMO regulation. NGO activity advocating against GMO introduction is highly prevalent in Europe—far more prevalent than in other parts of the world.[88] These organizations have been incredibly successful in swaying public opinion, as their anti-GMO stances are linked to a wide array of other sympathetic movements, such as social justice and anti-corporate movements.[89] Indeed, "[t]he single most powerful explanation for this continuing blockage of GMOs has been an energetic NGO campaign of disinformation, led and financed mostly by individuals from well-fed countries who do not need the technology themselves."[90]

Europe is also unique in its dichotomy of implementing a near total ban of GMO cultivation, while allowing mass importation of GMO products.[91] While public sentiment toward both is similarly negative, European states heavily rely on imports from the United States for livestock feed.[92] As the United States relies on GMO cultivation, especially for the crops contained in animal feeds, Europe has little choice but to accept GMO imports or face the ruin of its agricultural sector.[93] Europe financially benefits, however, from a ban on cultivation.[94] One significant reason for this paradox is that farmers seek the preservation of current products

87. Lucht, *supra* note 41, at 4257 ("Authorizations for GM crop cultivation or imports have become a highly charged political topic, with internal disagreement between EU member states and difficulties in reaching a common European position.").

88. *See id.* at 4257-60 ("While NGOs traditionally play a less powerful role in the U.S., they have been very successful in Europe in framing GMOs as threat to biodiversity, farmer autonomy, and food safety. Together with supporters from Green political parties and the organic movement, these groups have focused strongly on potential risks and possible negative effects of GM food and feed.").

89. *See* Robert Paarlberg, *A Dubious Success: The NGO Campaign Against GMOs*, 5 GM CROPS & FOOD 223, 223 (2014).

90. *Id.* at 224.

91. Tagliabue, *supra* note 65, at 60.

92. *GMO Import Bans Would Be Both Unnecessarily Costly and Pointless*, *supra* note 77 ("The EU is 70% dependent on imports of protein rich crops and has a self-sufficiency ratio of 3% for its soybean and soymeal needs. For now, the EU's production of those products cannot on its own meet the EU's protein demand for feed.").

93. *Id.* ("If imports of GM soya were to cease it would have huge negative consequences, including a reduction in domestic meat production and an increase in consumer prices.").

94. Tagliabue, *supra* note 65, at 60.

and prices to avoid competition inherent in the introduction of new GMOs.[95] There is also substantial ideological support in Europe for organic cultivation, which rules out GMO cultivation.[96] And, while NGOs remain the most visible proponents of anti-GMO legislation, the pesticide industry has also supported strict GMO legislation because the introduction of GMOs inherently leads to less dependence on insecticides and herbicides.[97]

The environmental and health issues faced by Europe in the 1990s, just before most of the present regulations were drafted, are another major motivator for Europe's strict legislation.[98] The 1990s consisted of numerous health scares and foodborne illness outbreaks in Europe, the introduction of GMOs in mass scale in America, and the introduction of the precautionary principle.[99] The combination of these climactic factors pushed EU leaders to enact strict regulations, which have outlasted the concerns of the 1990s.[100]

B. African GMO Regulations

1. Cultivation of GMOs

While African regulations are not unified under one regulatory system like the EU, there does exist a common trend—a nearly complete ban on cultivation throughout the entire continent.[101] Only four countries, Sudan, South Africa, Burkina Faso, and Nigeria, have allowed cultivation of GMO crops.[102] Of these

95. *See id.* at 59-61 ("In order not to harm the old-fangled products of EU farmers: 'profitability in markets where GM varieties have not been introduced, such as in Europe, becomes threatened by competition from lower priced GM imports. It is, therefore, logical for farmers in such a position to oppose approval of GM varieties if there is a prospect for maintaining some product differentiation and continuing to sell the conventional product at the previous, higher price.'").

96. *Id.* ("To gain the political and electoral consensus of "organic" food producers and retailers: 'suppression of GE agriculture in the EU is widely recognized as ideological rather than scientific, driven to a large extent by the organic food industry in an effort to protect organic food premiums at the expense of overall competitiveness.'").

97. *Id.* at 61.

98. Lucht, *supra* note 41, at 4257.

99. *See id.* at 4257-64.

100. *Id.* at 4264.

