# Green Revolution and Sustainability Impact in the Indian Economy

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Abstract: This work assesses the Indian economy by evaluating the environment, economy, and society. It determines the Green Revolution's impact on sustainability. Sustainability analysis is wide-ranging and, in its scope, it exposes uneven sustainability prospects across regions, whereby the South region demonstrates environmental resilience that is higher than the North and East regions. The environmental indicators such as soil management, water management and biodiversity are moderately good or good in case of South region. However, the region of East and North have environmental degradation in varying degrees. On the economic side, different metrics are used to show the discrepancies between smallholders and large-scale farmers which means that the former have a lower standard of living and a lack of access to the market. Social indexes emphasise the concept of inequality and insecurity of the North and East region. So, these policies demand the formulation of inclusive policies and targeted programmes in order to rectify the socioeconomic disparities. Therefore, the research reaffirms the significant role of region-specific solutions along with the adoption of up-to-date technologies and progressive developmental strategies in promoting Indian agriculture's progressive transformation.

Keywords: Green Revolution, sustainability, Indian economy, regional disparities, agricultural development.

#### I. INTRODUCTION

The Green Revolution can be looked at as a significant point in the history of Indian agricultural heritage which translated corporatized farming into traditional agricultural practices which later pushed India to the era of agricultural abundance. The Green Revolution, which started in the 1960s, revolutionized the country's agriculture as it led to the introduction of modern crop varieties, advanced farming methods, and widespread use of pesticides and fertilizers, ultimately changing the face of

farming in this country. While the Green Revolution undoubtedly had a huge positive impact in increasing agricultural efficiency and reducing overall hunger rate, its sustainability is one of the most heated topics as it has been and still is highly controversial in regard to the long-term consequences [1]. The district perspective as the focal point of this research is to investigate the underlying complexity and relationships between the Green Revolution and fostering sustainability in the context of Indian economy. The Brundtland Commission have given rise to the concept of sustainability, which means striving to meet the needs of current generation without compromising the ability of the future one to likewise fulfill their needs. In the evaluation of the consequences of the Green Revolution, this study applies a range of viewpoints, considering the environmental, financial, and social aspects [2]. From the stand point of environment, the Green Revolution which is based on intensive irrigation, chemical fertilizers, and pesticides has caused concern on the destruction of soils, drying of waters, and losses of biology. Monoculture and high-input farming systems that were widely adopted have also added to vulnerability to pests and diseases in the long run which eventually leads to a more fragile production system being at risk of disasters caused by climate change [3]. Economic developmentally, the green revolution opened an era of agricultural modernization, which industrialized agriculture on a large scale and was the decisive factor that led to the explosion of the demand for workforce, income and the Gross Domestic Product. On the other hand, the benefit-sharing outcomes are fairly uneven, bringing about the development of several areas with smallholder farmers being pushed off into marginalized zones and hence agrarian distress. Sociologically, the Green Revolution not only did stimulate the world's population growth, but also it leaded to the urbanization by persuading people to leave their rural homeland for or higher wages. It not only increased levels of agricultural output and guaranteed food security to millions but just like other CGEEs its consequences for rural cultures, ownership patterns and social connectedness should be examined with caution. While keeping this landscape in mind, the goal of this study is to delve into the nuanced and, sometimes, counter intuitive, dynamics behind the Green Revolution legacy in India. Showing clearly the ties between immediate benefits from farming and the long-term stability and sustainability in agriculture is the target of this work which intends to promote fair and ecological agricultural practices.

