Manuscript ID:
IJEBAMPSR-2025-020506

Volume: 2

Issue: 5

Month: October

Year: 2025

E-ISSN: 3065-9140

Submitted: 05-Sept.-2025
Revised: 15-Sept.-2025
Accepted: 15- Oct.-2025
Published: 31-Oct.-2025

Address for correspondence:
Dr. Kavita Shrikant Vadrale
Assistant Director/Assistant Professor, Yashwantrao Chavan School of Rural Development, Shivaji University, Kolhapur (Maharashtra)
Email: ksv.ycsrd@unishivaji.ac.in

DOI: 10.5281/zenodo.17474055

DOI Link:
https://doi.org/10.5281/zenodo.17474055

Circular Economy in Horticulture: Case Studies on Value Creation and Sustainable Development

Dr. Kavita Shrikant Vadrale[1], Priyanka Tarapurkar[2]
[1]Assistant Director/Assistant Professor, Yashwantrao Chavan School of Rural Development, Shivaji University, Kolhapur (Maharashtra)
[2]Research Scholar, Department of Economics, Shivaji University, Kolhapur (Maharashtra)

Abstract

The paper discusses how adopting circularity principles in the horticulture sector benefits the plant and supports sustainable development. The study considered seven case studies from the Kolhapur and Sangli regions of Western Maharashtra, India, and attempted to identify the 3R practices adopted by these nurseries. The study calculated the derived monetary benefits to the plant by the reduce and reuse principle of circularity, and monetary benefits were calculated by considering the recycling principle. The study finds that the three R's are applied in all seven nurseries. Under the 3 R principles, water-reducing techniques, economic size of a tray for saplings, reducing the use of plastic, and saving energy through solar panels. These practices are observed under the 'Reduce' circularity principle. 'Reuse' circularity practices were identified in the area where waste trays were used for heating purposes, seedless sugarcane from sugarcane nurseries was sold to factories/jaggery plants/ farmers, coconut shells were used for plantation and sugarcane leaves were used for heat purposes, etc. Lastly, 'Recycle' activities are evident in compost making, such as using banana roots, a litter of rose plants, and sugarcane leaves, as well as replacing breakable drip pipes with new ones. The study concluded that all the nurseries' monetary benefits from recycling activities outweigh the derived benefits, and it reasonably creates monetary value for them either directly or indirectly through the 3R principles of circularity. In the case of Sustainable development, seven of the 17 goals are directly associated with this empirical study on the horticulture sector.

Keywords: *Circularity, Nursery, Horticulture, Business, Waste Management, Benefits and SDGs*

Introduction

The linear economic model heavily relies on the overexploitation of natural resources. It leads to environmental degradation and is not a sustainable production method in the long run. Conversely, the circular economy concept is an economic system that continuously repurposes resources to achieve sustainability, significantly reducing waste. A circular economy aims to achieve sustainability goals by using materials more efficiently and in a circular manner. Materials and products are used more intensively, for longer, and repeatedly in a circular business model than in a take-make-dispose linear model. Products and services undergo various lifecycle stages in a circular model, including extraction, production, use, and waste disposal. The circularity of resources boosts economic activity on one hand and environmental well-being on the other hand.

The concept of circularity, closely linked to the circular economy, refers to principles that extend beyond conventional manufacturing and waste management, encompassing a range of other fields. The idea focuses on avoiding waste & pollution, conserving materials and products, and restoring natural systems. Circularity requires going beyond mainstream linear business models and supporting an efficient use and a continuous flow of resources. The circularity principles can be applied to various fields, including agriculture, construction and architecture, fashion and textiles, technology and electronics, the food sector, energy, and waste management, among others. Relating to that, (Totok Hendarto**,** 2022**)** studied the creation of organic fertilisers through mangrove solid waste and leaf litter.

How to Cite this Article:
Vadrale, K. S., & Tarapurkar, P. (2025). Circular Economy in Horticulture: Case Studies on Value Creation and Sustainable Development. International Journal of Economics, Business, Accounting, Agriculture and Management Towards Paradigm Shift in Research (IJEBAMPSR), 2(5), 33–41. https://doi.org/10.5281/zenodo.17474055

(Rangel-Buitrago, 2019) assessed the application of circularity principles in marine litter. (Alan Murray, 2017) discusses the challenges of managing waste in the horticulture sector through a circular economy framework.

