

Nombre de la actividad: Sustentaciones Orales Trabajo Final Proyecto de Investigación

Curso: Proyecto de Investigación

Docente: Gina Hincapié Mejía

Programa: Ingeniería Ambiental

Objetivos de la actividad: Divulgar por medio de presentaciones orales los trabajos finales de los proyectos de investigación de Ingeniería Ambiental

Productos a divulgar: Resúmenes de las ponencias

Proceso: Docencia

La ejecución y socialización de proyectos de investigación constituyen un eje fundamental en la formación académica de los estudiantes, especialmente en las etapas iniciales de su trayectoria científica. En el curso *Proyecto de Investigación*, las presentaciones orales permiten no solo comunicar de manera rigurosa y coherente los avances obtenidos, sino también fortalecer competencias esenciales como la argumentación, el pensamiento crítico, la capacidad de síntesis y la apropiación conceptual. La presentación y discusión pública de las propuestas favorecen la reflexión colectiva, enriquecen el proceso investigativo y ofrecen oportunidades para recibir retroalimentación pertinente que contribuye a la mejora continua del trabajo.

Los resúmenes que se presentan a continuación sintetizan los principales objetivos, fundamentos teóricos y metodológicos, así como los resultados de las propuestas desarrolladas por los estudiantes. Su lectura permite apreciar la diversidad de intereses investigativos, el compromiso con la construcción de conocimiento y la consolidación de competencias que serán determinantes en el ejercicio profesional y académico futuro.



Analysis of the effect of biofertilizers with arbuscular mycorrhizal fungi and mountain microorganisms on lavender (*Lavandula angustifolia*) and cubanelle pepper (*Capsicum annum*) crops.

#### **Student Names**

Daniela Alexa Ramírez Yepes  
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#### **Course Teacher**

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#### **Abstract**

The growing global demand for food underscores the urgent need to adopt sustainable agricultural practices that reduce dependence on chemical fertilizers and minimize their negative environmental impacts. Within this context, research was conducted to analyze the impact of two biological treatments—arbuscular mycorrhizal fungi (AMF) and mountain microorganisms (MM)—on the development of *Capsicum annum* L. (Cubanelle pepper) and *Lavandula angustifolia* (lavender), with the aim of evaluating their viability as biofertilizers. The analysis was carried out in Envigado Antioquia, using a randomized experimental design, introducing three treatments (AMF, MM, and AMF+MM) plus a control group. Various factors were measured, including plant height, aboveground and root biomass, leaf count, and soil electrical conductivity. The results revealed that



the AMF+MM combination generated a notable synergistic effect on plant growth, promoting nutrient uptake and physiological efficiency. Furthermore, a decrease in soil electrical conductivity was observed, along with a growth pattern that prioritizes strengthening the root system. These results support the idea that biofertilization with microbial consortia is a viable and sustainable strategy for improving agricultural productivity, reducing the need for chemical inputs, and promoting the transition to resilient agroecological systems.

**Keywords**

Biofertilization, arbuscular mycorrhizal fungi, mountain microorganisms, agricultural sustainability, plant symbiosis.



## Análisis de estrategias de aprovechamiento de subproductos de plantas de tratamiento residual municipal con enfoque de economía circular

*Analysis of Strategies for the Utilization of By-products from Municipal Wastewater Treatment Plants with a Circular Economy Approach*

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**Abstract:** The global context is marked by a concern for the sustainability of all available natural resources, which is why wastewater treatment emerges as a critical proposal in the environmental field at both international and local levels. Although treatment plants (WWTPs) are essential for water treatment, to safeguard the environment and public health, they generate by-products that are normally considered waste. However, these by-products harbor significant materials in resource recovery and the creation of added value related to the circular economy.

Through this project, a detailed analysis of by-product utilization strategies in municipal WWTP at the municipal level from a global context, adopting the available circular economy models. Hence, best practices result with the use of available technologies to transform all that matter into valuable resources, minimizing the environmental impact that comes from them, and maximizing sustainability with the production of biogas, the recovery of nutrients in the agricultural sector, and construction materials; the foregoing being evaluated in environmental, economic, and technical feasibility.

**Keywords:**

Municipal Wastewater Treatment Plant, Waste Management, By-product Utilization, Circular Economy.