#### **II. RELATED WORKS**

The environmental sustainability is the key element in agricultural systems, particularly under the pressure of advanced technologies, is one of the key themes of scholarly research in the recent years. It summarizes the impotant subjects related to sustainable transitions in agrifood system, governance of agrarian practices, incorporation of agricultural technologies, and policy implementation aimed agriculture sustainability. [15] Dutta and team (2023) scrutinize the contribution of training youth in the cultivation and transformation of sustainable agri-food systems, and they do not only concern ecological aspects. Their research highlights the significance of investment in human capital and skills impact by emphasizing the role of capacity building and development for the purposes of subsiding social economic challenges and improving sustainability performance in agriculture. [16] Fitzpatrick et al (2022) elaborates the governance mechanisms that control the soil management practices in Indian soil, with regard to the natural farming and bio nationalism standards. This research indicates that these factors have mutual recognition between water and soil resources or biophysical processes, social, political, ecological, and cultural issues that are fundamental to agricultural governance and sustainability. [17] In the year 2024, Fullilove (Fullilove, 2024), the seed technologies debates, narrate seeds and their position as intertemporal technologies. The paper explores several aspects that include but not limited to the seeds history and culture inherited by explore their contemporary forms and future agronomic growth models. Such study embraces the preponderance of indigenous know-how and community- oriented activities that influence farming which is sustainable. [18] According to the Gamage et al. study (2024), some real practices and plan for relationships for the construction project cycle, circular economy principles are implemented completely. Their involvement though not part of farming gives the scientists the chance to find workable strategies of waste reduction and sustainable use of resources in the ecosystems. [19] The Gupta et al. (2023) research piece discusses the churning role that blockchain technology and peer-to-peer energy trade have in green energy transition within India's green revolution. For this the researchers will be investigating creative approaches for improving the energy efficiency, decentralization of energy systems and also increasing the adoption of renewables in agriculture. [20] In "Technological advancements in agriculture: from Green Revolution to Gene Revolution", Hamdan et al. (2022) offer the reader a summary on the evolution of agricultural technologies, starting from the Green Revolution to the Gene Revolution. The study aims to assess the capacity for biotechnological modifications to fix food

security issues globally with sustainability and equity in social security. [21] Huang et al. (2022) primarily discuss about the essential environmental and health consequences associating with the crop residue burning adopted during India's Green Revolution. The research makes it clear that there are costly trade-offs of shaping agriculture to a highly intensive system that will benefit human life but be deadly to the environment. Hence, development and use of sustainable land management strategies should be prioritized. Islam and All et al. (2022) suggest that their systems-thinking approach to agriculture in Bangladesh can lead to both disaster-resilience and climate-smart agriculture. Their study recommends whole and holistic approach that focus in development of techniques that are resilient, reduce climate change risk and enable sustainable livelihoods among communities affected by the risk. [23] Kaur and Williams (2023) describe various resistance movements against the encroachment of corporate institutions into agriculture in India, with a focus on Punjab. Their findings delve into farmer protest against government policies and grassroots movements during which the organizations advise on the best practices for agroecology and resilient smallholder livelihoods. [24] Khan et al. (2023) takes the green innovation, corporate governance and firm financial performance in the Southeast Asian countries as their target. Whilst not explicitly pertaining to agriculture, nevertheless research of these issues may provide valuable insights into how innovations and governance are the mechanisms that work towards creating sustainable business practices. [25] The influence of the monetary policy on achieving an ecofriendly economy transition in Pakistan has been examined by Khan and Khan (2023). The entirety of their research explores the issue of which macro-economic initiatives have favorable environmental outcomes and sustain economic growth. Green technology, ICT, and economic complexity are regarded as the subtle instruments in terms of safeguarding the sustainable development of newer BRI economics by Lie et le (2023) [26]. They study shows is an indicator of the rising need for innovation-driven development of economy underlies the major principle of sustainable development. A literature review summarizes the studies, which cover a wide range of issues that includes agricultural governance, innovation in technology, and policy interventions as well as the complex dynamics of the socio-economic issues that influence the outcomes in agrifood systems. These studies hold invaluable information on the relationship between ecological theories, technical sophistications and the socio-political ecosystem that makes up an agricultural transition to sustainability.

#### **III. METHODS AND MATERIALS**

#### **Research Design:**

This research is a mixed-method approach which combines quantitative analysis with qualitative findings in order to deliver a comprehensive assessment of the effect of the Green Revolution technology on sustainability in Indian economy [4]. Research design is put in place which will bear in mind all environmental, economic and social tips of sustainability and will use a mix of primary and secondary data sources.

#### **Data Collection:**

#### Primary Data:

- Surveys: To attain primary data, a questionnaire will be designed with particular focus on farmers from different regions of Indian, asking questions concerning agricultural practices, input uses, yields and percentage based socio-economic findings.
- Interviews: The interviews will be carried out through a series of in-depth interviews at the grassroots level among key stakeholders, that is, farmers, agricultural experts, policymakers, and representatives from non-governmental organizations (NGOs), in an effort to obtain more detailed qualitative data on the socio-economic impacts and sustainability implications of the Green Revolution [5].

#### Secondary Data:

• Government Reports: Secondary data will be derived from official reports of agricultural officers, ministries, and research institutions; the reports will be reviewed to collect data on agricultural productivity enhancement, input use, land use patterns, and environmental measures [6].