101. *See Why African Countries Maintain Tight Restrictions on Genetically Modified Food*, WORLD POL. REV. (May 28, 2019), https://www.worldpoliticsreview.com/trend-lines/27892/why-african-countries-maintain-tight-restrictions-on-genetically-modified-food [https://perma.cc/9UBQ-X34A].

102. *Id.*

four, only South Africa allows cultivation of crops for human consumption; the other three only allow cultivation of GMO cotton.[103] While the cultivation of fiber crops can alleviate food security by improving the economic situations of farmers,[104] complete alleviation of food security can only come through cultivation of crops for human consumption.

South Africa stands alone in the continent as one of the leading global GMO cultivators, recently planting nearly 3,000,000 hectares of GMO crops including maize, soybeans, and cotton.[105] Recognizing the potential benefits of GMOs at an early stage, South African leadership separated itself from the rest of the continent by passing its Genetically Modified Organisms Act of 1997 (Act), which allows for the introduction of GMO crops for cultivation.[106] Under the Act, three regulatory bodies work to approve the introduction and regulate the production of GMOs in the country.[107] For a GMO to be approved, the Act requires an environmental risk assessment and a public notice procedure, much like the EU approval process.[108] Unlike the EU, however, South Africa is not bound by transnational consensus as approval is granted by its own national Executive Council on GMOs.[109] Separate laws also require the labeling of foodstuffs that contain GMOs.[110]

Although the cultivation bans are presently widespread, 13 countries have allowed testing of GMO crops.[111] While much of the continents' leaders are aware of the benefits of GMO cultivation, outside pressures continue to hamper immediate change.[112]

103. *Id.*

104. *See* BROOKES & BARFOOT, *supra* note 21, at 40 fig. 8.

105. *See* John Agaba, *Why South Africa and Sudan lead the continent in GMO crops*, ALL. FOR SCI. (Jan. 15, 2019), https://allianceforscience.cornell.edu/blog/2019/01/south-africa-sudan-lead-continent-gmo-crops/ [https://perma.cc/A5BY-7ELS].

106. Hanibal Goitom, *South Africa*, *in* RESTRICTIONS ON GENETICALLY MODIFIED ORGANISMS 175, 175 (2014), https://www.loc.gov/law/help/restrictions-on-gmos/south-africa.php [https://perma.cc/5QGZ-ZPA3].

107. *Id.*

108. *Id.*

109. *Id.* at 178.

110. *Id.* at 182.

111. Agaba, *supra* note 105 (showing that those countries include Burkina Faso, Cameroon, Ethiopia, Ghana, Kenya, Malawi, Mozambique, Nigeria, Swaziland, Tanzania and Uganda).

112. *Id.* ("They are open to what biotech can do to alleviate hunger and poverty in their countries. But they are giving too much ear to persons who are opposing the technology."

2. Motivation for Regulations

The primary cause of the cultivation bans in Africa is European influence on African legislation.[113] One influence is an exact parallel to the cause of European bans—NGOs.[114] European NGOs campaign fiercely throughout Africa to prevent GMO cultivation and importation and have been quite successful at influencing legislators and the public.[115] While NGO activists press for bans with fear tactics, they abstain from presenting the pro-GMO consensus among Western scientists.[116] As African leaders rely heavily on the scientific research of Europe, they sometimes assume the NGOs represent a scientific consensus favoring a ban on GMOs.[117] Although small-scale farmers and the public have little say in the regulations,[118] NGOs have also been successful at influencing public opinion and creating a generally fearful attitude towards GMOs for human consumption.[119]

European regulations themselves are also another significant cause for the bans. As African leaders look to Europe as a standard for science legislation, they often mimic legislation in hopes to legislate in accordance with a scientific

(quoting Humphrey Mutaasa, director of partnerships at Uganda National Farmers Association)).

113. Jennifer Ann Thomson, *Why is Africa reluctant to use GMO crops?*, WORLD ECON. F. (July 17, 2015), https://www.weforum.org/agenda/2015/07/why-is-africa-reluctant-to-use-gmo-crops/ [https://perma.cc/C4BT-TCL7].

