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An alarming reality: Nearly half of pesticides approved for major crops in Latin America are not allowed in the European Union

A new international study published in the journal *Proceedings of the Royal Society B* reveals profound inequalities in the regulation of agricultural pesticides worldwide. According to the study, which assessed the legal status of active ingredients (chemical substances with biocidal functions contained in commercial formulations) up to December 31, 2020, nearly 50% of the active ingredients approved for use in major agricultural crops in Latin America were not allowed in the European Union (EU) due to risks to human health and the environment.

The research analyzed pesticide legislation in eight Latin American countries (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Mexico, and Uruguay) and compared it with European regulations. The crops evaluated were soybean, maize, rice, sugarcane, wheat, apple, avocado, coffee, sunflower, and grape. In total, 523 active ingredients approved for the ten crops analyzed were identified, of which 256 (48.9%) were banned or not approved in the EU. In addition, 236 active ingredients banned in these eight countries were identified, of which 202 (85%) were also banned in the EU. These results highlight an unequal regulatory framework between the two regions, with less stringent regulations in the Latin American countries evaluated. Moreover, 88% of the active ingredients approved in at least one Latin American country and classified as highly hazardous by the World Health Organization (WHO categories Ia and Ib) were not allowed in the EU. Costa Rica had the highest number of approved active ingredients not allowed in the EU (140), followed by Mexico (135), Brazil (115), Argentina (106), Chile (99), Bolivia (87), Uruguay (86), and Colombia (57).

The study also evaluated economic factors that could influence pesticide approval, such as production volume and export value of each crop in each country, using statistical models. Results showed that crops with higher production or export value—such as soybean, maize, wheat, and rice—had a greater number of approved active ingredients and a higher number of active ingredients not approved in the EU. These findings are alarming, as these crops are of enormous regional importance in countries whose economies partially depend on agricultural exports and are experiencing processes of economic reprimarization. In particular, soybean and maize are mostly cultivated using genetically modified seeds, which are dependent on the massive use of pesticides as part of the technological package. In 2017, more than 20 years after their release, GMOs represented 42% of the global cultivated area in Latin America. More recently, drought-tolerant genetically modified wheat has been approved in several countries in the region

The study warns that Latin America is currently the region with the fastest growth in pesticide use and one of the world's leading food exporters. This combination of high pesticide demand and weak environmental and health protection regulations increases direct exposure among agricultural workers and communities living near croplands, as well as indirect exposure of the general population through pesticide residues that may remain in food, water, air, and soil. In addition, pesticides disperse into the environment, affecting a wide range of living organisms, ecosystems, and fundamental ecological processes, while their environmental effects are often unknown due to deficiencies in environmental impact studies.

In summary, the study demonstrates the unequal implementation of the Precautionary Principle included in the Rio Declaration on Environment and Development (1992), which has been adopted by both the EU and the eight Latin American countries evaluated. According to this declaration, *"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."* Unequal implementation of the Montreal Protocol and of the Rotterdam and Stockholm Conventions was also observed in the Latin American countries evaluated. The authors highlight the urgent need to strengthen environmental and health policies by harmonizing regulations across Latin American countries in line with the most rigorous international standards and by prioritizing sustainable alternatives, such as agroecology and integrated pest management.

As a first step, the authors recommend immediately banning the production, sale, and use of all active ingredients classified as highly hazardous. This would help prevent existing regulatory asymmetries between countries from allowing those with weaker legislation to

bear the consequences of the global trade in these compounds. In addition, risk management should be implemented at local and regional scales, ensuring that pesticide approvals comply with updated risk assessment protocols and context-specific monitoring programs. Risk assessments should also be improved by incorporating environmentally relevant mixtures of compounds and by more rigorously evaluating effects on non-target species. Governance policies should include official, rigorous, and open data sources, pesticide monitoring programs, improved access to reliable information for workers, consumers, and communities, training in integrated pest management, and real and effective incentives to promote safer agricultural practices, such as agroecological production.

The research was conducted by a multidisciplinary and multicenter team of scientists from the Latin American Society for Bee Research (SoLatInA) and the CYTED COLMENA Network, and was led by Dr. Grecia de Groot, a postdoctoral fellow at the Institute of Biodiversity and Environment Research (INIBIOMA), affiliated with the National University of Comahue (UNCo) and the National Scientific and Technical Research Council (CONICET). This scientific work, published in the British journal *Proceedings of the Royal Society B, Special Feature:"The other 1%: Showcasing science and scientists from the Global South and indigenous communities" Guest edited by Sarah Brosnan, Stephanie Meirmans, Maurine Neiman, Guadalupe Peralta and Shalene Singh-Shepherd, under the title "Global inequities in pesticide legislation: nearly half of pesticides approved in major crops in Latin America are not allowed in the European Union"*, represents a key contribution to understanding the current pesticide governance landscape in Latin America and constitutes the most comprehensive comparison among countries in the region to date. Given that approvals and bans of active ingredients change periodically in each country, the research team is currently working on an updated regional dataset that will be published in the near future.

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Contacts
Grecia de Groot (Argentina): grecia.degroot@comahue-conicet.gob.ar
Carolina Morales (Argentina): moralesc@comahue-conicet.gob.ar
Marcelo Aizen (Argentina): maizen@comahue-conicet.gob.ar

Social media
CONICET: Instagram: @conicetdialoga / X: @Conicet
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Harvest of soybean, the crop with the largest area and highest number of active ingredients approved in Latin America not allowed in the EU. **Photo credit: Matías Sarlo, de Agencia** Tierra Viva. https://minga.agenciatierraviva.com.ar/agronegocio/