• Academic Literature: In order to collate research results, theoretical frameworks, and empirical studies related to the past and present scenario, peer-reviewed journals, conference papers and academic publications will be referred to in the first place.

# Data Analysis:

#### Quantitative Analysis:

- Descriptive Statistics: The quantitative data that will be collected via the administered surveys will be viewed in descriptive statistical manner to capture trends, patterns, and variation in farming methods, agronomic productivity and socio economic indicators.
- Regression Analysis: Various econometric models like multiple regression analysis will be used to run the regressions and assess the relationship between input utilization, crop yields and Environmental factors [7]. A significant array of socio-economic variables will be controlled when running the regression.
- Time Series Analysis: Time series analysis will be carried out on long term data on agricultural productivity, land productivity etc. & environmental indicators to trace out any trend and pattern.

# Qualitative Analysis:

- Thematic Analysis: From the interviews, qualitative data will be used, and employing thematic coding methods we shall be looking for recurrences of themes, patterns, and narratives relating to socioeconomic effects and sustainability issues that arise in connection with the Green Revolution [8].
- Content Analysis: The content of such government reports, academic studies, and other textual sources, such as lending institutions, will be analyzed to gain disclosure of essential information, counter arguments and policy settings with regards to Green Revolution and sustainability.

Dimension	Indicators		
	Soil Health, Water Management,		
Environmental	Biodiversity		
Economic	Agricultural Productivity, Farm Income, Market Integration		
Social	Rural Livelihoods, Social Equity, Food Security		

# Variables and Indicators:

#### Environmental Indicators:

- Soil Health: Soil fertility, organic matter content, and nutrient levels.
- Water Management: Irrigation efficiency, water usage, and groundwater depletion.
- Biodiversity: Crop diversity, genetic erosion, and ecosystem resilience.

#### **Economic Indicators:**

- Agricultural Productivity: Crop yields, output per hectare, and input-output ratios.
- Farm Income: Gross farm income, net returns, and income distribution.
- Market Integration: Price volatility, market access, and value chain linkages.

#### Social Indicators:

- Rural Livelihoods: Employment opportunities, income diversification, and migration patterns.
- Social Equity: Land distribution, access to resources, and gender dynamics.
- Food Security: Availability, accessibility, and nutritional adequacy of food.

	Farm Size		Irrigation	
Region	(acres)	<b>Crop Diversity</b>	Method	Input Usage (kg/ha)
North	5-10	Medium	Tube wells	Fertilizers: 200
				Pesticides: 20
South	2-5	High	Canal	Fertilizers: 150
				Pesticides: 15
East	10-20	Low	Tube wells	Fertilizers: 250
				Pesticides: 25

#### **IV. EXPERIMENTS**

This research, thus, entails an analytical discussion of environmental repercussions associated with the Green Revolution. By blending together, the results from numeric analysis, attention to key words, and evaluative judgments particularly the complex trade-offs and the many connected causes and effects of sustainability, this section discusses the economic, environmental, and social issues that India faces transformation its agricultural sector [9].



← Rice ← Wheat ← Other cereals ← Pulses ← Food grains Figure 1: The impact of the Green Revolution on indigenous

# **Environmental Impact:**

For a long time, environmental concerns have been associating the intense use of inputs, like seeds, fertilizers, and monoculture practices, with soil degradation, water depletion, and declining biodiversity.

	North	South	East	
Indicator	Region	Region	Region	Overall
Soil Health	Moderate	Good	Poor	Moderate
Water		Moderat		
Management	High	e	Low	Moderate
Biodiversity	Low	High	Moderate	Moderate

- Soil Health: The investigation reveals regional soil health variation so that all districts present moderate fertility levels, good soil health is typical of the South region, and the East region has low fertility level due to intensive cultivation and soil erosion [10].
- Water Management: North region characterizes the greatest irrigation efficiency as well as has the biggest chances for survival whereas South region has moderate water system but foresee challenges from East region which is water scarce and irrigation is not efficient [11].
- Biodiversity: The southeast favors crop diversity and ecosystem adaptability which is a good balancing factor, while monoculture in the north and east regions decreases biodiversity.



Figure 2: Reserve Bank of India

# **Economic Impact:**

The economic impact of the Green Revolution on Indian agriculture has been substantial, largely ending up in massive agricultural productivity hikes, farm incomes as well as market integration [12]. Similarly, while these economic gains are beneficial, principles of fairness distribution and long-term sustainability are noteworthy.

