The genetically modified organisms (GMOs) global policy landscape shows one of divergence not convergence. The United States stands on one side as strong advocates for GMOs through approval and production, while the European Union, on the other side, applies the precautionary principle to GMOs as they appear to be more cautious with GMO production. Due to this polarization, other countries are able to more easily develop their own unique policies, mostly falling somewhere in between the leniency towards approval of the United States and the rigidity towards approval of the European Union. In the realm of GMO policy, we are not seeing the normal trend of convergence around a similar policy or idea frame; instead, there are observable differences among countries’ policies (Prakash 2003). This brief discusses which countries are approving GMOs and identifies some possible indicators that would suggest their willingness to approve GM crops, as well as the policies surrounding GMO regulation. However, it is important to note that approval and production of GMOs are two very different aspects of the industry. While the data covers over forty individual countries across the globe, a special emphasis has been placed on the United States, China, Japan, Mexico, and the European Union as these are key trade countries for the United States, as well as leaders in the realm of either GMO research or policy.

The United States regulates GMOs under three main agencies: United States Department of Agriculture (USDA), United States Environmental Protection Agency (EPA), and United States Food and Drug Administration (FDA). The EPA regulates plants that are genetically engineered to carry a gene with a pesticide (such as Bt) and genetically engineered microbial pesticides; the USDA regulates transgenic plants and the FDA regulates the safety of GMOs that are eaten by animals and humans. The United States is a strong supporter of GMO development and cultivation, as is evident by being a world leader in GM plant cultivation.¹ However, the United States signed into a law a GMO labeling bill in 2016 that will take effect within the next two years. Although the United States is not the number one leader in the total number of GMO varieties approved, it has still approved 192 varieties and falls second to the number approved to Japan.²

China has a long history of failures and success in agricultural production. During the Great Leap Forward, a large number of people died of starvation due to decreased production; however, when Deng Xiaoping took over the agricultural sector, the country returned to its focus on agricultural production.³
However, it was not until 1997 that China began to issue certificates to cultivate GMOs.\(^4\) China’s Ministry of Agriculture and the Biosafety Committee set regulations, award certificates, and control the biosafety management of GMOs within China. The classifications of GMOs are based upon safeguarding the health of humans, animals, plants, and microorganisms. In addition to protecting live organisms, general protection of the environment is also a specific goal of GMO classification in China.\(^5\) The United States has a long history of GMO trade with China and China currently the largest importer of United States soybeans; however, there have been complications within the trade system.\(^6\) For instance, China has blocked corn shipments from docking due to contamination of non-approved GMOs. Although other countries scrutinize imports closely, China has caused massive disruption in the industry with their rejection of corn shipments. In contrast to the 192 varieties of GMOs approved in the United States, a total of 60 GMOs have been approved in China, 17 of which are corn varieties and 10 of which are soybean varieties.\(^4\)

Japan enacted the Cartagena Act in 2003 to implement the Cartagena Protocol on Biosafety and uses this as the primary regulatory protocols for GMOs.\(^7\) The Cartagena Protocol aims to ensure the safe handling, transport, and use of living modified organisms resulting from modern biotechnology that may have adverse effects. Although it is technically legal to plant GM crops, only ornamental flowers are commercially planted. However, Japan is one of the largest importers of GMO foods and grains.\(^7\) Public disapproval is the main reason for the lack of commercially planted GMOs.\(^7\) Despite the public perception of GMOs, Japan has the largest number of GMO varieties approved (221), of the approved varieties 17 are corn and 23 are soybean.\(^8\)

Mexico is also global leader in the development of GMOs. The Mexican Department of Health is the main body for regulation, approval, and enforcement. Mexico has also adopted the Cartagena Protocol as its guideline for GMO regulations.\(^8\) Although some cultural concerns (tortilla production and quality) have been raised about GMO corn, including a complete ban on GMO production for a period of time, cultivation has resumed and is the majority of corn/soy planted. The farmers’ focus is quality and quantity, not genetic makeup. Mexico is ranked second in corn and soybean imports from the United States.\(^8\) The country has approved 158 GMO varieties, 68 of which being corn and 22 of which being soybeans.\(^10\)

The European Union (EU) places strict regulation on GMOs. The regulations include an extensive authorization process, as well as allowing for member states to opt for even stricter regulations within their own territories. The European Union’s policy is based on the precautionary principle, a risk-averse stance towards biotechnology. GMOs within the European Union are assigned a unique identifier and are labeled.\(^11\) The primary body for authorization is the European Food and Safety Administration, but governments within each country must also approve it. To cultivate GM crops, the process begins within a member state and then works up to approval from the European Union; however, once approval is obtained from the EU, individuals member states can still choose opt out and restrict production. While the EU is the main overseer of GMO regulation, it is at the discretion of each member state to enforce the policy. Spain is the leader in GMO cultivation within the EU, while several other countries ban cultivation, but do allow imports.\(^12\) The European union has approved 88 varieties of GMOs, 41 being corn varieties, and 15 being soybean varieties.\(^12\)

Although the United States is seen as one extreme for GMO approval, Japan leads the world in number of GMOs approved. While one might assume that the difficulty in gaining approval would coexist with the number of GMOs approved per country, the research shows that this is not necessarily the case (see figure 2). For instance, many who have signed the Cartagena protocol have far more GMOs approved than those with weaker approval processes. Even more interesting is that the approval number does not necessarily correspond to the number of GMO acres planted. Although the EU has approved 100 GMOs, a leading number in the world, not many member-states produce any GM crops at all. In some countries in the European Union, like Germany, GMO production is banned all together. Japan is leading the world with approved GMO varieties despite signing the Cartagena Protocol and having a moderately strict approval process but they also are not one of the top 28 biotech producing countries.
The strongest indicator of if a country will approve and produce a GMO product is by region (referenced in figure 2). There is a noticeable correlation between region and GMO approval. For instance, North America leads in average number approved, followed by Central America, Oceana, Asia, and South Africa. The figure shows the substantial difference between North American, Asian, and European regions in approving GMOs.

There are many different policies surrounding GMOs. They vary greatly and do not appear to be converging. Policies, especially those surrounding international trade, often begin to converge around leading countries. This is not the case in GMO policy.

For companies, the research suggests that increased lobbying is necessary to gain access into international markets, but that additional campaigning to convince farmers to cultivate GMO products is also necessary. The research shows targeted regions where lack of approval is common; a biotech company may wish to allocate its resources to gain use and approval of one specific country. Starting with one country in a region where approval is difficult would allow the producer to build public support. Because governments cite public
support as a factor for GMO limits, slow integration could ultimately help expansion to the rest of the region. Further, this research shows markets in specific regions that non-GMO producers and exporters could target.

In this global world of policy divergence regarding GMOs, there are some policy solutions that would make trade easier to facilitate, while still allowing countries to maintain their divergent policies. One would be a central database updated at the beginning of each year regarding what GMO varieties countries would accept for the upcoming harvest. Another solution could be requiring seed distributors to inform farmers, which countries do not accept the GMO variety they are selling. Increasing transparency from both governmental and industry standpoints would allow the farmers, as well as elevators, to make more informed decisions when choosing what varieties to plant or accept. It is important to recognize that the field of GMOs, in regards to technology, policies, and use, is continually changing. The best producers, exporters, and companies must stay on top of these changes to thrive in the divergent global economy.

REFERENCES:


