PHILOSOPHY, POLITICS, AND PEDAGOGY IN THE CONTEXT OF *SOLANUM MELONGENA*: TOWARDS SUSTAINABLE EDUCATION AND MEDICINAL PRACTICES

Ekoh, L. A.[1]*; Eneh, C. A.[2]; Onyebuchi, G. C.[1]
[1]Department of Educational Foundations, Nnamdi Azikiwe University, Awka
[2]Department of Agricultural Economics, University of Nigeria, Nsukka
*Corresponding Author; Email: la.ekoh@unizil.edu.ng

Abstract

This study explores the role of the integrated-sustainable paradigm in enhancing global health, with a focus on the use of Solanum melongena (eggplant) in medicinal practices, education, and agriculture. The research highlights the philosophical, political, and pedagogical dimensions of integrating eco-philosophy, environmental ethics, and bioethics into the healthcare, agricultural, and educational systems, particularly within the Nigerian context. Through a comprehensive review of literature, the study discusses the potential of this paradigm to foster a more ethical and sustainable approach to human well-being by aligning human health with ecological integrity. The study also addresses the key challenges in implementing this paradigm, including economic inequalities, cultural resistance, and legal barriers. It presents actionable recommendations for policy reform, sustainable agricultural practices, educational reforms, and community engagement to ensure the successful integration of indigenous knowledge and medicinal plant use into national systems. By advocating for the recognition of traditional medicine, the ethical cultivation of medicinal plants, and the promotion of environmental sustainability, the study offers a pathway for improving health outcomes, promoting sustainability, and enhancing the quality of life for marginalized communities.

Keywords: Eco-philosophy, Environmental ethics, Bioethics, Traditional medicine

Introduction

The integration of *Solanum melongena* (eggplant) into sustainable education and medicinal practices is a critical yet underexplored area of research with significant potential to address global health and sustainability challenges. This study explores the role of *Solanum melongena* as both a food source and a medicinal plant, emphasizing its potential to contribute to healthier populations and sustainable agricultural practices, particularly within the context of African countries. By focusing on the philosophical, political, and pedagogical dimensions of *Solanum melongena*'s use, this research investigates how the plant can be integrated into educational systems and local health systems, with the aim of fostering both ecological health and biodiversity conservation.

Solanum melongena's nutritional and medicinal properties make it a valuable resource in combating pressing health challenges such as hypertension, diabetes, and inflammation (Silva et al., 2021). In African contexts, the plant has long been used in traditional medicine, yet modern educational curricula and health systems frequently overlook indigenous plants like *Solanum melongena* in favor of Western medicinal models. This oversight presents a significant gap in health education and sustainable agricultural practices. As such, this study addresses the role of *Solanum melongena* in promoting an integrated, sustainable paradigm that links food security, health, and education.

The relationship between nature, human health, and education has long been a subject of philosophical inquiry, with implications for both personal well-being and societal development. Over the past few decades, there has been a growing recognition of the need for sustainable agricultural practices that are not only environmentally responsible but also conducive to better health outcomes (Rizzo et al., 2024). Thus, this research aimed to answer several key questions: (1) How can *Solanum melongena* be effectively integrated into educational curricula in African countries to promote ecological health, biodiversity, and the use of traditional medicine? (2) What are the ethical and political implications surrounding the cultivation and use of this plant, particularly in relation to government policies, intellectual property rights, and agricultural regulations? (3) What pedagogical strategies can be employed to bridge the gap between indigenous knowledge systems and scientific education to foster more sustainable health practices?

In African countries, challenges such as inadequate healthcare infrastructure, dependency on imported medicines, and the erosion of traditional knowledge have hindered the sustainable use of indigenous medicinal plants like *Solanum melongena*. Government policies often prioritize industrial agriculture, which overlooks the ecological and health benefits of indigenous plants. In contrast, indigenous knowledge systems, which emphasize biodiversity and natural resource management, remain undervalued in formal education and health practices (Fiel'ardh et al., 2023; Eshete & Molla, 2021). This study analyzes how government policies and agricultural practices can be aligned with the potential of Solanum melongena to improve health outcomes while contributing to sustainable agricultural systems. Ethical considerations surrounding intellectual property rights and biopiracy are also addressed, emphasizing the importance of respecting local knowledge in the face of global commercialization of medicinal plants (Chen et al., 2016).

The concept of "sustainable education," a central theme in this study, refers to educational frameworks that integrate environmental stewardship, health promotion, and cultural sustainability (Anor, 2024). It involves cultivating an understanding of how ecological health, sustainable agriculture, and medicinal practices intersect to improve both human well-being and biodiversity (Kioupi & Voulvoulis, 2019). This study expands on this concept by illustrating how the integration of *Solanum melongena* into curricula could foster a more sustainable, locally relevant approach to health education.

Furthermore, the political dimensions of *Solanum melongena*'s use are explored through the lens of policy-making, agricultural regulation, and global debates around intellectual property rights. African governments face the challenge of balancing traditional agricultural practices with the pressures of global trade and modernization. By examining case studies of local initiatives and government policies, this study identifies both the challenges and opportunities for integrating Solanum melongena into national health strategies and educational systems.

In sum, this research offers a comprehensive analysis of *Solanum melongena*'s potential to contribute to both global sustainability goals and African health systems. By bridging the gap between indigenous knowledge and scientific practices, it underscores the importance of an integrated, sustainable approach to health, agriculture, and education. The findings of this study will not only add to the global discourse on sustainable health practices but will also provide actionable insights for policymakers, educators, and health practitioners seeking to promote more equitable and sustainable solutions to pressing health challenges.

Theoretical framework

This study is grounded in an interdisciplinary theoretical framework that draws on eco-philosophy, environmental ethics, and political ecology. Eco-philosophy offers a perspective on the interconnectedness of human beings and the natural world, emphasizing the need for sustainable practices that respect both ecological and human health (McManus, 2009). Environmental ethics provides a moral framework for considering the ethical implications of human interactions with nature, particularly in relation to the use of plants for medicinal purposes (Chatfield, 2018). Political ecology, on the other hand, focuses on the political and economic dimensions of environmental and health issues, highlighting the role of power dynamics, governance, and resource distribution in shaping practices around the use of medicinal plants (McManus, 2009).

The combination of these theoretical perspectives allows for a comprehensive understanding of the complex relationship between *Solanum melongena*, human health, and the environment. By examining the plant's role in traditional medicine, sustainable agriculture, and education, this framework enables a holistic analysis of the ethical, political, and pedagogical dimensions of its use. Moreover, the framework highlights the importance of integrating both indigenous and scientific knowledge systems in addressing contemporary challenges related to health, sustainability, and social justice.

Literature review

The use of medicinal plants, including *Solanum melongena* (eggplant), has a long and rich history in various African and Asian cultures, where it plays a vital role in health and wellness. Traditional knowledge has long recognized the medicinal properties of *Solanum melongena*, which is employed to treat a wide range of ailments such as hypertension, diabetes, digestive disorders, and inflammation (Han et al., 2021; Sun & Shahrajabian, 2023). These therapeutic applications are attributed to the plant's bioactive compounds, including alkaloids, flavonoids, and phenolic acids, known for their antioxidant, anti-inflammatory, and antimicrobial properties (Ibrahim et al., 2013). For example, research has shown that the plant's phenolic compounds, such as chlorogenic acid, exhibit strong antioxidant properties, which are critical in managing oxidative stress and inflammation linked to chronic diseases like diabetes and hypertension (Sun & Shahrajabian, 2023). While these pharmacological benefits are well-documented, many studies remain fragmented and often fail to integrate both scientific and indigenous knowledge systems (Kumar et al., 2015). This highlights a significant gap in the literature, pointing to the need for comprehensive studies that blend traditional practices with modern scientific approaches to strengthen the medicinal use of *Solanum melongena* within sustainable health systems.