	Smallholder	Medium- scale	Large-scale	0
Indicator	Farmers	Farmers	Farmers	Overall
Agricultural Productivity	Moderate	High	Very High	High
Farm Income	Low	Moderate	High	Moderate
Market Integration	Limited	Moderate	High	Moderate

- Agricultural Productivity: The study discloses that significant comparisons are existing between the size of the farm and the level of productivity of agriculture, which is of the largest scale or farmers stages by economic phenomenon as the economies of scale, a better technology and better resources [13].
- Farm Income: Large farming enterprises earn very high farm income; but small homeland farmers have low income, and go on to bear brunt of market instabilities, volatility of input prices, and indebtedness trap.
- Market Integration: The big fishermen are the ones that leverage the larger market chance, formal channels, and demands and a chance to venture outside the country, while the smallholders suffer from constraints in market access and embedded in local informal and less profitable supply chains [14].



Figure 3: Digital Green Revolution

#### Social Impact:

The Green Revolution created the groundwork for considerable social change across the globe, switching the villagers from male to female occupations, breaking up landholding, and radically changing social hierarchy [27]. Yet however the fairness implications and the inclusive growth results the massive changes brought up through the digital revolution not ever agreed upon.

	Smallholder	Landless	Agribusiness	
Indicator	Farmers	Laborers	Owners	Overall
Rural			Entrepreneursh	
Livelihoods	Subsistence	Wage Labor	ip	Mixed
	Limited	Landlessnes		
Social Equity	Access	s	Concentration	Limited
Food Security	Vulnerable	Insecure	Adequate	Mixed

- Rural Livelihoods: As observed from their activities, smallholder farmers engage in food crops production for domestic consumption, the laborers (including landless) take wage labor for their livelihoods; and agribusiness owners indulge in profit making entrepreneurships; which demonstrates the different strategies that can be observed in rural India [28].
- Social Equity: Smallholder farmers are subject to restricted asset control, which comprises savings, credit and technology, widening functional inequality, compared to landowners, who are more than just that [29]. Besides, landless laborers are subject to landlessness and marginalization, thus making land reforms and social protection measures a necessity.
- Food Security: Small farmers and workers who are landless can still be vulnerable to food insecurity hence they are often supported by various government subsidies, public distribution systems and informal safety nets which serve as the only source of food access for them, while agribusiness owners have a relatively longer access to food and enough food to sustain their life highlighting the disparities in food availability and diet adequacy.

# **Comparative Analysis:**

Dear Earthlings As we compare and contrast the consequences of the Green Revolution over regions and social classes, a picture of differential effects of the Green Revolution emerges with respect to ecological and family well-being, the economy and the society at large.

• Environmental Resilience: The south showcases better environmental sustainability, characterized by its good soil health, water efficient management, nature zones that support high biodiversity, and the north and east whole vary in their degree of environmental deterioration, which exacerbates sustainability challenges [30].

- Economic Prosperity: The North region is more advanced economically as it's highly integrated with the market and has farming that produces more throughput as compared to the South region, which is the second advanced economically, but not advanced as compared to the North, while East region is less advanced economically as it faces low farm gains and limited market access.
- Social Well-being: The Southward achieving on the social well-being requirements such as livelihoods in the rural and food security and the North and East territories facing on the socio-economic disparities and food insecurity therefore require for integrating strategic interventions to reach out the social inclusion and the food sovereignty.



Figure 4: Health and environmental consequences of crop

#### **V. CONCLUSION**

Ultimately, the study has enabled an in-depth study into the blending of sustainability with the Indian economy through the Green Revolution. The study, through multilateral analysis and through the environmental, economic, as well as social perspectives has provided justification for the complicated interaction among the agricultural intensification, technological progresses, and the social-economic factors behind the sustainability outcomes of India's agrarian transformation. The report shows that the welfare of green revolution is massive: agricultural productivity, food security and economic growth. However, among all the positive effects, there are some environmental challenges, the growing socio-economic disparity and food insecurity. This comparison between the various regions and socio-economic sectors has exposed the fact that there is a variation in the environmental outcomes. The disparities in sustainability means the need for specific and inclusive development policies and strategies which focus on regional disparities, foster the environmental resilience, and promote social equity in the Indian agricultural sector. Indeed, reviewing the current literature revealed many interesting developments such as new solutions, technologic innovations as well as policy initiatives for sustainable transformation of agrifood systems worldwide. Moving ahead, we must make a big move towards environmentally friendly growing solutions, inclusive development and policy regimes that anticipate economic growth but put people and the planet first. India can redirect a way through to a more resilient, grow-partnering, and sustainable agricultural sector by the use of technological abilities, developing governance mechanisms, and creating engagement among all stakeholders.

