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Research Abstracts



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ANALYSING THE IMPLICATIONS OF THE 2021 AMENDMENTS TO WHO AIR QUALITY GUIDELINES FOR PM_{2.5}

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PM_{2.5} pollution has been considered the most hazardous air pollutant to human health. It impacts the respiratory system, causing *inter alia* acute lower respiratory diseases, lung cancer and chronic obstructive pulmonary disease. It can also cause problems related to the cardiovascular system, such as ischemic heart disease and stroke. While there has been a decrease in the PM_{2.5} concentrations in the past few years, the annual concentration of this pollutant in Malta is more than twice the Air Quality Guideline set by the WHO. According to the latest scientific information, this guideline represents the threshold at which PM_{2.5} attributed mortalities would decrease substantially. Through this study, mortalities attributed to PM_{2.5} have been estimated, and emission reduction requirements were explored. Population data from the National Statistics Office, mortality data from the Directorate for Health Information and Research, and air pollution data from the Environment and Resources Authority were used to establish the mortalities that could be attributed to PM_{2.5} in 2019 using the WHO's AirQ+. Following this, emission inventory projections for 2025 and 2030 were used to model two pollution scenarios for 2025 and 2030. This exercise shows that the limit value proposed by the European Commission in its revision of the Ambient Air Quality Directive (10 µg/m³) can be achieved only if the contributions of the natural sources (sea salt and Saharan dust) are deducted. Mortalities were again estimated for both 2025 and 2030, and a slight percentage decrease in mortalities was estimated (respectively ~7% and ~19%). However, the decrease in mortalities would be far more significant in a scenario in which the 5 µg/m³ Air Quality Guideline is reached (63.16%). Given that Malta would not be able to reach the AQG or the European Commission 2030 limit, stricter environmental regulations need to be adopted both on a national front and an EU-wide front. Furthermore, more effective pollution control measures need to be implemented.

Keywords: PM_{2.5} pollution, mortality, air quality guideline, emission reductions

COMPARING WATER POLLUTION LEVELS IN VARIOUS IRRIGATION SOURCES USED FOR AGRICULTURE AROUND DIFFERENT LOCATIONS IN THE MALTESE ISLANDS

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This project aimed to compare water quality in different Districts of Malta and assess the water sources used for agriculture. Water samples were analyzed to identify potential contaminants and classify the districts by water quality. The study also examined the impact of water quality on agricultural practices and farmers' concerns. The findings provide insights into water quality, its impact on agriculture, and the perspectives of farmers. The study focused on variables such as pH, electrical conductivity, chlorides, and nitrates, which are crucial for crop selection and irrigation. Thirty-six samples were collected from the six districts defined by the National Statistics Office. Borehole water emerged as the primary irrigation source, followed by rainwater and spring water. Illegal boreholes and strict control systems were identified as issues. Drip irrigation was the most common irrigation method used, offering efficiency and water conservation. Market gardening and potatoes were found to be the most water-intensive crops. The study also revealed variances in organic farming practices. Some water quality issues reported by farmers, included salinity and high nitrate levels. Corrective measures were noted. pH and conductivity analysis showed variations in different water sources. Rainwater had lower conductivity and chlorides compared to borehole and spring water. Nitrate pollution was a major concern, with most samples exceeding the EU limit. Correlation analysis highlighted relationships between conductivity, chloride, nitrate, and pH. Principal Component Analysis provided insights into sample clustering based on water source and region. Overall, the project provides information for improving water quality and better agricultural sustainability in Malta.

Keywords: water quality, irrigation, agriculture.