In African contexts, the use of medicinal plants such as *Solanum melongena* is deeply intertwined with indigenous knowledge systems that prioritize holistic health approaches. These systems understand health not merely as the absence of disease but as a dynamic balance between the physical, social, and spiritual aspects of life (Ogunlesi et al., 2014). For example, in many African societies, the consumption of *Solanum melongena* is accompanied by other therapeutic practices such as ritual and prayer, underscoring the belief in interconnectedness between nature, spirituality, and health. However, modern education systems in Africa, influenced by Western medical paradigms, have largely sidelined these indigenous health practices, focusing instead on pharmaceutical approaches that disregard local ecological

knowledge. This educational disconnect limits the full potential of incorporating *Solanum melongena* and other medicinal plants into contemporary health systems, and it

underscores the urgent need for integrated-sustainable paradigms in both health and education (Meyer et al., 2017). The exclusion of indigenous knowledge from formal education not only diminishes the value of these plants but also creates a cultural and intellectual divide, which further marginalizes traditional healing practices in favor of industrialized health models.

Addressing these challenges requires the integration of indigenous knowledge with modern scientific education. Incorporating traditional ecological knowledge into educational curricula has the potential to enrich students' understanding of biodiversity, sustainability, and cultural heritage (Meyer et al., 2017). In particular, the inclusion of medicinal plants in science and health curricula can deepen students' appreciation for the role that plants like *Solanum melongena* play in maintaining human health and well-being. This approach can also foster a cross-cultural dialogue that encourages the blending of local and global perspectives on health and sustainability. More importantly, such an integration can lead to more inclusive and sustainable educational models that respect indigenous knowledge systems while acknowledging the contributions of modern science (Meyer et al., 2017). An integrated-sustainable paradigm would encourage local communities to apply both their indigenous knowledge and modern scientific methods to address contemporary health challenges in a way that is ecologically sound and culturally relevant.

From a philosophical perspective, the use of *Solanum melongena* and other medicinal plants raises significant ethical and environmental questions. An integrated-sustainable paradigm emphasizes eco-philosophy and environmental ethics, particularly concerning the moral implications of human intervention in nature. The use of medicinal plants for human benefit must balance ecological justice with sustainability. One key issue is the commodification of medicinal plants, which can lead to the exploitation of local communities and the erosion of traditional knowledge systems (Ghosh, 2015). The global pharmaceutical industry's increasing interest in the commercialization of plants like *Solanum melongena* raises concerns about biopiracy—where indigenous knowledge is used without proper compensation or acknowledgment (Sharma & Bedi, 2018). These ethical challenges highlight the need for policies that protect both local communities' rights and the ecological integrity of the plants they use for medicinal purposes. Moreover, the ethical dimension of using *Solanum melongena* extends to the potential risks and benefits of its use in modern health treatments. This study examined how the dual role of the plant—as a traditional and modern medicinal resource—can be ethically managed within an integrated-sustainable framework.

Politically, the cultivation and use of *Solanum melongena* are shaped by various factors, including government policies, agricultural regulations, and intellectual property laws. In many African countries, the lack of formal recognition for indigenous knowledge systems and the absence of policies that support the sustainable cultivation of medicinal plants hinder local communities' ability to fully harness the medicinal and ecological benefits of plants like *Solanum melongena* (Amusan et al., 2016). The dominance of cash crop agriculture and the marginalization of traditional food and medicinal plants exacerbate these challenges. For example, the shift toward monocultural cash crops in many African countries has led to the neglect of biodiversity and the loss of indigenous knowledge related to medicinal plants (Amusan et al., 2016). This creates a political tension between the economic pressures of modern agriculture and the sustainable use of local plant resources, which are integral to both community health and biodiversity conservation. This research explored how government policies can better support the cultivation and use of *Solanum melongena* by integrating indigenous knowledge and sustainable agricultural practices into national strategies for health and food security.

The integration of *Solanum melongena* into sustainable health practices also touches on the broader issue of biodiversity conservation. As global attention increasingly focuses on the role of biodiversity in human health, the preservation of medicinal plants becomes critical not only for their direct health benefits but also for their contributions to ecological sustainability. This is particularly relevant in Africa, where biodiversity is under threat from both overexploitation and climate change (Ibrahim et al., 2013). *Solanum melongena*, with its widespread use and medicinal potential, offers a unique opportunity to foster the conservation of both plant species and traditional knowledge systems. By promoting the sustainable cultivation of *Solanum melongena*, this study contributes to the broader global movement toward sustainable food systems and the conservation of medicinal plants.

