BIOINPUTS AS A SUSTAINABLE ALTERNATIVE IMPLEMENTED IN AGRICULTURAL ECOSYSTEMS IN LATIN AMERICA: CURRENT SITUATION AND PERSPECTIVE FOR PEST AND DISEASE MANAGEMENT

The need to find alternatives to the use of agrochemicals, specifically insecticides and fungicides of chemical origin, aimed at the management of pests and diseases in various crops of the region, was the main objective for the implementation of the Integrated Pest Management and Integrated Crop Management programs. However, in practice, it´s observed that the premise of reducing production costs and guaranteeing the profitability of crops was considered a utopia as long as the use of micro and macrobiological agents was not implemented within the context of biological control of pests and diseases. The high rates of insecticide and fungicide residues reported in the rural population in Latin American countries; In addition to the contamination of agricultural soils and water sources, this was not a sufficient reason to consider clean agrotechnologies and specifically biological agents as a viable alternative to the problem raised. The triggering factor that promoted the application of biological agents as pest and disease regulating agents in agricultural crops, characterized within the group of bioinputs, was the increase in the costs of agrochemicals, including insecticides and fungicides, attributed, among other factors, to recent geopolitical events. From this condition and the trend in the reduction of the sales of agrochemicals, the period in which the Research-Development-Innovation (R+D+i) process for the production of macro and microbiological products in Latin America is acquiring regional relevance. The potential impact of the investment of these bioinputs is consistent with the conservation of biodiversity and in turn with the sustainable development goals, the Convention on Biological Diversity and the *One Health Action Plan*, which further supports the relevance and implementation of this clean technology at a global level.

Bioinput investment for 2022 in Latin America was approximately USD 1.25 billion. When compared to the R+D+i process dedicated to its production in research centers and universities, it would require public policies that promote investment, develop local supply and facilitate the adoption of this clean technology in the region. However, the regulatory and registration processes for these products are time-consuming and costly, which affects the process of adopting the technology. In addition to considering the link between scientific and technological systems and start-ups to be fragile, it´s essential for the promotion and use of these biological control agents by the main actors in the agri-food chain, which are producers and farmers. For this reason, the development of new business strategies is required, which implies the generation of innovative technologies and must be viewed differently from the marketing plans established for agrochemicals.

In view of the above, and with the intention of highlighting the possible solutions that limit the adoption and use of bioinputs by producers, we highlight some measures that may favor this process. Technical training of actors linked to research centers, universities and producer organizations, specifically with the bioinputs used in the rational management of pests and diseases; the structuring of producer organizations in order to be able to access public or private financing; the development of a dissemination strategy, which allows the dissemination of the economic advantages, the impact and the challenges that will probably have to be solved and the incorporation of producers with other actors within the agri-food chain, with a view to the exchange and strengthening of the application of the agrotechnology generated.

The promotion of bioinputs to be successful requires financing where the actors involved, including international organizations, local governments, companies and producer associations, require a solid link. Funding must be guaranteed in the medium and long term, through regional, governmental and international alliances, and must be supported by R+D+i activities and projects, without ruling out the adoption and transfer of the technology used. The creation of normative and regulatory frameworks, considering the quality control of the bioinput used, the registration of these pest management agents, ensuring that this public good generates sufficient funds for the development and adoption of these control agents. The need to enhance the technological adoption of these products, through dissemination and specialized technical assistance. Cultural and economic resilience, among others, will ensure the successful adoption and use of bioinputs in the agri-food chain.

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