114. See Paarlberg, supra note 89, at 223.

115. *Id.* at 225-27 ("These NGO campaigns had a cumulative effect on Africa's urban policy-making elites, many of whom—within a postcolonial mind-set—saw European practices as the best practices. The NGO campaigners were concealing the fact that all of the most important science academies in Europe had so far found no evidence of new risks from GMOs, so leaders in Africa were left to conclude that the best thinking (i.e., European thinking) must require a rejection of GMOs.").

116. *Id.* at 226.

117. *Id.* at 225-27 ("As one local Kenyan leader said in 2006, 'Europe has more knowledge, education. So why are they refusing [GM foods]? That is the question everyone is asking.'").

118. *See id.* at 227.

119. *See generally* Yan, *Food security feared as Kenya readies to start growing GMO cotton*, XINHUA (Jan. 29, 2019), http://www.xinhuanet.com/english/2019-01/29/c_137784739.htm [https://perma.cc/43J7-6EVM] ("At fresh produce markets across Kenya, citizens are shunning buying bigger tomatoes, mangoes, pawpaws or oranges for fear that they may be genetically modified. The fear is extended to even poultry products where chickens that are too big are classified as genetically modified organisms by consumers and shunned therefore. The misconception is widespread across the East African nation that fresh produce traders and even supermarkets avoid stocking such products.").

consensus and to stay in the good graces of European nations.[120] Europe bans the cultivation of GMOs to stave off American competitors because it can afford to do so,[121] and Africa follows suit despite its drastically differing position and motivations. European aid organizations even provide technical assistance in drafting African legislation and directly take part in codifying European-style anti-GMO laws.[122]

European import laws also affect African legislation and practices. Although Europe is dependent on GMO imports, it imports far fewer GMOs than much of the developed world, and its consumers take an unfaltering anti-GMO stance.[123] As previously discussed, although the EU technically allows for the importation of GMO crops, individual nations have taken dramatic measures to ensure GMOs do not enter their nations, including threats of unofficial embargos and destruction of legally transported GMO material. Africa, which relies largely on food exports to Europe, is forced to adjust its own regulations to match European interests .[124] The common-sense African approach goes, "if European consumers don't want to purchase these products, it's safer not to plant them at all."[125]

120. L. VAL GIDDINGS ET AL., SUPPRESSING GROWTH: HOW GMO OPPOSITION HURTS DEVELOPING NATIONS 6-7 (2016), http://www2.itif.org/2016-suppressing-innovation-gmo.pdf [https://perma.cc/9L4A-LAS9] ("Under the Cartagena Protocol to the United Nations Convention on Biodiversity, the United Nations Environment Programme has spent millions of (European) dollars encouraging and assisting developing countries to adopt restrictive 'biosafety' legislation that limits the use of safe and more productive GM seeds. These barriers are regulatory restrictions that discriminate against 'GM' products in violation of the established rules of international trade.").

121. *See id.* ("Given that there are relatively few farmers in Europe and that their productivity even without GMOs is relatively high, at least compared to Africa (European farmers are able to afford mechanization, fertilizers, herbicides, and pesticides to raise productivity), the economic cost to Europe of banning GMOs is mostly in the form of modestly higher prices for some foods.").

122. *Why African Countries Maintain Tight Restrictions on Genetically Modified Food*, *supra* note 101 ("There are also assistance channels. The European assistance agencies provide technical aid to African governments in drafting regulations toward these technologies, so it's no coincidence that regulations that tend to be drafted resemble regulations that you find in Europe.").

123. Lucht, *supra* note 41, at 4263-65; *see generally* Wesseler & Kalaitzandonakes, *supra* note 82, at 328.

124. GIDDINGS ET AL., *supra* note 120, at 6-7 ("Africa's farm exports to Europe are six times as large as exports to the United States, so it is European consumer tastes and European regulatory systems that Africans most often must adjust to.").

125. *Why African Countries Maintain Tight Restrictions on Genetically Modified Food*, *supra* note 101.