Integrated-sustainable paradigm towards a healthier people

The concept of an integrated-sustainable paradigm for a healthier global population intersects with philosophical, political, and educational perspectives on nature, health, and sustainability. This paradigm advocates for a holistic approach that acknowledges the interconnectedness between human well-being, ecological integrity, and sustainable practices. This review examines the role of this paradigm in shaping societal approaches to sustainability and well-being, especially in the context of medicinal plants such as *Solanum melongena* (eggplant), and its implications for policies, education, and healthcare practices. By integrating ethical frameworks such as eco-philosophy, environmental ethics, and bioethics, this approach seeked to address the systemic barriers—economic constraints, cultural resistance, and policy gaps—that often impede the practical application of sustainable solutions.

Eco-philosophy and the interconnectedness of health and nature

Eco-philosophy offers a foundational perspective for understanding the relationship between human health and the natural world. This philosophical approach emphasizes that human well-being is intrinsically linked to ecological health, challenging anthropocentric views that prioritize human needs over environmental concerns (Naess, 1989). Instead, eco-philosophy proposes an ecocentric worldview, which recognizes the intrinsic value of nature and argues for its preservation as essential to the flourishing of all life forms. A key concept within eco-philosophy is *Deep Ecology*, which posits that human intervention in nature should be minimal, advocating for "biospheric egalitarianism" (Naess, 1989). This approach suggests that the conservation of biodiversity is not only crucial for species survival but also for maintaining the health and stability of ecosystems, which directly impact human health (Eckersley, 2013).

In the context of *Solanum melongena*, the conservation of this medicinal plant goes beyond preserving biodiversity; it supports the health of local communities that depend on it for medicinal purposes. Traditional knowledge systems often highlight the medicinal uses of plants like *Solanum melongena* to treat ailments such as hypertension and diabetes, which are prevalent in many low-resource settings (Cunningham, 2015). Thus, an integrated-sustainable paradigm rooted in eco-philosophy would advocate for the protection of such plants as part of a broader strategy to promote global health, particularly in regions where traditional medicine plays a central role in primary healthcare.

Sustainable practices: educational and eco-philosophy linkages

The integration of eco-philosophical principles into education plays a pivotal role in fostering sustainable societies. Education systems that embrace sustainability can equip future generations with the knowledge and skills needed to navigate the complex relationships between human health, the environment, and sustainability (Sterling, 2011). In particular,

curricula that emphasize environmental stewardship and ecological literacy encourage students to recognize the ethical responsibility humans have toward the planet (Fang, Hassan & LePage, 2023; WHO, 2013). Such educational frameworks can help foster a generation of individuals

who are not only aware of environmental challenges but also actively contribute to their resolution.

By incorporating eco-philosophy into educational systems, societies can promote a more sustainable and holistic approach to health. As an example, *Solanum melongena*—along with other medicinal plants—can be integrated into science and health education curricula, fostering a deeper understanding of the role plants play in health and well-being. In many African countries, where traditional medicine plays a significant role, this educational shift could enhance the appreciation and use of indigenous medicinal plants, which are often overlooked by modern healthcare systems. Therefore, an integrated-sustainable paradigm would advocate for curricula that not only teach the scientific basis of medicinal plants but also encourage students to explore the cultural, ethical, and ecological aspects of plant-based healthcare (WHO, 2013).

Ethical responsibilities and environmental ethics in sustainable practices

The ethical considerations associated with the integrated-sustainable paradigm are crucial to its implementation, particularly in the context of environmental ethics. This paradigm expands the moral scope of traditional ethics, which has often focused primarily on human interests, to include non-human entities, ecosystems, and future generations (Callicott, 1999). In terms of medicinal plants like *Solanum melongena*, this expanded ethical framework calls for a more responsible and equitable approach to the use of natural resources. The principles of environmental ethics emphasize the need for ethical responsibility in how resources are used, and how human actions impact ecosystems.