POLLEN CHARACTERIZATION OF HONEY FROM *APIS MELLIFERA RUTTNERI* AND *APIS MELLIFERA BUCKFAST*: A CASE STUDY FROM MALTA

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Melissopalynology is an important field of study that focuses on the evaluation of pollen found in honey. Since these pollen grains vary in structure, this method of analysis can identify the parent vegetation, ultimately shedding light on the foraging trends or plant preferences of the honeybees (*Apis mellifera*). Despite its importance, limited literature exists on the Maltese islands regarding the vegetation preferred by the endemic honeybee, *Apis mellifera ruttneri*, leading to an absence of conservancy. The constant hybridisation and importation of other honeybees, such as *Apis mellifera buckfast*, have also accelerated its endangerment status. This study has found the similarities and lack thereof between the foraging preferences of the two *Apis mellifera* subspecies residing in Wardija, by analysing 18 honey samples. A standard extraction procedure was used to prepare the samples for microscope analysis for the purpose of pollen identification and quantification. Following this, the pollen was then characterized using principal coordinate analysis (PCoA). It was found that the subspecies foraged on similar floral families, namely Fabaceae and Asteraceae, but differ at the vegetation-type level. The *ruttneri* honeybees showed a preference for *Hedysarum*-type flora while the *buckfast* had high counts of *Vicia sativa* and *Lotus*-type flora, and overall had a higher number of pollen grains in their honey. The latter subspecies showed a lot more clustering than the endemic kind, suggesting that their overall flora selection was not as varied. This research has only provided pollen trends found in honey obtained from one area during one season, therefore further studies would need to be conducted to confirm these findings.

Keywords: honey characterisation, *Apis mellifera buckfast*, *Apis mellifera ruttneri*, pollen

MAPPING THE SMALL-SCALE EXTENT OF *POSIDONIA* MEADOWS IN ĊUMNIJA AND ANCHOR BAY

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Seagrass meadows are vital components of marine ecosystems, providing numerous ecological services, acting as a foundation for a healthy marine habitat. This study aimed to map out seagrass meadow coverage in Ċumnija and Anchor Bay whilst also acting as a proof of concept for future studies attempting to map out seagrass across the Maltese coast. The study employed remote sensing techniques, including satellite imagery, geographic information systems (GIS) and machine learning algorithms, to identify and delineate seagrass meadows in the target bays. Field validation was also conducted through underwater surveys and drone surveys to confirm the presence of seagrass and assess the accuracy of the remote sensing results. The results demonstrated the feasibility of utilizing remote sensing techniques to map seagrass coverage, achieving an accuracy of 65-70% based on ground-truthed data from 2022. The results indicated that out of a total area of 435,400 m² in both bays, 65% consisted of bare sand and 35% was covered with seagrass. Temporal analysis for seagrass coverage, although less successful due to the absence of ground-truthing data, provided insights on seagrass populations achieving an accuracy ranging from 55-60%. The results showed that there was no major change in seagrass populations across the 7-year period analyzed. There were various limitations encountered throughout the study which will need to be tackled in future bathymetric classification attempts. With the aims achieved, this study can serve as a foundational reference and methodology for mapping seagrass along the Maltese coast, while future research can address the encountered limitations.

Keywords: *Posidonia oceanica*, satellite imagery, remote sensing, machine learning, field validation

THE RELATIONSHIP BETWEEN ABIOTIC FACTORS AND BIODIVERSITY AT SALINA NATURE RESERVE

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Salina Nature Reserve (SNR) is a network of disused salt pans that hosts a variety of flora and fauna that create an ecosystem suitable for local and migratory avifauna. Salinas have become increasingly important as they serve as alternative habitats for wetland birds. SNR is a prime example of a saltern system in the Maltese Islands that is also officially managed as a bird sanctuary. Despite its importance as a bird reserve, there is very limited knowledge regarding the site and its ecosystem. Therefore, the main aims of this project were to examine the correlation between biodiversity and the abiotic gradients at SNR and to generate baseline data for successful environmental management of the site and establish a foundation for future research. To achieve these aims, data collection began in July 2022 and finished in April 2023. The abiotic factors were characterized in terms of the pan properties, including surface area and distance from the sea, as well as water quality, including water temperature, salinity, pH and nitrate and phosphate concentrations. The biota selected for the study was phytoplankton and this was characterized through phytoplankton density. The main finding of the study was the statistically significant correlation between water temperature and phytoplankton density. This means an increase in water temperature resulted in an increase in phytoplankton density, thus producing a seasonal trend. Increases in salinity generally lead to a decrease in phytoplankton density. In this study, however two of the pans having a very high salinity also had a high phytoplankton density. Moreover, the study found that the coloration of water within the pans was caused by a high phytoplankton density. No significant correlations were identified between phytoplankton density and pH, nitrate and phosphate concentrations respectively. This project has generated baseline data which could be further developed and researched in future studies and will also benefit the management of SNR.

