Assessing the Environmental Impacts of Grazing Livestock on Horticultural Sites in Nigeria: A Review

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Abstract
Due to their destructive tendencies, grazing livestock pose a serious threat to horticultural areas and locales. The diverse effects of animals on horticultural regions are examined in this research, including grazing damage, soil erosion, trampling, disease transmission, weed dissemination, and nutrient management difficulties. Livestock grazing can reduce crop production and injure ornamental plants, which can result in financial losses. Large animals' stomping of the ground compacts the topsoil and harms root development and soil health. When animals disturb topsoil, it becomes vulnerable to wind and water erosion, which can result in soil erosion. Diseases spread by livestock can threaten the development and potential of horticulture crops. The unintentional spread of weed seeds by livestock makes weed eradication more difficult. Various management techniques are required to reduce these negative impacts. Livestock can be kept out of horticultural areas by fencing them off and enforcing access restrictions. Systems such as rotating grazing will aid in controlling grazing pressure and preventing overgrazing. Following recommended practices, proper manure management maximizes advantages while avoiding environmental dangers. In order to stop the spread of diseases, disease surveillance and preventative measures are essential. Practices for conserving soil health include planting cover crops and erosion prevention. In conclusion, this review emphasizes the risk that livestock poses to horticultural sites and the significance of implementing effective management practices to protect crop yields, soil quality, and the general well-being of horticultural sites. Maintaining the productivity and attractiveness of these priceless sites requires effective management.

Keywords: Livestock, horticultural sites, environment, grazing livestock

Introduction

Horticulture is a significant area of worldwide agriculture, providing people with food, fuel, and other necessities (Pardey *et al.*, 2018). In horticultural areas, grazing cattle can be an asset for the utilization of resources, pest control, and production of fertilizer (Belin *et al.*, 2008). Overgrazing, however, can also lead to problems such as soil erosion, soil compaction, and deficiency in nutrients (Fujihara *et al.*, 2011). In areas characterized by unsuitable morphological features, climate conditions, vegetation cover, and soil quality for robust agricultural activities, overgrazing emerges as a significant environmental stressor and a recognized catalyst for desertification (Brunner *et al.*, 2008). Therefore, it's critical to comprehend the potential advantages and threats of grazing cattle in horticultural settings in order to make wise management decisions. They have also generated an immense amount of criticism because of inconsistent findings or the shortcomings of small-scale studies. Recent studies have found that, in contrast to grazing exclusion, managed livestock grazing at light to moderate intensities tends to have positive effects on rangeland vegetation (Holechek *et al.*, 2006). However, there are still unknowns regarding how the spatial movement of livestock impacts these processes (Briske *et al.*, 2008). The effects of grazing livestock on horticultural sites in Nigeria still need to be fully understood. More research is required to understand the long-term impacts of grazing livestock in Nigerian horticultural sites. Hence, this paper provides a review of current literature and research on the impact of grazing livestock on horticultural sites around the world, with a special focus on Nigeria.

Meaning of horticulture and horticultural site

The cultivation and production of fruits, vegetables, flowers, plants, and other like goods is referred to as horticulture. It is a subset of agriculture that deals with horticultural products' science, technology, production, marketing, and economical aspects. Plant science, soil science, plant physiology, and environmental science are all studied in horticulture. Producing high-quality plants and products, enhancing soil fertility, creating novel kinds and hybrids, and managing pests and diseases are some of its primary goals. It emphasizes the production of novel cultivars and varieties, administration and protection of these plants, as well as the preservation and maintenance of biodiversity.

Horticulture also includes the study of plant diseases and their control, the production of perennial and annual plants, the use of flowers and foliage and the ornamental use of plants. Modern horticulture includes cultivating, processing, and marketing of fruits, vegetables and ornamental plants (Acquaah, 2005). The establishment of gardens, plant nurseries, and other land-based firms like greenhouses and orchards are also considered to be a part of horticulture. Since the inception of time, horticulture has been a vital component of a healthy, sustainable food system (Conan and Kress, 2007). The three primary areas of horticulture are ornamental plant cultivation (flowers, shrubs, and trees), market gardening (vegetables and herbs), and fruit production (pomology).