Multinational organizations like the United Nations (UN) also impact African legislation. African nations rely heavily on UN policy recommendations, and Europe has shaped those recommendations in their favor to object to GMOs.[126] A prime example of such recommendations taking effect is through the Cartagena Protocol.[127] Enacted by the UN in the 1980s, the Cartagena Protocol recommends strict international regulations towards GMOs and was framed largely as a result of the hijacking of the enactment process by European anti-GMO NGOs.[128] The protocol negotiation process and its enactment had a profound impact on African legislators,[129] and the protocol's recommendations have now been enacted throughout the African continent.[130]

Multinational organizations and European nations have also independently employed their aid-giving capacity to force African compliance with GMO regulation.[131] Countries such as Germany—along with multiple multinational organizations—have threatened to withhold aid to African nations if they do not adopt anti-GMO legislation.[132] Under the Cartagena protocol, the UN has also

126. *Id.* ("European governments play a prominent role in the United Nations, and they have shaped U.N. treaties like the 2003 Cartagena Protocol, to give expression to a highly precautionary European approach to GMOs. The United States, which often turns its back on these U.N. special agencies, has left the field wide open for European influence. . . . [G]overnments in Africa deeply appreciate the one-country-one-vote ethic that prevails in the United Nations General Assembly, and they depend heavily on U.N. agencies for opportunities to express themselves in international fora. So, when European governments, especially environmental ministries, shape the way things are done inside the U.N. special agencies, it's heavily influential on African governments.").

127. Paarlberg, *supra* note 89, at 225.

128. *Id.* at 224-26 ("Once they were given access to the protocol negotiation process, anti-GM organizations such as Greenpeace, Friends of the Earth International, and the Third World Network spread scare stories about the risks GMOs and advocated that the new Protocol be modeled around a 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes").

129. *See id.* at 225 ("Many African delegates originally came to the protocol negotiations fearing not that GMOs were dangerous, but that they might work so well in rich countries as to leave African agriculture farther behind. These Africans were quickly turned around by NGO scare stories.").

130. *See Why African Countries Maintain Tight Restrictions on Genetically Modified Food*, *supra* note 101 ("European governments play a prominent role in the United Nations, and they have shaped U.N. treaties like the 2003 Cartagena Protocol . . . . Africa has followed Europe's lead in its regulatory approach to this technology.").

131. *See id.*

132. GIDDINGS ET AL., *supra* note 120, at 7 ("European nations have also used informal pressures to lean on African nations to shun GMOs. . . . Germany threatened Zimbabwe that it would lose overseas development assistance unless the country shut down its agricultural

spent millions of dollars to directly influence African nations to enact anti-GMO legislation.[133]

C. Effect of European GMO Regulation on African Food Security

The result of European GMO regulation and influence on Africa has been devastating to the African continent.[134] In economic terms, it has been estimated that if the rest of the African continent had followed the lead of South Africa by introducing GMO maize, soybean, and cotton alone, revenue increases for farmers would have reached nearly one billion dollars in one year.[135] The effect of the suppression of these technologies was estimated to be around 2.5 billion dollars lost in a five-year span.[136] GM maize, soybean, and cotton comprise only nine percent of total African crop production, leaving open massive opportunities for GMO-adopting African countries to increase revenues.[137] One study that focused on bananas, cowpeas, and maize, estimated that over 500 million dollars in revenue could be attained through the introduction of those crops in just five African countries, and Nigeria could lose around 40 million dollars in one year because of a delay in the approval of GM cowpea alone.[138] In total, if developing countries continue their non-adoption of GMOs, an estimated 1.5 trillion dollars of revenue is estimated to be lost by 2050.[139] With over 60 percent of the African population being farmers, these economic hardships penalize a major sector of the African population and further exacerbate food security woes.[140]

biotechnology research efforts—a proud program that was once among the most advanced in the developing world.").

133. *See id.* ("Under the Cartagena Protocol to the United Nations Convention on Biodiversity, the United Nations Environment Programme has spent millions of (European) dollars encouraging and assisting developing countries to adopt restrictive 'biosafety' legislation that limits the use of safe and more productive GM seeds.").

134. *See generally* GIDDINGS ET AL., *supra* note 120.

135. *Id.* at 12-13.

136. *Id.* at 15.

137. *Id.* at 13.

138. Ben Johnson, *The human cost of the EU's anti-GMO policy*, ACTION INST.: TRANSATLANTIC BLOG (Sept. 15, 2017), https://acton.org/publications/transatlantic/2017/09/15/human-cost-eus-anti-gmo-policy [https://perma.cc/A2T3-FV2E].