Keywords: Salina Nature Reserve, water quality, phytoplankton, environmental management, avifauna

INVESTIGATING PRECIPITATION TRENDS ACROSS THE CENTRAL MEDITERRANEAN REGION

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In recent years, precipitation patterns have been fluctuating due to climate change. Therefore, this study focused on analyzing precipitation trends in the central Mediterranean region. Six weather stations were examined and the analysis covered the period up to 2022. The study specifically looked at two climatic indices, namely Total Monthly Precipitation (PR) and the Number of Wet Days ($R > 1\text{mm}$) at both annual and seasonal scales. To ensure data quality, data was gathered from various sources and was checked for accuracy. Statistical methods were applied to determine the significance of the precipitation trends. A confidence level of 90% and a significance level of 0.1 were chosen for the analysis. Detecting trends proved challenging due to data homogeneity and therefore uncertainties still persist. However, clear evidence emerged of decreasing trends in both precipitation indices during the spring and winter seasons. In contrast, statistically significant increasing precipitation trends were observed for both indices during summer and autumn. From an annual perspective, the $R > 1\text{mm}$ index showed an increasing trend while the PR index indicated a decreasing trend in most stations, although some of these trends were not statistically significant. Overall, the study concluded that climate change is impacting the central Mediterranean region, resulting in drier winters and wetter summers. Given the high variability of precipitation, the study highlights the importance of regularly examining long-term climatic trends and recommends further exploration of precipitation patterns in the central Mediterranean. This information can provide valuable insights for scientific assessments and policy-making by relevant authorities.

Keywords: precipitation, trends, weather, central Mediterranean region, climate change.

EVALUATING URBAN LANDSCAPE QUALITY OF BIRŻEBBUĠA

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Malta's status as a signatory of the European Landscape Convention along with the increase in urbanisation observed in Malta underscore the need for improved planning. This study analyses urban landscape quality (ULQ) in Birżebbuġa (Malta), using an Urban Landscape Quality Index (ULQI) and a survey regarding resident perceptions. The study revealed spatial variations in landscape quality, indicating the positive influence of green spaces and general lack of abandoned buildings along with negative impacts including buildings under construction and lack of cycling infrastructure. The findings reveal ~70% similarity between resident perceptions and observation results, with perception-based data showing more negative results than that of the observation exercise. Thematic analysis of open-ended survey questions indicated that issues of governance, overdevelopment, inadequate green spaces, and poor waste management as the factors that negatively affect urban landscape quality. Overall ULQ was found to vary across the locality. The rankings of neighbourhoods by ULQ produced near-identical results between the observation exercise and the survey (only one neighbourhood differed in its order between the two rankings), with both methods concluding that the neighbourhood of Tal-Papa has the highest ULQ while the neighbourhood of San Ġorġ has the lowest ULQ. The study recommends future research on pollution levels in the locality, the quality of green/open spaces, and residents' perceptions of governance. Despite limitations in sample size and subjectivity, the ULQI methodology proves effective in assessing urban landscape quality in Birżebbuġa. The research contributes insights into the current state of urban landscape quality and illustrates a foundation for improving urban landscape quality in Malta. Replicating the study with representative sample sizes and involving multiple researchers would enhance the accuracy of findings. With some fine-tuning, this research can act as a resource for future initiatives targeting the enhancement of ULQ throughout the Maltese Islands.