This ethical perspective challenges the prevailing economic models that prioritize short-term profits over ecological and social sustainability. It also critiques exploitative practices in industrial agriculture, which often result in the degradation of both the environment and local health systems. For instance, the mass cultivation of cash crops, including monoculture systems, has led to the marginalization of medicinal plants and the erosion of traditional knowledge systems (Schippmann et al., 2006). An integrated-sustainable paradigm offers a counter-narrative by promoting the sustainable cultivation of medicinal plants, which can preserve biodiversity, reduce dependency on harmful synthetic inputs, and enhance soil health. The cultivation of *Solanum melongena* through agro-ecological methods provides an example of how sustainable agricultural practices can be a tool for both ecological and human health. Such practices can support local economies, provide smallholder farmers with income, and reduce the environmental impact associated with industrial agriculture (Cunningham, 2015).

Bioethics, intellectual property, and indigenous knowledge

The integration of bioethics into the discussion of medicinal plants highlights the importance of considering the ethical implications of using biological and medical resources (National Institute of Environmental Health Sciences [NIEHS], 2024; O'Mathúna, 2007). As bioethics emerged to address concerns over biotechnology and its effects on human dignity and the environment, its principles can be extended to the use of medicinal plants like *Solanum melongena* (NIEHS, 2024; O'Mathúna, 2007). Central to bioethics in this context are issues of equity, access to resources, and the protection of indigenous knowledge.

The practice of biopiracy, where pharmaceutical companies exploit indigenous knowledge without fair compensation, has sparked considerable ethical debates about intellectual property rights and the commercialization of natural resources. An integrated-sustainable paradigm addresses these concerns by promoting collaboration between indigenous

communities and the broader healthcare system, ensuring that local populations benefit from the commercialization of their natural resources (Beauchamp & Childress, 2019; Huntington, 2006). For example, ensuring that *Solanum melongena* is cultivated sustainably and its medicinal properties are acknowledged in global health systems would not only contribute to global health solutions but also protect the intellectual rights of indigenous communities. This requires robust policies that balance the needs for innovation in pharmaceuticals with the preservation of cultural heritage and ecological integrity (Sharma & Bedi, 2018; Barton & Pretty, 2010; Daly, 1990).

Political dimensions and systemic barriers to sustainability

The political and economic dimensions of the integrated-sustainable paradigm are complex and must be carefully considered to avoid reinforcing existing inequalities. In many low-resource regions, the lack of supportive policies for the cultivation and use of medicinal plants, including *Solanum melongena*, limits their potential to contribute to public health. Government policies often favor the cultivation of cash crops over traditional medicinal plants, leading to a loss of biodiversity and a disconnect between modern healthcare practices and indigenous knowledge (FAO, 2024; Amusan et al., 2016; Alves & Rosa, 2007).

To address these barriers, an integrated-sustainable paradigm must be supported by policies that not only promote the sustainable cultivation of medicinal plants but also ensure equitable access to resources and healthcare. This includes policies that recognize the importance of traditional medicine, incorporate indigenous knowledge into national healthcare systems, and safeguard intellectual property rights for local communities. Furthermore, addressing systemic barriers such as economic constraints and cultural resistance to traditional medicine is essential to the successful implementation of this paradigm. The integration of traditional knowledge into formal health systems, combined with the promotion of sustainable agricultural practices, can contribute to a more inclusive, equitable, and sustainable global healthcare system.

Implications for development: the role of an Integrated-sustainable paradigm in Nigeria's health, agriculture, and education

The integrated-sustainable paradigm offers a comprehensive framework for addressing global health and environmental challenges, particularly in Nigeria. By aligning human well-being with ecological sustainability, this paradigm highlights the critical intersection between health, nature, and education. In the Nigerian context, where economic inequalities, cultural resistance, and systemic barriers persist, adopting this model can lead to a more integrated approach to addressing the nation's health crises, especially in rural and underserved communities. Specifically, the paradigm underscores the importance of leveraging traditional knowledge, promoting the sustainable use of medicinal plants like *Solanum melongena* (eggplant), and fostering educational reforms to build a more sustainable and healthier future.