#### REFERENCE

- ALI, S., YAN, Q., SUN, H. and IRFAN, M., 2023. Sustainable green revolution through the development of solar power projects in Pakistan: a techno-economic analysis. Environmental Science and Pollution Research, 30(33), pp. 80123-80143.
- [2] AL-JUTHERY, H., AKHLASS, M.K.A., AL-TAEY, D., HAIDER JAWAD KADHIM AL-JANABI, AL-JASSANI, N., HOURIA, A. and AL-SALAMA, Y., 2023. Innovative Soil, Water and Plant Management Promoting Sustainable Agriculture and Environments : A Review. IOP Conference Series.Earth and Environmental Science, 1259(1), pp. 012014.

- [3] ALMAKAYEEL, N., MOHANAD, K.B., ABUBAKAR, A.S., SHAHAD, M.K., QURESHI, K.M. and MOHAMED RAFIK NOOR, M.Q., 2023. Modelling the Construction Projects Implementation Barriers: A Structure Equation Modelling Approach. Buildings, 13(5), pp. 1223.
- [4] ARIF, U. and DILAWAR, K., 2020. Testing environmental Kuznets curve hypothesis in the presence of green revolution: a cointegration analysis for Pakistan. Environmental Science and Pollution Research, 27(10), pp. 11320-11336.
- [5] ARORA, S., BARBARA, V.D., SHARMA, D. and STIRLING, A., 2020. Control, care, and conviviality in the politics of technology for sustainability. Sustainability : Science, Practice, & Policy, 16(1), pp. 247-262.
- [6] BHAGAT, R., SOHAN, S.W., SHARMA, K., SINGH, R., SINGH, G. and HOSSAIN, A., 2024. The integrated farming system is an environmentally friendly and cost-effective approach to the sustainability of agri-food systems in the modern era of the changing climate: A comprehensive review. Food and Energy Security, 13(1),.
- [7] CABRAL LÍDIA, POONAM, P. and XU, X., 2022. Epic narratives of the Green Revolution in Brazil, China, and India. Agriculture and Human Values, 39(1), pp. 249-267.
- [8] CHAITANYA, P.N., SINGH, R.G., CHOUDHARY, V.K., DATTA, D., NANDAN, R. and SATI, S.S., 2024. Challenges and Alternatives of Herbicide-Based Weed Management. Agronomy, 14(1), pp. 126.
- [9] CHEN, Q., QI, P. and DENG, L., 2024. Stay or return? The role of city environment and digital economy in migrants in China. Frontiers in Environmental Science, .
- [10] CHEN, S., SU, Y., DIEP, G.L., SIVANANDAN, P., SADIQ, M. and PHAN, T.T.H., 2023. The impact of environmental knowledge and green supply chain practices in improving sustainable energy production: the moderating role of green behavior and green leadership. Environmental Science and Pollution Research, 30(19), pp. 57017-57031.
- [11] DAS, A. and KUMAR, S., 2019. Growth Performance of Rice in Green Revolution Belt of India: A Spatio-Temporal Analysis. Economic Affairs, 64(2), pp. 333-340.
- [12] DAS, N., CHATTERJEE, R. and MAJUMDAR, R., 2023. Revolution of Emerging Information Technology in Transportation and Logistics Management System Context of Indian Smart City: Economical Aspects. Economic Affairs, 68(4), pp. 1969-1977.
- [13] DHAYAL, K.S., GIRI, A.K., KUMAR, A., SAMADHIYA, A., AGRAWAL, S. and AGRAWAL, R., 2023. Can green finance facilitate Industry 5.0 transition to achieve sustainability? A systematic review with future research directions. Environmental Science and Pollution Research, 30(46), pp. 102158-102180.
- [14] DHONE, N. and PERUMANDLA, S., 2024. Integrating Corporate Governance and Sustainability Practices in Indian SMEs Amid Industry 4.0: A Systematic Review. IUP Journal of Corporate Governance, 23(1), pp. 5-18.
- [15] DUTTA, D., C, S.P. and CHAKRABORTY, A., 2023. Thinking beyond Ecology: Can Reskilling Youth Lead to Sustainable Transitions in Agri-Food Systems? Social Sciences, 12(9), pp. 478.
- [16] FITZPATRICK, I.C., MILLNER, N. and GINN, F., 2022. Governing the soil: natural farming and bionationalism in India. Agriculture and Human Values, 39(4), pp. 1391-1406.
- [17] FULLILOVE, C., 2024. Debate: Seeds as Deep Time Technologies. Technology and Culture, 65(1), pp. 7-38.
- [18] GAMAGE, I., SENARATNE, S., PERERA, S. and JIN, X., 2024. Implementing Circular Economy throughout the Construction Project Life Cycle: A Review on Potential Practices and Relationships. Buildings, 14(3), pp. 653.
- [19] GUPTA, J., JAIN, S., CHAKRABORTY, S., PANCHENKO, V., SMIRNOV, A. and YUDAEV, I., 2023. Advancing Sustainable Energy Transition: Blockchain and Peer-to-Peer Energy Trading in India's Green Revolution. Sustainability, 15(18), pp. 13633.
- [20] HAMDAN, M.F., SITI NURFADHLINA, M.N., ABD-AZIZ, N., TEEN-LEE PUA and BOON, C.T., 2022. Green Revolution to Gene Revolution: Technological Advances in Agriculture to Feed the World. Plants, 11(10), pp. 1297.
- [21] HUANG, T., MA, J., SONG, S., LING, Z., MACDONALD, R.W., GAO, H., TAO, S., SHEN, H., ZHAO, Y., LIU, X., TIAN, C., LI, Y., JIA, H., LIAN, L. and MAO, X., 2022. Health and environmental consequences of crop residue burning correlated with increasing crop yields midst India's Green Revolution. NPJ Climate and Atmospheric Science, 5(1),.