139. GIDDINGS ET AL., *supra* note 120, at 15.

140. *Id.* at 6.

The economic afflictions of GMO bans pale in comparison to the most devastating effect of food insecurity—its death toll.[141] If Kenya had adopted GMO corn in 2006, "between 440 and 4,000 lives could theoretically have been saved."[142] If Uganda had allowed introduction of a pest-resistant GMO banana before a destructive pest outbreak, between 500 and 5,500 lives could have been saved within the last decade.[143] A one-year delay in GMO cowpea approval in Nigeria could result in 100 to 3,000 lives lost to starvation.[144] Based on current trends, an estimated 38,857 lives will be lost in the next decade if GMO approval delays continue in Africa.[145]

V. SOLUTIONS

As has already been established, GMO implementation directly improves the food security of adopting nations.[146] Therefore, the primary goal of legislators seeking to alleviate food insecurity should be the adoption of legislation that best promotes the cultivation of GMOs by African farmers. Both the motivations of contrary legislation and the poor legislation itself must be confronted to reach this goal.

A. Changes to EU GMO Regulations

1. Cultivation

The first area of regulation which must be addressed is Europe's ban on cultivation.[147] Although the continent's cultivation bans do not adversely affect African trade opportunities like its import bans do, the cultivation bans reinforce the message that GMOs are unsafe or otherwise harmful.[148] Because African lawmakers, for better or worse, look to European regulations for guidance, a change in European law will likely lead to similar changes in Africa.[149]

141. Justus Wesseler et al., *Foregone Benefits of Important Food Crop Improvements in Sub-Saharan Africa*, PLOS ONE, July 2017, at 10.

142. *Id.* at 9.

143. *Id.*

144. *Id.* at 10.

145. Johnson, *supra* note 138.

146. *See* GIDDINGS ET AL., *supra* note 120, at 1-2.

147. *See id.* at 1.

148. *Id.* at 7.

149. *See id* at 5-6.

A first step in stopping European bans should be the cancellation of the two op-out procedures available to EU states—the Safeguard Clause and the subsequent opt-out directive.[150] Without these two procedures, each state would be required to allow cultivation of EU-approved GMOs. With these procedures done away with future bans will be prevented and 19 EU states would be required to allow presently banned GMO cultivation.[151]

Procedures also need to be changed to allow for smoother approval of GMOs. An important first step should be the elimination of the public input procedure.[152] The purpose for such procedures should be for the deciding bodies to hear differing reasoning for legislation. However, when the legislation is purely scientifically based—as is the case for GMO approval—allowing for drawn-out influence from anti-science lobbyists defeats the purpose of public input. Further, NGOs have become incredibly powerful in Europe and have abused that power to enact anti-science GMO regulations.[153] To stop this undue influence, the public input procedure should be abandoned for GMO cultivation regulations.

Although the requirements for cultivation approval are stringent for individual GMOs, it is widely accepted that high standards should be in place to prevent untested organisms from being introduced into the environment.[154] However, Europe's approach—which bases its legislation in the precautionary principle—is an extreme reaction to potential threats.[155] Because the scientific consensus overwhelmingly recognizes the safety of GMOs,[156] restrictions on

150. *See* Directive 2015/412, of the European Parliament and of the Council, *supra* note 56, at 2; Directive 2001/18, of the European Parliament and of the Council, *supra* note 45, at 21-22.

151. Andy Coghlan, *More Than Half of EU Officially Bans Genetically Modified Crops*, NEWSCIENTIST (Oct. 5, 2015), https://www.newscientist.com/article/dn28283-more-than-half-of-european-union-votes-to-ban-growing-gm-crops/ [https://perma.cc/LRQ7-EXP8] ("19 member states had applied ahead of the deadline of 3 October to take advantage of rules introduced in April permitting individual member states and regions to ban cultivation of GM crops that have been judged by Europe's regulators as posing no risk to human health or the environment.").

152. *See generally* Directive 2001/18, of the European Parliament and of the Council, *supra* note 45, at 12.

153. *See* GIDDINGS ET AL., *supra* note 120, at 8-9.