This paper aims to explore the circularity practices in the horticulture sector, with a focus on nurseries. Consequently, a nursery is a basic need for horticulture. Plant propagation techniques and practices are the core of horticulture nurseries. (Portal, 2024) The Indian horticultural sector plays a significant role in the country's economy, accounting for over 33 per cent of agriculture's Gross Value Added (GVA). It offers farmers more money, a variety of farm operations, and alternative rural employment possibilities. (Welfare, 2024) The paper discusses how adopting circularity principles in the horticulture sector benefits the plant and supports sustainable development. The balance of the paper is planned as follows: Section II reviews relevant literature, Section III provides data and methodology, Section IV discusses the benefits of adoption of circularity practices and how they support sustainable development based on empirical evidence, and Section V concludes with some implications of the results.

Review of Literature:

Numerous studies have explored the concept of circularity. Numerous studies have been reported in the literature, covering the various facets of the circular economy, its applications in various sectors, and its advantages. (Mauch, 2016) provides an overview of the concept of "zero waste" from various perspectives. According to the paper, actual zero waste is an illusion, and transitioning to zero waste requires the collaborative effort of all members of society. (Alan Murray, 2017) emphasizes the conceptualizations and origins of the Circular Economy, which involves redesigning processes and cycling materials, which may contribute to more sustainable business models. (Nathalie Gontard, 2018) discusses agricultural residue waste management and identifies the variety of waste uses and challenges associated with it. (Breda McCarthy A. B., 2019) describes the challenges of managing waste in the horticulture sector by implementing a circular economy to reduce food wastage. The study focuses on consumer behaviour and value-added strategies for transforming food waste in closing-loop food technology. Marine litter has existed for a very long time, but its effects on the environment have become more prominent, mainly due to the rapid rise in the use of plastics. (Rangel-Buitrago, 2019) finds solutions for marine litter. Circular economy stages were suggested as part of the mitigation solution.

(Elisa Chioatto, 2020) explained the circular business models through a product life cycle archetype and interviewed the eight firms in Emilia Romagna to assess the CE practices adopted by the firm. (Totok Hendarto**,** 2022**)** explained the circular economy strategies for mangrove waste in the mangrove nurseries. The study assessed the organic fertilisers combining the mangrove solid waste and leaf litter in agricultural fields. (Sara Rauf, 2024) presented organic horticulture as a sustainable and eco-friendly approach to agriculture. It highlighted the importance of certifications, market opportunities, soil management, and chemical-free pest control in promoting sustainable practices in agricultural horticulture. (Debarshi Mukherjee, 2024) the paper provides a comprehensive review of the literature on the impact of the horticulture industry (fruits, vegetables, and flowers) on the sustainable development of smallholder livelihoods. It identifies key factors and the potential of Agriculture 4.0 technologies to contribute to sustainable livelihood development in the horticulture sector. (Ellen Beerling, 2024) focusses on the elements to foster transfer and uptake of technologies and practices in circular horticulture. (Santosh D.T) It explained that innovation in horticulture is essential for sustainable growth. It also explained a unique pattern in agriculture in the special context of sustainable horticulture, which involves water management for long-term sustainability in the horticulture sector.

Materials and Methodology:

The study considered seven case studies from the Kolhapur and Sangli regions of Western Maharashtra, India, to assess the adoption of circularity principles in the horticulture sector. It attempted to understand; how circularity principles help sustainable development. Semi-structured interviews were conducted with the Nursery Plant Owner. The questionnaire covered the questions related to the 3R principles (Reduce, Reuse, and Recycle) of circularity adoption in the nurseries. The purposive sampling was used to identify the nurseries where the circularity practices are found. In-depth interviews were carried out with the respondents. By utilising the 3 R principles, the study estimates the monetary and derived-monetary benefits of circularity.