Keywords: urban landscape quality, urban planning, quality of life, Birżebbuġa

CORPORATE SOCIAL RESPONSIBILITY: A CASE STUDY OF LAW FIRMS IN MALTA

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Corporate Social Responsibility (CSR) has become increasingly popular in company reporting, with many organizations adopting CSR strategies and publishing annual reports documenting their actions. This study focuses on the uptake of CSR in Maltese law firms, as there is currently no data available on CSR practices in this sector within the country. The aim of this research was to understand the barriers and incentives for CSR in Maltese law firms; it was conducted through interviews and questionnaires with relevant personnel. The findings show that the size of the law firm is related to its approach to CSR, notably the number of projects undertaken. There are several incentives for CSR implementation, including: societal impact, employee welfare, environmental responsibility, public relations, talent attraction, and cost savings. Law firms in Malta participate in comparable CSR efforts, with charity donations and pro-bono work being the most common. While differentiation may be created by participating in one-of-a-kind projects that are in line with the firm's principles. The study emphasizes the need for a better understanding of the importance of CSR in order to encourage more law firms to engage. The study's findings give insights into the motives for implementing CSR practices and can help Maltese law firms overcome implementation difficulties. Policymakers can benefit from greater knowledge of the barriers to CSR adoption in order to establish campaigns that promote socially responsible behavior. Further study is recommended to delve deeper into the hurdles and motivations, as well as to broaden CSR adoption in the legal profession and across other corporate sectors.

Keywords: pro-bono work, environmental responsibility, incentives, social return on investment

SATELLITE-DERIVED BATHYMETRY FOR SELECTED SHALLOW MALTESE COASTAL ZONES

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Bathymetric data acquisition has become paramount to manage and operate coastal regions effectively. The conventional method of conducting in-situ bathymetric surveys through the use of echo sounders is inadequate in shallow water environments and entails considerable logistical expenses. Conversely, lidar mapping offers a proficient approach to surveying coastal regions. Nonetheless, this entails substantial financial expenses for data acquisition. Contrastingly, satellite-derived bathymetry (SDB) represents a more cost-effective approach to surveying coastal areas, although exhibiting a lower resolution level. This study combines all three of these techniques to achieve accurate bathymetric depth data of three pocket beaches, Golden Bay, Ghajn Tuffieħa Bay and Ghadira Bay, located in the Maltese archipelago. An empirical pre-processing workflow for estimating SDB was developed through the use of collected in-situ depth measurements and satellite data acquired from Google Earth Engine. Four separate machine learning algorithms namely, random forest, k-star, multilayer perceptron, and linear regression, were tested on Golden Bay and Ghajn Tuffieħa Bay, each of which produced varied depth accuracies through the calibration of SDBs with depth values derived from alternative techniques. K-star provided the most accurate predicted depth values, followed by random forest, multilayer perceptron and linear regression which produced the least accurate results. The predicted depth outcomes were also spatially visualized using maps, providing a better understanding of the variation in depth both temporally and between the different algorithms. Additionally, Ghadira Bay was used to validate the previous results. Thus, this study offers an understanding of the level of accuracy attainable in determining depths of shallow coastal areas using SDB methods.

Keywords: Maltese Islands, satellite-derived bathymetry, machine learning algorithms

ANALYSING FOOD INSECURITY AMONG UNDERGRADUATES AT THE UNIVERSITY OF MALTA

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Food insecurity is a lack of consistent access to adequate nutritious food - a global concern with significant health implications. Vulnerable populations, including university students, are particularly at risk. This research project aims to analyze the prevalence of food insecurity among undergraduate students at the University of Malta. It also focuses on identifying contributing factors, understanding the impacts on physical and mental health as well as academic performance, and exploring coping strategies. Limited research exists on food insecurity among undergraduate students in southern European countries, highlighting the need for this study which has employed a mixed-methods explanatory design to investigate students' experiences of food insecurity. Data was collected through questionnaires, focus groups and interviews. Online questionnaires allowed for efficient data collection, whilst focus groups provided a deeper understanding of participants' perspectives on food insecurity. Semi-structured interviews were also conducted with university personnel to gather additional insights. Data analysis involved statistical techniques using IBM SPSS for quantitative data and thematic analysis using NVivo software for qualitative data. Findings show that several students experience some degree of food insecurity due to financial challenges, time constraints and limited food options. Lack of proper food intake negatively affected the undergraduates' mental health, social interactions and academic performance. University resources including the Food Bank, Student Solidarity Fund and counselling services, were recognized as strategies to tackle the problem of food insecurity among undergraduate students. It was noted that greater promotion of these services is necessary to raise awareness among those unaware of their availability and who would benefit from utilizing them.