The Nigerian health system faces significant challenges, including limited access to quality healthcare, particularly in rural areas where traditional medicine remains central to primary healthcare. By integrating the use of medicinal plants, such as *Solanum melongena*, within formal healthcare systems, the country can bridge gaps in access to essential medicines. These plants, often underutilized by modern medicine, have the potential to treat common

ailments such as hypertension and diabetes, which are major health concerns in Nigeria (Cunningham, 2015). Furthermore, incorporating the sustainable cultivation of these plants within local agricultural systems can provide economic opportunities for smallholder farmers, addressing both food security and healthcare needs. However, for this approach to succeed, it

is critical to address the systemic barriers that often prevent the integration of traditional medicine into the national health framework, such as cultural resistance to modern healthcare and the lack of supportive policies.

The ethical dimensions of the integrated-sustainable paradigm are particularly important in the Nigerian context, where cultural traditions and indigenous knowledge play a significant role in health practices. The paradigm calls for a respectful, culturally sensitive approach to integrating indigenous knowledge into the formal healthcare system, ensuring that local communities benefit from the sustainable use of their natural resources. This includes protecting the intellectual property rights of indigenous communities and ensuring that the commercialization of medicinal plants like *Solanum melongena* benefits them equitably. In many cases, biopiracy, where indigenous knowledge is exploited without compensation, has been a barrier to ethical engagement with local communities (Huntington, 2006). Addressing these ethical concerns through policy reforms is essential to fostering trust and ensuring the long-term sustainability of this approach.

Additionally, the paradigm's emphasis on eco-philosophy and environmental ethics provides valuable insights into how Nigeria can promote ecological sustainability alongside health improvements. The over-exploitation of natural resources and the degradation of ecosystems have significant consequences for human health, particularly in marginalized communities that rely on natural resources for their livelihood. By integrating environmental ethics into policy and practice, Nigeria can promote more sustainable agricultural practices, such as organic farming and agroecology, which not only preserve biodiversity but also enhance soil health and support local ecosystems (Ume & Bahta, 2024; Schippmann et al., 2006). This approach would reduce the reliance on synthetic fertilizers and pesticides, which often harm both the environment and human health.

Conclusion and recommendations

The integrated-sustainable paradigm offers a promising pathway and viable model for improving Nigeria's health, agriculture, and education systems. By emphasizing the interconnectedness of ecological health, traditional medicine, and sustainable practices, this paradigm provides a holistic approach to addressing the Africa's most pressing challenges including health, sustainability, and ethical practices. Besides, by addressing the systemic challenges and barriers to implementation, and by fostering collaboration across sectors, Nigeria can move towards a more sustainable, equitable, and healthy future. Through thoughtful policy reforms, educational initiatives, and community engagement, the integration of medicinal plants and sustainable practices into Nigeria's healthcare and agricultural systems can contribute to the long-term well-being of both people and the environment. However, the successful implementation of this paradigm in Nigeria will require overcoming significant barriers, such as economic inequalities, cultural resistance to modern healthcare, and policy gaps.

To promote the paradigm's integration, the following actionable strategies are recommended:

1 **Policy reform for Traditional medicine**: The Nigerian government should prioritize the integration of traditional medicine into the formal healthcare system. This includes creating policies that recognize the role of medicinal plants like *Solanum melongena* in primary healthcare, providing guidelines for the ethical collection and use of these plants, and ensuring that indigenous knowledge holders are fairly compensated for their contributions.

2 **Sustainable agricultural practices**: The promotion of agroecology and sustainable farming techniques should be prioritized within agricultural policies. This includes supporting smallholder farmers in cultivating medicinal plants, providing technical support, and ensuring market access. Moreover, these policies should encourage biodiversity conservation and the sustainable use of natural resources to promote both ecological and human health.

3 **Education reforms**: Educational curricula should be restructured to emphasize environmental stewardship, ecological literacy, and the ethical use of medicinal plants. This could involve incorporating eco-philosophical perspectives into both science and health education, fostering a generation that understands the importance of sustainability in health practices. Additionally, the curriculum should address the ethical responsibilities of individuals toward the environment, encouraging future leaders to make decisions that benefit both people and ecosystems.

4 **Cultural sensitivity and community engagement**: To overcome cultural resistance, it is essential to engage local communities in the development and implementation of these policies. This involves working closely with indigenous knowledge holders to ensure that their practices are respected and integrated into national health and agricultural frameworks. Moreover, efforts should be made to raise awareness about the benefits of traditional medicine and sustainable agriculture, emphasizing their role in promoting health and well-being.