154. *See* Ray Robert, *Think GMOs Aren't Regulated? Think Again*, FORBES (Dec. 21, 2015, 11:13 AM), https://www.forbes.com/sites/gmoanswers/2015/12/21/how-are-gmos-regulated/?sh=3ab4ad206255 [https://perma.cc/BRW7-W58N].

155. *See* Tagliabue, *supra* note 65, at 58.

156. *See* THE NAT'L ACADS. OF SCIS., ENG'G, & MED., *supra* note 30, at 1-4.

approval abandon the precautionary principle, which should remain only in application towards highly risky, novel, and unresearched technologies.[157]

The low approval of GMOs for cultivation in Europe is not primarily due to the required testing and scientific backing, but rather the one-state one-vote rule for approval utilized by the EU[158] To remedy this error, the EU should shift to a board of experts in the field of agricultural science to make approval decisions for the Union, similar to the approach employed in South Africa.[159] Such an approach would ensure that decisions are grounded in a scientific approach, rather than the political desires of nations influenced by outside anti-science groups.[160] Although EU cultivation regulations do not directly impact African farmers, allowing cultivation makes an important statement, one likely to be heard on the African continent and which will hopefully influence positive change.[161]

2. Imports

The area of law that most directly affects African food security is import regulations. Although the EU has approved 88 GMOs for importation and heavily relies on GMO imports for livestock feed, only a fraction of those approved GMOs are used regularly for human consumption.[162] Because of this, no African country grows crops primarily for human consumption, including the four that have allowed for GMO cultivation.[163] To encourage crops to be grown in Africa that can directly aid the food security crisis, the EU must adopt import approval procedures to encourage different crop introductions.[164] Similar to the cultivation ban problem, the one-state one-vote procedure for imports also allows individual states to hijack

157. *See* Beat Späth, *Senselessly Shunning Science: the EU Parliament's GMO Dilemma*, EURACTIVE (Dec. 17, 2019), https://www.euractiv.com/section/agriculture-food/opinion/senselessly-shunning-science-the-eu-parliaments-gmo-dilemma/ [https://perma.cc/87TM-6G47].

158. *See id.* ("Countries including Germany, France, Italy and Poland have not voted in favour of the approval of safe GMO products even for import, even though their economies do already benefit from them and could further. This voting behavior, combined with lack of support in the Parliament and a general failure of EU institutions to counter disinformation on GMOs, is the main reason why Europe has effectively expelled agricultural innovation in this field, all the while undermining trust in the EU's food safety assessment procedures.").

159. *See* Goitom, *supra* note 106, at 178.

160. *See id.*

161. *See* Paarlberg, *supra* note 89, at 225.

162. *GMO Import Bans Would Be Both Unnecessarily Costly And Pointless*, *supra* note 77.

163. Agaba, *supra* note 105.

164. Paarlberg, *supra* note 89, at 225.

science-backed legislation.[165] This approval procedure should also be dropped and replaced with a science-based board.[166] Such a board would be less concerned with the competition problem—which incentivizes states to allow GMO importation only for animal consumption—and would instead make decisions based on the human benefit of GMO introduction.[167]

3. Labeling

Labeling laws also pose a major impediment to food security. African farmers are often against growing GMOs primarily because of the difficulties in marketing to a consumer base so avidly opposed to them.[168] Labeling laws perpetuate the myths and concerns which drive consumer opposition and in turn drive down production in Africa.[169] To prevent the spread of fear, the EU should abandon its mandatory labeling requirements and instead allow labeling to be optional. Such a procedure would allow consumers to choose products they know to be GMO-free from sellers who wish to make the information available, while allowing other sellers the choice to share that information. This would give farmers a fair chance to introduce not only harmless, but largely beneficial products to EU markets.

4. Influence

One of the largest impediments to African food security is direct European influence in African policy through lobbying and pressure from European NGOs and governments.[170] At the very least, European governments should stop the neocolonialist threat of withholding support to African nations and their hijacking of legislation in multinational organizations and allow African nations the freedom to choose their own regulations.[171] Furthermore, European leadership should end its cover-up of scientific research done within its own borders and its support of anti-science NGOs, and instead allow for the free dissemination of the science which African nations depend on for policy creation. A hands-off approach by Europe towards African regulations may be the first step in remedying past errors,

165. Späth, *supra* note 157.

166. Tagliabue, *supra* note 65, at 58.

167. *See id.*

168. GIDDINGS ET AL., *supra* note 120, at 5-6.

169. Daren Bakst, *5 Reasons Why We Don't Need Federally Mandated GMO Labeling*, THE HERITAGE FUND (June 24, 2016), https://www.heritage.org/agriculture/commentary/5-reasons-we-dont-need-federally-mandated-gmo-labeling [https://perma.cc/639Z-7X3V].