Keywords: food insecurity, University of Malta, undergraduate students

MONITORING *CERATONIA SILIQUA* L. POLLEN IN MALTA

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Climate change will impact different interconnected global systems; therefore, it is important to monitor indicators of these changes in order to further understand and predict the implications of climate change. Plants being known bioindicators, may phenologically be altered in response to climate change, and thus have been one of the subjects of climate change research. Aerobiology has been a growing interdisciplinary field that may be utilized to monitor the phenological changes through monitoring pollen season and concentrations. The carob tree, *Ceratonia siliqua*, being native to the Mediterranean, has certain adaptations that may allow it to be more resistant to changes that will be further exacerbated by climate change. With interests in the species contributing to sustainable development in the region, monitoring its phenological changes would be beneficial for the carob industry. This project investigated the pollen season and concentration of *C. siliqua* and aimed at contributing to the limited aerobiological research in Malta. This was done through utilizing the Burkard trap, alongside passive capturing and ground truthing. The results obtained shows that the carob season for Autumn 2022 in the region was from 2nd of October to the 21st of November. Furthermore, *C. siliqua* pollen concentrations showed poor correlations with the meteorological parameters, namely mean temperature, precipitation, relative humidity and wind speed. However, long-term data would be required as several other factors were not considered. This results from this project can be used as a baseline for future aerobiological research on *C. siliqua*, in order to understand the impact that our changing climate will have on the species.

Keywords: carob, *Ceratonia siliqua*, aerobiology, pollen calendar, Malta

AN EVALUATIVE SNAPSHOT OF THE MARINE SOUNDSCAPE FOR MALTA: A STEPPINGSTONE TOWARDS ACHIEVING 'GOOD ECOLOGICAL STATUS'

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The issue of low-frequency underwater noise pollution has only recently started to gain significant recognition and awareness within the scientific community, with research unveiling the consequent plethora of behavioral and physiological implications caused to marine wildlife as a result of the masking in marine mammals. The lack of long-term data on continuous, low-frequency underwater noise emissions, predominantly generated from shipping activity, is the primary underlying inhibitor in achieving 'Good Ecological Status' of European waters, a principal target conceptualized by the Marine Strategy Framework Directive (2008/56/EC). With the projected increase in shipping activity, the blue economy, and consequently underwater noise pollution, exposure of marine fauna to this pollutant will exacerbate. The complete absence of a regulatory framework addressing low-frequency underwater emissions across the Maltese territorial waters is the reason behind Malta's inability at meeting the MSFD's goal by 2020. To address this disparity in national data, this research utilizes digital signal processing and Automatic Identification Systems (AIS) data to provide a preliminary, investigative groundwork on the national marine soundscape. This is done by analyzing snapshots of audio data collected from Ċirkewwa and the Valletta Grand Harbor between 2020 and 2022. To further contextualize the findings of this research, a general comparative analysis is conducted using the results of this study and data from similar works conducted in the Gulfs of Catania and Gdańsk. The resultant noisy marine environments of Ċirkewwa and the Grand Harbor, as revealed through this research, warrant urgency for the generation of national comprehensive regulations and monitoring systems to alleviate the poor state of the Maltese marine soundscapes.

Keywords: Underwater noise pollution, shipping noise, Marine Strategy Framework Directive, Good Ecological Status, Maltese Islands, Automatic Identification Systems.