Three of the seven nurseries are dedicated to cultivating sugarcane alone, one to flowers, and the other three to mixed sorts of nurseries, such as those that cultivate bananas, tissue cultures, sugarcane, bamboo, teak, etc. The main objective of the study was to identify the three R practices that these nurseries adopted in their plants. Furthermore, using the circularity principles, the

primary goal is to determine the monetary and derived-monetary benefits for the plant. In the case of the first two principles, i.e. for Reduce and Reuse, we have calculated the monetary benefits on a derived basis wherever possible. For example, if the plants use waste trays to create heat rather than a new plastic sheet for heating purposes. In this case, the cost associated with the plastic sheet used for heating is saved. Therefore, the avoided cost of plastic sheets is considered a benefit to the plant. In this way, derived-monetary benefits were calculated wherever calculation was possible.

On the other hand, monetary benefits were calculated directly using the output generated through the recycling process. If nurseries produce compost using waste, then the value of the compost is considered a monetary benefit.

Empirical Evidences based on Case Studies:

The empirical evidence based on case studies was presented in four parts: Profile of the Nurseries, Areas of Circularity in the Horticulture Sector, Benefits of Circularity, and Association between Circularity and Sustainable Development.

Profile of the Nurseries

The brief profile of the nurseries comprises the type of plants in the nurseries, year of establishment, area of operation and employment generated. The operational age of every other nursery, with the exception of C7 nursery, is less than ten years. The area also varies from 30 guntha to 7 acres of land. The majority of nurseries specialise in sugarcane and contain a variety of species of sugarcane saplings, such as ASI18121, PDL15012, SMK 13374, etc. They use cocopeat for plant growth and sometimes calcium oxide (for creating heat), pesticides, and humic acid as fertilisers to improve soil properties and promote plant growth. A distinctive plant called C5 Nursery makes plantations out of coconut shells. Keralan coconut shells are purchased and used to grow tulip blossoms. About half of the workers in nurseries are employed full-time during the year, with some employees being hired in part at the busiest times of the year. Figure 1 provides the details of the nursery profile.

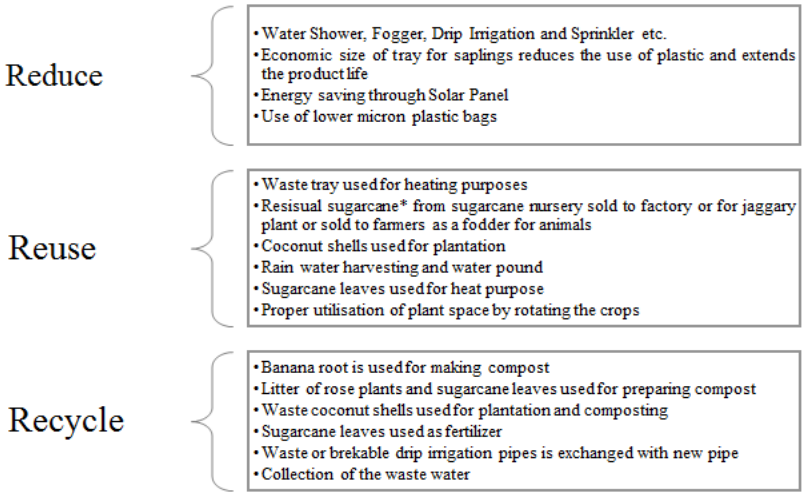
Figure 1: Description of the Nurseries

SN	Case Studies	Type of Plants	Year	Area	Employment
1	C1	Banana, Tissue Culture, Sugarcane, Bamboo, and Teak	2015	55 Guntha	17
2	C2	Sugarcane	2014	1.5 acre	13
3	C3	Sugarcane	2013	3 acre	08
4	C4	Sugarcane and Rose	2013	35 Guntha	12
5	C5	Tulip Flowers	2017	2 acre	10
6	C6	Sugarcane	2016	1.5 acre	14
7	C7	Banana, Saag and Bamboo	2002	7 acre	52

Areas of Circularity in the Horticulture Sector

The horticulture sector has an excellent potential for high productivity and recycling of water and nutrients. Consequently, an effort was made to identify potential circularity areas within the horticultural sector. The areas in which selected nurseries have employed circularity tactics are depicted in Figure 2

Figure 2: Areas of Circularity



Note: * After extracting the sugarcane buds for planting and the leftover stalk is known as residual sugarcane.