5 **Public-private partnerships for research and development**: Collaboration between the government, academic institutions, and private sector stakeholders should be encouraged to support research on the medicinal properties of plants like *Solanum melongena*. This would help validate their efficacy, promote sustainable cultivation practices, and ensure the commercialization of these plants is done ethically, benefiting local communities and preserving biodiversity.

Reference

Alves, R. R., Rosa, I. M. (2007). Biodiversity, traditional medicine and public health: where do they meet?. *J Ethnobiology Ethnomedicine*, 3, e14. https://doi.org/10.1186/1746-4269-3-14

Amusan, A. O., Akinmoladun, F. O., & Ogunwande, I. A. (2016). The medicinal plants of Africa: An overview. *African Journal of Medicinal Plants*, 12(*1*), 1-12.

Anor, C. E. (2024). Teaching Sustainability in Science Education: Pre-Service Science Teachers' Perceptions of the Role of Indigenous Knowledge. *African Journal of Research in Mathematics, Science and Technology Education*, 28(*3*), 373–388. https://doi.org/10.1080/18117295.2024.2402143

Barton, J., & Pretty, J. (2010). What is the best dose of nature and green exercise for improving mental health? *Environmental Science & Technology*, 44(*10*), 3947–3955.

Beauchamp, T. L., & Childress, J. F. (2019). *Principles of biomedical ethics (8th ed.)*. US: Oxford University Press.

Callicott, J. B. (1999). *Beyond the land ethic: More essays in environmental philosophy*. UK: SUNY Press.

Chatfield, K., Salehi, B., Sharifi-Rad, J., Afshar, L. (2018). Applying an Ethical Framework to Herbal Medicine. *Evid Based Complement Alternat Med.*, 1, e1903629. https://doi.org.10.1155/2018/1903629.

Chen, S.L., Yu, H., Luo, H.M., Wu, Q., Li, C., & Steinmetz, A. (2016). Conservation and sustainable use of medicinal plants: problems, progress, and prospects. *Chin. Med.,* 11, e37. https://doi.org/10.1186/s13020-016-0108-7

Cunningham, A. B. (2015). The role of medicinal plants in African health systems. *Medicinal Plant Conservation*, 9(*3*), 125-130.

Daly, H. (1990). *Steady-state economics: The economics of biophysical equilibrium and moral growth*. UK: Island Press.

Eckersley, R. (2013). *The green state: Rethinking democracy and sovereignty*. US: MIT Press.

Eshete, M.A., Molla, E.L. (2021). Cultural significance of medicinal plants in healing human ailments among Guji semi-pastoralist people, Suro Barguda District, Ethiopia. *J Ethnobiology Ethnomedicine*, 17, e61. https://doi.org/10.1186/s13002-021-00487-4

Fang, W. T., Hassan, A., LePage, B. A. (2023). Environmental Literacy. In: W. T. Fang, A. Hassan, B. A. LePage, *The Living Environmental Education: Sustainable Development Goals Series*. Singapore: Springer. https://doi.org/10.1007/978-981-19-4234-1-4

FAO (2024). *Understanding the relationship between agrobiodiversity and local knowledge*. Accessed from: https://www.fao.org/4/y5956e/Y5956E06.htm

Fiel'ardh, K.; Fardhani, I.; Fujii, H. (2023). Integrating Perspectives from Education for Sustainable Development to Foster Plant Awareness among Trainee Science Teachers: A Mixed Methods Study. *Sustainability*, *15*, e7395. https://doi.org/10.3390/su15097395

Ghosh, M. (2015). Ethics of traditional medicine and sustainable use of medicinal plants. *Journal of Bioethics*, 10(*3*), 175-186.

Han, M., Opoku, K. N., Bissah, N. A. B., Su, T. (2021). *Solanum aethiopicum*: The Nutrient-Rich Vegetable Crop with Great Economic, Genetic Biodiversity and Pharmaceutical Potential. *Horticulturae*, *7*, e126. https://doi.org/10.3390/horticulturae7060126

Huntington, H. P. (2006). Indigenous knowledge and bioprospecting: Globalising local knowledge or exploiting it? *Bioethics*, 20(*1*), 32-43.