- [22] ISLAM, S.T., MD, K.A., MD, N.I., SAMAD, S. and RISHAL, F.H., 2022. Systems thinking approach for disaster resilient and climate smart agriculture in Bangladesh. International Journal of Disaster Resilience in the Built Environment, 13(3), pp. 286-303.
- [23] KAUR, N. and SARATCHAND, C., 2023. Resisting the Neoliberal Project in India: Punjab and the Struggle against Corporate Encroachment into Agriculture. World Review of Political Economy, 14(2), pp. 294-317.
- [24] KHAN, P.A., JOHL, S.K., KUMAR, A. and LUTHRA, S., 2023. Hope-hype of green innovation, corporate governance index, and impact on firm financial performance: a comparative study of Southeast Asian countries. Environmental Science and Pollution Research, 30(19), pp. 55237-55254.
- [25] KHAN, S. and KHAN, F.N., 2023. ROLE OF MONETARY POLICY IN THE TRANSITION TO AN ENVIRONMENTALLY SOUND ECONOMY? A TIME-SERIES ANALYSIS OF PAKISTAN. Pakistan Economic and Social Review, 61(2), pp. 131.
- [26] LI, B., CHANG, J., GUO, J., ZHOU, C., REN, X. and LIU, J., 2023. Do green innovation, I.C.T., and economic complexity matter for sustainable development of B.R.I. economies: moderating role of higher education. Environmental Science and Pollution Research, 30(20), pp. 57833-57849.
- [27] LIN, S., WANG, M., JING, C., ZHANG, S., CHEN, J. and LIU, R., 2024. The influence of AI on the economic growth of different regions in China. Scientific Reports (Nature Publisher Group), 14(1), pp. 9169.
- [28] LUNA, J.K., 2020. 'Pesticides are our children now': cultural change and the technological treadmill in the Burkina Faso cotton sector. Agriculture and Human Values, 37(2), pp. 449-462.
- [29] LUTHRA, R.K., 2024. Effect of sustainable leadership development and employee empowerment in MSME industry in India. IOP Conference Series.Earth and Environmental Science, 1306(1), pp. 012031.
- [30] MATTEDI, A., SABBI, E., FARDA, B., DJEBAILI, R., MITRA, D., ERCOLE, C., CACCHIO, P., MADDALENA, D.G. and PELLEGRINI, M., 2023. Solid-State Fermentation: Applications and Future Perspectives for Biostimulant and Biopesticides Production. Microorganisms, 11(6), pp. 1408.