USING CLIMATE CHANGE PROJECTIONS TO ANALYSE THE IMPACTS ON MALTESE AGRICULTURE

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This research study examines the projected climate change (CC) impacts on agriculture in the Maltese islands for the years 2050 and 2070. These islands are located in the centre of the Mediterranean region and are recognised as a hotspot for CC. The study utilizes predicted changes in regional precipitation and temperature obtained from the World Climate Research Program (WCRP). Furthermore, six of the Coupled Model Intercomparison Project phase 5 (CMIP5) models that address two Representative Concentration Pathways (RCPs) as provided by the WorldClim database, were employed. By employing statistical analysis and Geographic Information System (GIS) software, the study attempts to demonstrate that CC is expected to have detrimental effects on local Maltese agriculture. By evaluating the predictions of Global Circulation Models (GCMs), this study provides a robust assessment of the potential impacts of bioclimatic and physical factors on Maltese agriculture. Regardless of the RCP scenario considered, the findings suggest that the projected increase in temperature and reduction in precipitation will have significant effects on local agricultural productivity.

Keywords: Maltese Islands, agriculture, climate change, CMIP5, temperature, precipitation

EXPLORING ENGAGEMENT WITH INDOOR NATURE AMONGST APARTMENT DWELLERS IN MALTA

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The aim of this study was to explore the engagement of apartment dwellers in the urbanized Northern Harbor District (NHD) of Malta with indoor plants. The objectives include exploring the importance of indoor plants, identifying the drivers and limitations of indoor gardening, and examining the impact of different types of greenery on human-nature connection. An embedded mixed methods design was utilized, with a mainly qualitative approach using semi-structured interviews, and a complementary quantitative questionnaire distributed to adults residing in apartment buildings in the Northern Harbor District of Malta. Interview results were analyzed through thematic analysis, while questionnaires provided additional information on drivers and levels of engagement. Thematic analysis revealed that participants found gardening beneficial to their well-being and this helped them feel connected to nature. Participants expressed various motivations for indoor urban gardening, including aesthetic value, improving air quality, and the desire to care for something living, as well as mitigation for living in a heavily urbanized context. Drawbacks included dealing with insects and finding someone to care for plants when travelling. The study also examined the role of nature connectedness and found no significant correlation between nature connectedness scores and characteristics of indoor gardening. Future research could explore whether the presence of plants or the act of gardening itself provides psychological benefits, as well as comparing engagement with indoor nature in the NHD to other districts with green spaces.

Keywords: indoor plants, urbanised, Malta, nature connectedness, well-being

RESTORATIVE POTENTIAL OF GREEN AND BLUE SPACES ON THE EXAMPLE OF THE MALTESE ISLANDS

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Urbanization increasingly threatens the experience of nature and its benefits. This study explores the restorative benefits of nature, focusing on the relative influence of green and blue spaces on attention repletion and was conducted in three phases. The first phase comprised a stratified survey of 369 undergraduate students at the University of Malta, assessing predicted restoration of selected green, blue, and built environments. The survey also measured nature connectedness and mental fatigue. The second phase assessed restoration in the same environments through field experiments. The final part of the study used Virtual Reality (VR) to compare simulated and real nature experiences. Results show that the green environment was generally most preferred and scored highest in terms of predicted restoration. However, the blue environment scored highest for the experienced restorative effects and seemed to produce the greatest improvement in attention task results. The comparison between predicted and experienced restoration yielded inconclusive results and should be further explored. Environmental characteristics influencing restoration were also identified, with these including a feeling of longing in green environments and the sensory experience, particularly sound, in blue environments. With regards to VR, this was generally considered insufficient to replace real nature. This paper argues for the need to protect existing green areas in the Maltese Islands, considering that blue spaces may not function as an alternative to the restorative experience.

Keywords: restoration; ART; mental fatigue; green spaces; blue spaces; virtual reality

INVESTIGATING THE LINK BETWEEN VOTING PATTERNS AND ENVIRONMENTAL BELIEFS IN MALTA'S GENERAL ELECTIONS

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Voting in western democratic states has been on the decline for the last several decades. There once was a time where Malta appeared immune to such trends, with near-universal voter turnout far surpassing even nations with mandatory voting. However, the last several election cycles have seen a sharp decline in turnout. At the same time, environmental issues and concerns have been on the rise, with metrics such as the Eurobarometer highlighting high levels of concern among the population. Although voting and political issues have been the subject of extensive study, especially with regards to socio-economic perspectives, the literature pertaining to investigating voting behavior and its relationship to environmental issues remains limited, while such work in the local context appears to be non-existent. This study collected data from the Maltese voting population on their voting behavior and environmental beliefs through the means of an online survey shared through social media. The data obtained was then analyzed through statistical correlation tests and regression models. Several methods of improvements are proposed, including improving the generalizability of the findings.