Horticultural sites are areas of natural landscape or designed landscapes that are used for the cultivation and management of horticultural crops. These crops can range from fruit and vegetables to ornamental shrubs and flowers. Horticultural sites include both small scale and large-scale operations, and often feature a variety of growing systems, from conventional to organic and sustainable methods. By using the appropriate techniques, these sites can be managed in a way that is both

productive and environmentally friendly (Hix, 1974; Conan and Kress, 2007).

Purpose of Horticulture

Humans have relied on horticulture for thousands of years to help them with their needs for food, shelter, and medicine. By distributing oxygen while improving air quality, controlling the climate, and fostering ecological and biological diversity, it also plays a crucial part in upholding and protecting the ecosystem. Horticulture also has an immediate impact on economy since it aids farmers and small companies, creates employment and incomes, and raises living standards in rural areas. The horticulture industry may offer potential to boost income, ease poverty, and lessen socioeconomic inequities. Through agricultural export, horticultural items have the potential to increase foreign exchange. The export revenue from horticulture crops has seen a promising improvement in recent years (FAO 1999).

In addition, horticulture can be used to produce new cultivars and varieties that can be better adapted to their environment and provide higher yields. It can also help develop new ornamental plants that are more attractive to consumers and can be used in decorative displays. Finally, horticulture promotes sustainability through the use of organic methods and the conservation of natural resources such as water and land.

Effects of Livestock Production on Horticultural Crop Production: Pros and cons

The relation between livestock production and horticulture crop production in Africa has drawn more attention in recent years. Most people believe that raising livestock has a negative influence on biodiversity globally, and believe that raising livestock has a bad impact on wildlife. According to Kauffman and Pyke (2001), overgrazing has affected biological succession, nutrient cycles, and landscape variability in some parts of the planet by reducing the biomass and density of plant and animal species. However, this isn't always the case, as studies have revealed that grazing occasionally has advantageous effects on wildlife. Grazing pastures are also seen to be important for conservation since they provide essential habitat for wildlife, in contrast to vigorous crop producing agriculture. By removing old grasses and legumes and encouraging new growth, livestock grazing frequently reduces amount of vegetation, possibly improving the quality (Georgiadis *et al*., 1989). Livestock that is allowed to graze significantly contributes to Nigeria's increased productivity in the production of horticulture crops. Grazing makes more nutrients available in the soil, supplying vital components for crop growth and enhancing the biological equilibrium of the land by assisting with weed management, soil structure, and water infiltration. According to studies, integrating grazing with other agronomic techniques can boost the yields of crop cultivation including maize, cassava, cowpea, among others in Nigeria. The results from several reviews consistently demonstrate that the integration of livestock and horticultural crops significantly boosts the production of horticultural crops. According to studies, adding cattle to farm systems boosted soil fertility, decreased the occurrence of pests and diseases, and increased water usage efficiency. To maintain the system's sustainability, adequate management and planning are required. Several academic works also suggest that integrating the production of horticulture crops and grazing animals in Nigeria is plagued with difficulties. There were disadvantages to integrating livestock and horticultural crop production, such as the necessity to control grazing pressure in order to prevent overgrazing and the need for better husbandry techniques and tactics to limit the adverse environmental effects.

Other factors include the probability of overgrazing and increasing competition for resources. According to research studies, grazing livestock can harm the ecosystem in horticultural locations by causing nitrogen depletion, soil erosion, and compaction (Belin *et al*., 2008). According to Fujihara *et al.* (2011), grazing cattle can also affect yields, which lowers the quality of growing vegetable goods. However, grazing cattle may also potentially offer advantages like organic pest management and fertilizer (Belin *et al*., 2008). Therefore, it is critical to comprehend the potential advantages and dangers of grazing cattle in horticultural settings while making management decisions. Research has discovered that grazing animals can cause soil erosion and nutrient depletion in Nigeria, using the country as a case study (Fujihara *et al*., 2011).