170. GIDDINGS ET AL., *supra* note 120, at 7.

171. *Id.*

but if Africa continues to look to Europe for leadership, Europe should transparently relay the scientific consensus towards GMOs and support pro-GMO policies in Africa.

As NGOs are also a major influence on African nations, EU leadership should actively decry their undue impact. While European leaders cannot directly prevent influence of this sort, which is important to protect the rights of dissenting organizations, it should stand by the consensus of its scientific leaders and be sure its message to African leadership is clearly pro-GMO.

B. Changes to African GMO Regulation

Although Africans presently feel bound by European legislation and influence, there are changes that can be made on the continent despite the present climate in Europe. African nations first need to enact legislation that creates a reasonable approval process for the cultivation of GMOs. Even the addition of textile crops or crops for feed like maize, cotton, and cowpea—which have already been introduced in South Africa—could provide major alleviation of food insecurity through increased revenues, even if those foods cannot themselves be used to feed hungry people.

A starting point for legislation could come from South Africa, which has already seen tremendous benefits from GMO introduction.[172] Because of South Africa's reasonable legislative approach to GMO introduction, both large-scale and small-scale farmers have adopted GMO cultivation—especially cotton and maize—in large numbers.[173] The results have produced significant yield increases for both crops as well as lessened pesticide use, all of which is advantageous in the fight against food insecurity.[174]

172. Marnus Gouse, *Socioeconomic and Farm-Level Effects of Genetically Modified Crops: The Case of Bt Crops in South Africa*, *in* GENETICALLY MODIFIED CROPS IN AFRICA: ECONOMIC AND POLICY LESSONS FROM COUNTRIES SOUTH OF THE SAHARA 25, 38 (José Falck-Zepeda et al. eds., 2013), http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/127816/filename/128027.pdf [https://perma.cc/L7Z2-52MT].

173. *Id.* at 27.

174. *Id.* at 29. ("All the peer reviewed publications on Bt cotton in South Africa (mainly focusing on smallholder farmers) report yield increases with the use of Bt cotton compared to conventional varieties. . . . Almost all studies also showed savings in insecticide expenditure. . . . Gouse et al. (2005) found average yield increases (due to better stem borer control) of 10–11 percent for commercial (dryland and irrigation) farmers, whereas smallholder Bt [maize] adopters reported yield increases of 0–32 percent for the seven seasons 2001/02–2007/08. . . .").

While starting with staple crops already used in Africa, legislation must be drafted to leave open research opportunities and chances for additional crops to be introduced, especially crops for human consumption. At the crux of food insecurity is not only the economic pitfalls of extreme poverty, but more importantly the lack of available food for consumption—especially in areas prone to drought—which will only increase in Africa due to global warming.[175] African nations must begin to allow subsistence farmers, which make up a large percent of the continent, to grow crops that will feed them and their communities through drought and economic hardship.[176]

VI. CONCLUSION

As the human population in Africa is expected to grow continually through the end of the century, and as climate change takes away more arable land in the continent, food insecurity will only become more pressing in the foreseeable future.[177] Technological solutions are, therefore, essential to increase food production in an increasingly demanding food market. GMOs can be a part of that solution, but only if Europe and Africa each make significant adjustments to present laws that allow for science-based decisions regarding GMO introduction. Under new forward-thinking, pro-science GMO policies, the African continent can take one leap forward toward food security.

175. Qaim & Kouser, *supra* note 23, at 1.

176. *Africa has Plenty of Land. Why is it so Hard to Make a Living From it?*, THE ECONOMIST (Apr. 28, 2018), https://www.economist.com/middle-east-and-africa/2018/04/28/africa-has-plenty-of-land-why-is-it-so-hard-to-make-a-living-from-it [https://perma.cc/QZL8-FBZN].

177. Qaim & Kouser, *supra* note 23, at 1.