We have discovered that the three R's are applied in all seven nurseries. C2 Nursery does not produce large-scale compost. They burned the sugarcane litter, and the remaining waste was converted into compost as much as required in their plant. C5 Nursery has already been planted based on coconut shell waste. The waste generation is very meagre in the plant. The compost generated by coconut shells and flower litter is very small and used for their nursery only. Consequently, in this instance, the recycling concept is not applicable. Figure 3 displayed a pictorial representation of whether the plants in the nursery used the three R practices.

Figure 3: Application of 3 R Principles

SN	Case Studies	Reduce	Reuse	Recycle
1	C1	✓	✓	✓
2	C2	✓	✓	×
3	C3	✓	✓	✓
4	C4	✓	✓	✓
5	C5	✓	✓	×
6	C6	✓	✓	✓
7	C7	✓	✓	✓

Benefits of Circularity

Circularity has many advantages. These benefits are divided into two categories: monetary benefits of circularity through recycling and derived-monetary benefits of circularity through reduce and reuse. 'Reduce' in a circular economy refers to product design and utilisation, reducing the demand for inputs and lowering consumption and waste. (Mialy Andriamahefazafy, 2022) According to the (Institute, 2019) circularity leads to the reduction of greenhouse gas emissions, conservation of the environment, reduction of processing costs, reduction of processing time and associated costs, innovation and job creation encouragement etc. The monetary benefits of circularity, as determined by the reduce and reuse principle, are listed in Figure 4.

The study addressed the usage of circularity in nurseries, which helps reduce the quantities of plastic, water, energy, and other materials that plants use. We have used a derived method to calculate the monetary benefits wherever possible. For example, if the plants use waste trays to generate heat instead of utilizing a fresh plastic sheet for heating purposes. The expense related to the plastic sheet used for heating is eliminated. Each sheet is priced at around Rs. 600. If they had 32 plant beds, the whole cost amounts to Rs. 600 multiplied by 32, equating to Rs. 19,200, which constitutes a savings. Likewise, the monetary benefits were calculated. Reuse indicates resale, alternative use, repair and use, etc. Circular Business Models (CBMs) focused on Extended-Life Span Production are concerned with the design of long-lasting and high-quality products. The nursery-wise detailed description of approximate derived-monetary benefits of circularity is described in Figure 4.

Figure 4: Derived-Monetary Benefits of Circularity through Reduce and Reuse

Case Studies	Description	Amount
C1	▪ The old tray is used only thrice, but the reduced-size tray is used 7-8 times. ▪ The waste tray is used for heating purposes; it reduces the cost of plastic sheets, which are used for heating the plants. (Rs. 600*32=Rs.19200/-) ▪ Water supply through hand showers saves 25 per cent of water. The monthly use of water has reduced from 7,500 litres to 5,000 litres.	294000 19200 - **313200**
C2	▪ Water supply through sprinklers and hand showers saves 20 per cent of water. The monthly water use has reduced from 8000 litres to 6500 litres. ▪ The plant's monthly energy requirement is 250 units, and the solar panels generate 300 units of energy, which saves the plant's energy bill. ▪ The waste tray is used for heating purposes. (Rs. 600*32=Rs.19200/-)	- 24000 19200 **43200**
C3	▪ Water supply through hand showers rather than sprinklers reduces water usage from 3 lakh to 2.5 lakh litres, saving 20 per cent of water.	-