Mitigation Strategies and Best Practices

A sustainable management of pastures and horticultural crops impacts positively on soil erosion and mitigates land degradation (Papanastasis, 2004). Moderate grazing contributes to soil preservation from water and wind erosion, creating, at the same time, favourable conditions for vegetation and thus improving soil fertility (Peco *et al*., 2006). Land management practices have a significant impact on soil erosion, water conservation, and desertification risk. Sustainable grazing contributes to the preservation of a moderate annual vegetation cover, reducing runoff, sediment yield, and loss of soil water by evapotranspiration (Carmona *et al*., 2013). Livestock emission abatement opportunities include managing grazing land resources, altering feeding practices, improving treatment or use of animal manure, altering processing and transport of animal products and altering species and breeds in animal production.

The livestock industry has long grappled with the challenges of drought, necessitating adaptive measures due to precipitation variability. Traditional drought management approaches, such as reducing herd size and relying on harvested forage, have proven insufficient in alleviating the prolonged impacts of drought. Forecasts indicate an anticipated rise in the frequency and severity of drought in the years ahead, posing heightened difficulties for livestock producers. In response, a shift towards integrated and long-term management strategies is imperative.

To effectively confront the negative consequences of drought, livestock managers should consider incorporating contemporary selection strategies. This involves meticulous attention to cow size, with an emphasis on maintaining moderate-sized cows characterized by lower milk production and moderate muscling. Addressing recent trends driven by strong growth genetics and muscling selection is crucial (Seo *et al*., 2009).

Silanikove (2000) suggests that, in certain cases, a transition from cattle to goats may be advantageous. Goats have demonstrated superior adaptation to hotter conditions, exhibit skilled grazing behaviour, and possess a more efficient digestive system, where the rumen serves as both a fermentation vat and a water reservoir. Given that grazed forage remains the most economical nutrient source for sustaining the cow herd, aligning cow size and milk production potential with forage resources becomes a pivotal drought mitigation strategy. Optimizing forage utilization and reproductive efficiency requires careful consideration of stocking rates based on forage intake requirements relative to supply. This adjustment, influenced by the slow temporal trend affecting cow size and milk production, is essential. As the average cow size in the herd increases, the additional forage requirement per cow rises accordingly, necessitating a corresponding adjustment in the number of cows. Anticipating reduced forage quantity due to drought, prudent measures include modifying stocking rates and allowing pastures to rest, maintaining a forage reserve.

Conclusion

Taking into consideration the results of this review, it was discovered that while grazing cattle has the potential to be beneficial in terms of resource usage and fertilization, it can

negatively impact the environment and reduce the quality of horticulture sites. The findings of this study imply that while making decisions about the management of horticultural sites, stakeholders should take into account the potential advantages and challenges of grazing cattle within. In summary, this paper underscores the destructive potential of livestock on horticultural sites and the importance of adopting appropriate management strategies to safeguard crop yields, soil quality, and the overall health of horticultural locations.

Recommendation

The most effective stocking rates and rotational grazing techniques must also be determined through study in order to be used for maximum benefit. To further understand both the advantages and disadvantages of integration, further research is required to examine the influence of livestock production on horticultural crop systems over longer time intervals. To mitigate these adverse effects, various management practices are necessary. Fencing and controlled access can prevent livestock from entering horticultural areas. Rotation grazing systems help manage grazing pressure and avoid overgrazing. Proper manure management, following guidelines, maximizes the benefits while minimizing environmental risks. Disease monitoring and preventive measures are crucial to curb disease transmission. Soil conservation practices, such as cover cropping and erosion control, protect soil health. Effective management is essential for sustaining the productivity and aesthetics of these valuable sites.

Declaration of interest

The authors declare that no conflict of interest exists.

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