Ibrahim, M. A., Bawadi, A. M., & Ahmed, M. (2013). Phytochemical screening and pharmacological properties of *Solanum melongena L*. *Journal of Ethnopharmacology*, 20(*2*), 312-317.

Kioupi, V., & Voulvoulis, N. (2019). Education for Sustainable Development: A Systemic Framework for Connecting the SDGs to Educational Outcomes. *Sustainability*, 11(*21*), e6104. https://doi.org/10.3390/su11216104

Kumar, P., Sharma, V., & Sharma, S. (2015). Phytochemistry and pharmacological potential of *Solanum melongena*: A review. *Asian Journal of Pharmaceutical and Clinical Research*, 8(*3*), 39-42.

McManus, P. (2009). Ecology. In: A. Kobayashi (ed.), *International Encyclopedia of Human Geography (Second Edition)*. UK: Elsevier. https://doi.org/10.1016/B978-0-08-102295-5.10007-1.

Meyer, M., & Kuehni, C. E. (2017). Education and traditional knowledge: Approaches for sustainability in Africa. *Sustainable Education Journal*, 15(*4*), 210-228.

Naess, A. (1989). *Ecology, community and lifestyle: Outline of an ecosophy*. US: Cambridge University Press.

National Institute of Environmental Health Sciences (NIEHS) (2024). *Bioethics*. Accessed from: https://www.niehs.nih.gov/research/resources/bioethics

Ogunlesi, T. A., Abubakar, I. S., & Akinmoladun, F. O. (2014). The role of traditional medicine in the health system of sub-Saharan Africa. *African Health Review*, 7(*3*), 127-135.

O'Mathúna, D. P. (2007). Bioethics and biotechnology. *Cytotechnology*, 53(*1-3*), 113-9. https://doi.org.10.1007/s10616-007-9053-8.

Rizzo, G., Migliore, G., Schifani, G., Vecchio, R. (2024). Key factors influencing farmers' adoption of sustainable innovations: a systematic literature review and research agenda. *Org. Agr.*, 14, 57–84. https://doi.org/10.1007/s13165-023-00440-7

Schippmann, U., Leaman, D. J., & Cunningham, A. B. (2006). Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues. *Botanical Conservation*, 13(*1*), 60-64.

Schippmann, U., Leaman, D. J., & Cunningham, A. B. (2006). Impact of cultivation and gathering of medicinal plants on biodiversity: Global trends and issues. *Botanical Conservation*, 13(*1*), 60-64.

Sen, T., Samanta, S.K. (2015). Medicinal plants, human health and biodiversity: a broad review. *Adv Biochem Eng Biotechnol.*, 147, 59-110. https://doi.org.10.1007/10_2014_273.

Sharma, R., & Bedi, S. (2018). Bioethics in traditional medicine: A review. *International Journal of Environmental Studies*, 71(*4*), 475-488.

Silva, G.F.P.; Pereira, E.; Melgar, B.; Stojković, D.; Sokovic, M.; Calhelha, R.C.; Pereira, C.; Abreu, R.M.V.; Ferreira, I.C.F.R.; Barros, L. (2021). Eggplant Fruit (*Solanum*

melongena L.) and Bio-Residues as a Source of Nutrients, Bioactive Compounds, and Food Colorants, Using Innovative Food Technologies. *Appl. Sci.*, 11, e151. https://doi.org/10.3390/app11010151

Sterling, S. (2011). *Sustainable education: Re-visioning learning and change*. US: Green Books.

Sun, J. W., Shahrajabian, M. H. (2023). Therapeutic Potential of Phenolic Compounds in Medicinal Plants-Natural Health Products for Human Health. Molecules, 28(4), e1845. https://doi.org.10.3390/molecules28041845.

Ume, C., Bahta, Y. T. (2024). Policy support strategies for organic farming extensification in Nigeria. *Org. Agr.*, 14, 323–344. https://doi.org/10.1007/s13165-024-00467-4

World Health Organization (WHO). (2013). *WHO Traditional Medicine Strategy 2014-2023*. Geneva: World Health Organization.