	▪ The solar panels generate 450 units of energy monthly, and their usage is around 420 units. This saves the plant's energy bill. ▪ The waste tray is used for heating purposes. (Rs. 600*64=Rs.38400/-) ▪ Water pound of 12 lakh litres storage capacity satisfies the 3-4 months' water requirement. ▪ Seedless sugarcane selling to the Jaggary Plant, Sugarcane Factory and Farmers.	30000 38400 - 210000 **278400**
C4	▪ Water supply through hand showers rather than sprinklers reduces water usage from 80000 litres to 65000 litres, saving 19 per cent of water. ▪ The waste tray is used for heating purposes. (Rs. 600*10=Rs.6000/-) ▪ Seedless sugarcane selling to the Jaggary Plant and Farmers.	- 6000 14000 **20000**
C5	▪ Water supply through Sprinklers and hand showers saves 20 per cent of water. The monthly water use has reduced from 10,000 litres to 8,000 litres. ▪ Coconut shells are used for plantation	- -
C6	▪ Water supply through hand showers rather than sprinklers reduces water usage from 13,000 to 10,000 litres, saving 23 per cent of water. ▪ The waste tray is used for heating purposes. (Rs. 600*20=Rs.12000/-) ▪ Wages of labour are exchanged with seedless sugarcane as fodder for animals. ▪ Nursery operated for 2-3 months only, and in the remaining months, other crops are cultivated.	- 12000 - - **12000**
C7	▪ Drip irrigation and hand showers for water supply reduce the amount of 15000 litres of water consumed daily. ▪ Collecting the 7000-litre wastewater in a well.	- -

Warana Biotech has reduced the size of the plastic tray. It used to be 16 inches by 1.8 feet and was capable of holding 40 plants; currently, it is just 4.2 inches by 1 feet and can hold 10 plants. The tray's strength was increased by its reduced size. It minimises the likelihood of trays breaking. A tray of the larger size is used three times, while a tray of the smaller size is used seven or eight times. The reduced tray size enhanced its strength, minimizing breakage and extending reuse cycles. Earlier, the nursery needed 70,000 trays a year; thus, the product life was nearly doubled with a smaller tray. Since the cost of one tray is Rs. 4.2 paisa * 70000 quantity, Rs. 294000/-is saved. With a solar panel installed, Siddhant and Bhumi Nursery save roughly Rs. 2000 & Rs.2500 per month on their energy bills and Rs. 24000 & Rs.30000 per year, respectively. Apart from this application, all nurseries used foggers, drip irrigation, sprinklers, and hand showers to reduce water usage.

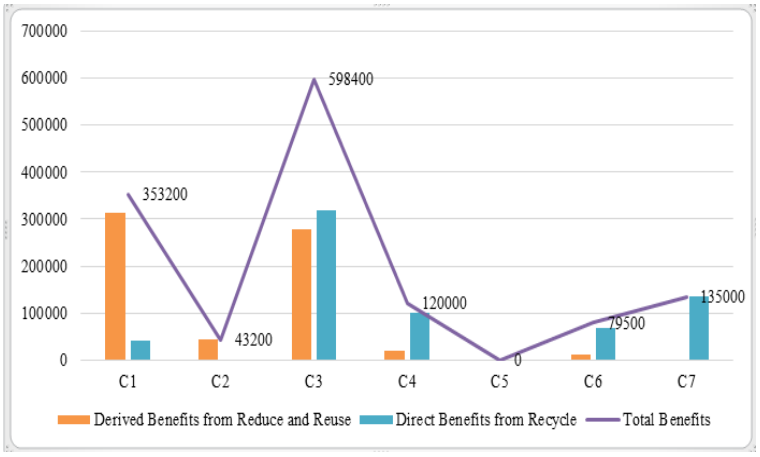
According to the (Bengtsson, 2019) recycling plays an essential role in a circular economy; it has the potential to reduce waste and limit resource consumption. In the words of (Stegemann, 2023), the economy should gain from protecting the natural environment in the long term through circularity. In the short term, benefits are expected in terms of cost savings, reduced price volatility, increased circularity, and enhanced marketing. The social benefits include: well-being, economic & social equality. The environmental benefits are non-renewable and do not regrow; therefore, ecosystem protection is necessary to preserve a healthy and pleasant environment, etc. Australia generated 64 million tonnes of waste in 2014-15, of which 60 per cent was recycled. (GIURCO, 2018) Therefore, recycling activity is essential to creating economic value and preserving the environment. Consequently, it also helps promote social well-being.