Keywords: voting behaviour; environmental concerns; general elections; online survey

INVESTIGATING THE DEGRADATION OF WASHED AND UNTREATED SALTY *POSIDONIA OCEANICA*, CAROB LEAF COMPOST, AND COMMERCIAL COMPOST IN A CALCAREOUS SOIL UNDER ANAEROBIC CONDITIONS

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The scope of this study was to analyze how different organic soil amendments affect the soil under anaerobic conditions. The trend of using commercial peat compost as a soil amendment has created a lot of environmental issues since it is imported from far away distances and its extraction requires the destruction of a vital habitat. In the Mediterranean, there is an abundance of *Posidonia oceanica* residues which wash ashore on beaches, and carob trees (*Ceratonia siliqua*) that naturally produce fertile leaf compost. These materials could potentially offer sustainable alternatives to the commercial peat compost. This study analysed the effectiveness of carob leaf compost (CLC), washed *Posidonia oceanica* (WPOC), untreated salty *Posidonia oceanica* (SPOC), and commercial peat compost (CPC) when added to calcareous soil under anaerobic conditions. The results indicated that CLC, WPOC, and CPC are all viable organic soil amendments, with WPOC showing to be the most suitable amendment in anaerobic conditions. While SPOC had poor parameters due to salt effects and high salinity, CLC demonstrated similar efficacy to CPC. This study highlights the potential of farmers and gardeners utilizing CLC and WPOC, as sustainable alternatives to CPC.

Keywords: *Ceratonia siliqua*, *Posidonia oceanica*, soil, sustainable organic amendments, anaerobic incubations.

INVESTIGATING THE EFFECT OF VARYING TEMPERATURES ON THE PHYTOCHEMICAL CONSTITUENTS OF MEDICINAL PLANTS FOUND IN THE MALTESE ISLANDS

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There has recently been a revival of interest in herbal medicine, and this has given rise to a demand for both additional information on the effects of these products as well as for ensuring that their shelf-life is lengthened. The availability and accessibility of the raw materials worldwide have prompted the World Health Organization to regard the provision of this information as critical. This research aimed at studying the effect of varying storage temperatures on the polyphenolic content of *Chiliadenus bocconei* Brullo, *Mentha spicata* L., *Ocimum basilicum* L. (basil) and *Petroselinum crispum* (Mill.) Fuss (parsley). The employed methodology makes use of the Folin-Ciocalteu test as a means to determine an approximate shelf-life via accelerated stability testing of the total phenolic content. The findings indicate higher preservation of the total phenolic content at lower temperatures, with stable trends visible until a maximum of 30°C. The resulting data indicated increased stability within the plant matrix of the *Chiliadenus Bocconei* Brullo, while for *Mentha spicata* L., the extracts presented higher stability. Basil extracts presented similar outcomes, however, samples kept at room temperature exhibited increased consistency. The same outcome was also observed for the parsley plant material. The UV-Vis profile was measured in order to assess long-term stability by analyzing the anthocyanin content within the species under study. Inconclusive results were obtaining from studies of the anthocyanin content, however further insight on the behaviour of these components at different temperatures was observed. Higher stability of the anthocyanin content was observed within the plant matrices, when compared to the plant extracts. Both phases of the method outputted relevant information about the behavior of different plant matrices with relation to polyphenolic preservation. Further studies may be required to further consolidate the obtained results and identify herb-specific metabolites as markers of shelf-life and stability.

Keywords: phytochemicals, herbal medicine, shelf-life



THANK YOU
FOR ATTENDING