Fe accumulation in leaf tissue and soil were evaluated using analysis of variance (ANOVA) with Statgraphics Centurion software.

- **Results and conclusions:** Treatments inoculated with *Rhizophagus fasciculatus* showed significant improvements in Fe translocation and tolerance to high iron concentrations compared to not inoculated treatments. These results suggest that *Zea mays L. saccharata*, in association with HMA, has high potential for the phytoremediation of Fe contaminated soils, contributing to ecological restoration and sustainable management of degraded soils.

Keywords: soil contamination; sweet corn; mycorrhiza; nutrient; remediation.





# Environmental Strategies and Circular Economy: A Systematic Review of Sustainability Indicators in Corporate Management

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Thematic Advisor: Carlos Fidel Granda Ramírez

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## Abstract:

Sustainability has emerged as a key pillar in both business and social spheres, driven by the growing need to balance economic development with environmental preservation and social well-being. This study analyzed the importance of sustainability in companies, identifying their main strategies, indicators, and reporting methodologies to promote a more sustainable development model. To achieve this, a systematic literature review was conducted using academic databases such as Scopus, ScienceDirect, EBSCO, Springer Nature Link, and Mendeley. Search equations were applied with key terms related to sustainability, circular economy, GRI indicators, and sustainability reports. Articles and doctoral theses published between 2015 and 2025 were analyzed, selecting those that addressed the impact of sustainability within the business environment. The results show a significant growth in academic production on sustainability, with an emphasis on the circular economy and transparency in corporate reporting. Moreover, GRI indicators and IFRS standards have gained greater relevance in measuring corporate sustainability performance. This study provides an understanding of how organizations can integrate sustainable strategies to improve competitiveness and contribute to environmentally responsible development.

## Keywords:

Circular economy, sustainability indicators, environmental strategies, corporate governance, GRI, ESG, sustainable development, reporting, circular models, sustainability assessment.



XXVI SEMANA DE LA FACULTAD

# ARQUITECTURA E INGENIERÍA

DEL 10 AL 14 DE NOVIEMBRE





**Abstract:**

This project evaluated water treatment processes, coagulation-flocculation, activated carbon filtration and catalytic ozonation with hydrogen peroxide for the removal of contaminants present in wastewater from the cosmetics industry. This wastewater contains a wide variety of substances that are difficult to degrade and cannot be completely eliminated by conventional physicochemical and biological treatments. Therefore, the application of an advanced oxidation process allowed for more effective removal of these compounds. The effect of adding oxidizing agents, such as ozone and hydrogen peroxide, as well as their combined application, was analyzed. The data obtained were analyzed using ANOVA through Duncan's mean difference. The results showed that applying the ozonation process resulted in a 54% removal of COD; however, when hydrogen peroxide was added, no statistically significant differences were observed. On the other hand, in control 2, which only contained hydrogen peroxide, the treatment was found to be less effective in the absence of ozone, as it only achieved a 4% removal rate.

**Keywords:**

**Keywords:** Advanced oxidation processes, Cosmetics industry, Emerging contaminants of concern, Hydrogen peroxide Ozone, Personal care products.



## Evaluation of the allelopathic effect of *Mentha sp.* and *Artemisia vulgaris* on the invasive species *Thunbergia alata*.

### Student Names

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### Abstract:

Invasive species, such as *Thunbergia alata*, pose a problem for ecosystems by causing biodiversity loss. Despite efforts to eradicate them manually and through the use of herbicides, these methods have been ineffective due to their rapid adaptation to environmental conditions and high reproduction rate. In this context, the present study seeks to establish a biological control alternative for this plant through allelopathy. To this end, the effect of aqueous extracts of the aromatic plants *Mentha sp.* and *Artemisia vulgaris* in proportions of 1:50, 1:20, and 1:10 on in vitro and substrate germination was evaluated. The results of the trials indicate that the treatments with *Mentha sp.* and *Artemisia vulgaris* did not exert an allelopathic effect on the germination of *T. alata* seeds, as no statistically significant differences were obtained between the treatments used and the control.

### Keywords:

Poet's eye, secondary metabolites, biodiversity, biological control, introduce species.