Figure 5: Monetary Benefits of Circularity through Recycle

Case Studies	Description	Amount
C1	The banana root is used to make compost. Five tons of compost were generated and sold at Rs 8000/—per ton.	40000
C2	-	-
C3	The compost is prepared using ungerminated sugarcane seedlings, unsold sugarcane seedlings, and sugarcane leaves, combined with molasses, salt, and water. The plant generated 80 tons of compost, which they sold for Rs. 4,000 per ton.	320000
C4	The compost is prepared using ungerminated sugarcane seedlings, unsold sugarcane seedlings, and sugarcane leaves, combined with molasses, salt, and water. The plant generated 18 tons of compost with Rs. 4500/- per ton they sold. Ungerminated sugarcane seedlings, unsold sugarcane seedlings, and sugarcane leaves were burned, and the ash was used as compost. The 5 tons of ash are generated, and the price is Rs. 3800/- per ton.	81000 19000 **100000**
C5	-	-
C6	The compost is prepared using ungerminated sugarcane seedlings, unsold sugarcane seedlings, and sugarcane leaves, combined with molasses, salt, and water. The plant generated 15 tons of compost, which they sold for Rs. 4500/- per ton they sold.	67500
C7	Banana stem waste is used to make compost, and 15 tons of compost are generated annually using salt and water. The price per ton of compost is Rs. 9000/-.	135000

Similar to the derived monetary benefits, nurseries also derive monetary benefits from recycling activities, as illustrated in Figure 5. The majority of nurseries utilise plant waste to create compost, which they sell on the market, thereby obtaining a good value. Occasionally, employers provide residual sugarcane to workers for animal feed, and in exchange, workers offer their labour services without compensation. Depending on the volume and intensity of recycling, each nursery is making a different amount of monetary benefits. Figure 6 represents the aggregate monetary benefits, including the derived and direct ones. Almost all the nurseries' monetary benefits from recycling activity outweigh the derived benefits. In general, nurseries benefited either directly or derived from the 3R principles of circularity.

Figure 6: Aggregate Monetary Benefits of Circularity



Circularity and Sustainable Development

The Sustainable Development Goals (SDGs) are a set of global goals to protect the planet and ensure peace and prosperity for everybody. The SDG goals were agreed upon in 2015. According to Bratland's report, sustainable development means "to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs." (Brundtland, 1987) United Nations General Assembly and are intended to be fulfilled by 2030. There are 169 global targets under 17 goals, many of which relate directly or indirectly to the circular economy. Out of 17 goals, seven goals are directly associated with this empirical study on the horticulture sector. These are No poverty (SDG 1), Clean water and sanitation (SDG 6), Affordable and clean energy (SDG 7), Decent work and

economic growth (SDG 8), Industry, innovation and infrastructure (SDG 9), Sustainable cities and communities (SDG 11), Responsible consumption and production (SDG 12) etc.

Circularity principles help to achieve sustainable development goals in many ways. In other research, (Neha Sharma, 2023) studied circular-based solutions to biomaterials, which mitigate sustainability issues. (Xiaoting Li, 2019) discusses the strategy and layout of circular-economy resource-based industries in coastal cities to achieve sustainable economic development. (Trajano, 2019) explains the concept of the circular economy for sustainable development and environmental protection. This section outlines how circularity practices in the horticulture sector can contribute to achieving sustainable development goals. The present study's circularity practices in the horticulture sector are related to the seven goals of the SDGs.

"End poverty in all its forms everywhere" is the first Sustainable Development Goal. The circular economy business model's emphasis on recycling, repair, and remanufacturing will lead to the creation of numerous jobs. Nurseries used the "Recycle" circularity principle in the present investigation. The recycling process creates more jobs. "Reuse" strategies also help to create jobs and another market for the product. Sugarcane without seeds is sold to farmers, the Jaggary Plant, or the factory. This is their input, and they run their businesses accordingly. This may help to provide additional employment and income for the people. "Waste Ventures India" works with waste pickers to transform waste into valuable resources. (Waste Ventures India, 2024) Likewise, waste generated from the horticulture sector can be converted into wealth by making compost and other valuable products.

Water conservation practices, which relate to 'ensuring availability and sustainable management of water and sanitation for all', are also found in the horticulture sector. All the nurseries adopted water-saving measures, including water showers, foggers, drip irrigation, and sprinklers, to reduce water usage. Seema Biotech LLP collects wastewater in a well and uses it for plant growth. The circular economy can contribute to completing the picture of emissions reduction by transforming the way we make and use products. (Tjerk Opmeer, 2020). The SDG 7th goal of affordable and clean energy indicates access to affordable, reliable, sustainable and modern energy. The circular economy promotes the integration of renewable energy sources, such as solar, wind, and biomass, into energy systems, thereby reducing reliance on fossil fuels and ensuring energy access for all. Siddhant and Bhumi Nurseries installed the solar panel system to meet their day-to-day energy requirement.

Under the 'decent work and economic growth', good work means providing chances for everyone to find productive employment that pays fairly, offers social protection for families, security in the workplace, and improved opportunities for social integration and personal growth. Thus, circularity principles are more labour-intensive and have the highest potential to create jobs. 'Reuse' and 'Recycle' practices in the present study enhance job opportunities for people, thereby increasing productivity and contributing to economic growth through improved livelihoods. The SDG's "Industry, innovation, and infrastructure" aim is satisfied via the reduced size of plastic plantation trays and packaging made of lower-micron plastics. Furthermore, SDG 11's "Sustainable cities and communities" aim is achieved by reducing the use of plastic, conserving water, and improving waste treatment.

Responsible consumption and production are crucial for sustaining livelihoods for both current and future generations. This study supports responsible consumption and production by optimising water use, implementing a take-back policy for drip pipes, compact planter trays, and solar panels, and promoting waste-to-wealth generation through recycling. However, the circular economy model combines circularity with sustainable development frameworks, focusing on reducing, reusing, and recycling materials. This approach reduces waste, conserves resources, and promotes economic flexibility. By adopting circular practices, we can create a prosperous, equitable, and sustainable society for the present and future.

Conclusion:

The study concludes that adopting circularity principles in the horticulture sector benefits plants and supports sustainable development. All seven nurseries from the Kolhapur and Sangli regions of Western Maharashtra, India, adopted the 3R practices. Under the 'Reduce' circularity principle, practices such as water-reducing techniques, optimising the economic size of a tray for saplings, reducing plastic use, and energy savings through solar panels were identified. 'Reuse' circularity practices were identified in the area where waste trays were used for heating purposes, seedless sugarcane from sugarcane nurseries was sold to factories/ jaggary plants/ farmers and coconut shells were used for plantation, etc. Lastly, 'Recycle' activities are evident in compost making, which involves using banana roots & litter of rose plants and sugarcane leaves. Additionally, broken, breakable drip pipes are replaced with new ones. All the nurseries' monetary benefits from recycling activities outweigh the derived benefits, and it reasonably generates monetary value for them either directly or through the 3R principles of circularity. There is

ample scope for those nurseries that have yet to adopt these practices in their plant. The nurseries can collect the nearby agricultural waste to make compost.

Seven of the 17 goals are directly associated with this empirical study on the horticulture sector, such as no poverty, clean water and sanitation, affordable and clean energy, decent work and economic growth, industry, innovation and infrastructure, sustainable cities and communities, and responsible consumption and production. The circular economy relates to sustainable development frameworks by practising the reduce, reuse, and recycle principles.

Acknowledgement
I am Dr. Kavita Shrikant Vadrale, thankful to Shivaji University, Kolhapur (India), for granting permission to carry out the work.

Financial Support and Sponsorship:
The authors are grateful for the financial assistance provided by Shivaji University, Kolhapur (India), under the Research Strengthening Scheme 2021-22.

Conflicts of Interest:
The authors declare that there are no conflicts of interest regarding the publication of this paper.

References:

1. Alan Murray, K. S. (2017, February). The Circular Economy: An Interdisciplinary Exploration of the Concept and Application in a Global Context. *Journal of Business Ethics, 140*(3), 369-380. Retrieved June 7, 2024, from https://www.jstor.org/stable/44164300
2. Breda McCarthy, A. B. (2019). Circular agri-food approaches: will consumers buy novel products made from vegetable waste? *RURAL SOCIETY, 28*(2), 91-107. doi:https://doi.org/10.1080/10371656.2019.1656394
3. Bengtsson, L. A. (2019). *Circular Economy and Plastics, A Gap-Analysis in Asean Member States* . Institute for Global Environmental Strategies.
4. Debarshi Mukherjee, L. K. (2024). Impact of Horticulture On The Sustainable Livelihood Development of Smallholders:A Spar-4-Slr & Future Research Agenda. *Agricultural and Resource Economics: International Scientific E-Journa, 10*(2), 80-115. doi:https://doi.org/10.51599/are.2024.10.02.04
5. Ellen Beerling, E. B. (2024). Awareness raising and transfer of knowledge and technology in circular horticulture. *epi-agri Agriculture and Innovation*, 1-14. Retrieved November 26, 2021
6. Elisa Chioatto, E. Z. (2020). Which innovations for Circular Business Models? A Product Life-Cycle Approach. *Fondazione Eni Enrico Mattei (FEEM)*. Retrieved june 7, 2024, from https://www.jstor.org/stable/resrep27688
7. GIURCO, S. S. (2018). From trash to treasure: Australia in a take–make–remake world. *Australian Institute of Policy and Science, 89*(1), 1--25,44.
8. Institute, S. E. (2019). Transformational change through a circular economy. Stockholm Environment Institute.
9. Mauch, C. (2016). The Call for Zero Waste. *A Future Without Waste? Zero Waste in Theory and Practice*, 5-12. Retrieved from https://www.jstor.org/stable/10.2307/26241370
10. Mialy Andriamahefazafy, A. B. (2022). *Unlocking the Circular Economy Potential of African Island States.* South African Institute of International Affairs.
11. Nathalie Gontard, U. S.-C.-W. (2018). A research challenge vision regarding management of agricultural waste in a circular bio-based economy. *Critical Reviews in Environmental Science and Technology, 48*(6), 614-654.
12. Neha Sharma, B. J. (2023). Controlled release fertilizer delivery system derived from rice straw cellulose nanofibres: a circular economy based solution for sustainable development. *Bioengineered, 14*(1), 2242124.
13. Portal, T. A. (2024). *TNAU Agritech Portal Farm Enterprises*. Retrieved from https://agritech.tnau.ac.in/farm_enterprises/Farm%20enterprises_horti.html
14. Rangel-Buitrago, A. W. (2019, May). Marine Litter Solutions for a Major Environmental Problem. *Journal of Coastal Research, 35*(3), 648-663. Retrieved from https://www.jstor.org/stable/26626095
15. Santosh D.T, C. S. (2024). Sustainable Horticultural Water Management: Trends and Innovations. In S. D.T, *Sustainable Horticultural Water Management: Trends and Innovations* (pp. 61-79). Delhi: International Books and periodicals Supply service. Retrieved July 3, 2024, from www.satishserial.com
16. Sara Rauf, Z. N. (2024). Organic Horticulture Techniques for Eco-Friendly Agriculture. *Trends in Biotechnology and Plant Sciences, 2*(1), 20-24.
17. Stegemann, S. v. (2023). The Circular Economy. In S. v. Stegemann, *An Introduction to Waste Management and Circular Economy* (pp. 306-348). UCL Press.
18. Tjerk Opmeer, F. v. (2020). *Circular Economy & SDGs How circular economy practices help to achieve the Sustainable Development Goals.* Netherland: Netherlands Enterprise Agency. Retrieved July 14, 2024
19. Totok Hendarto, D. B. (2022). The Circular Economy Strategy of Reusing Mangrove waste

in the mangrove Nurseries. *International Journal of Innovative Science and Research Technology, 7*(12), 1460-1464.

20. Trajano, J. C. (2019). *Advancing Non-Traditional Security Governance Through A Circular Economy for Sustainable Development and Environmental Protection.* S. Rajaratnam School of International Studies.
21. Welfare, D. o. (2024). Retrieved from https://agriwelfare.gov.in/en/Hirticulture
22. *Waste Ventures India*. (2024). Retrieved July 14, 2024, from https://wasteventures.com/waste-pickers/.
23. Xiaoting Li, J. B. (2019). Circular Economy of Resource-Based Industries in Coastal Cities and the Influence on Sustainable Development. *Journal of Coastal Research*, 96-99.