23381200

Header

Who: 23381200

What: C7083 Assignment

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C7083_23381200 github repository

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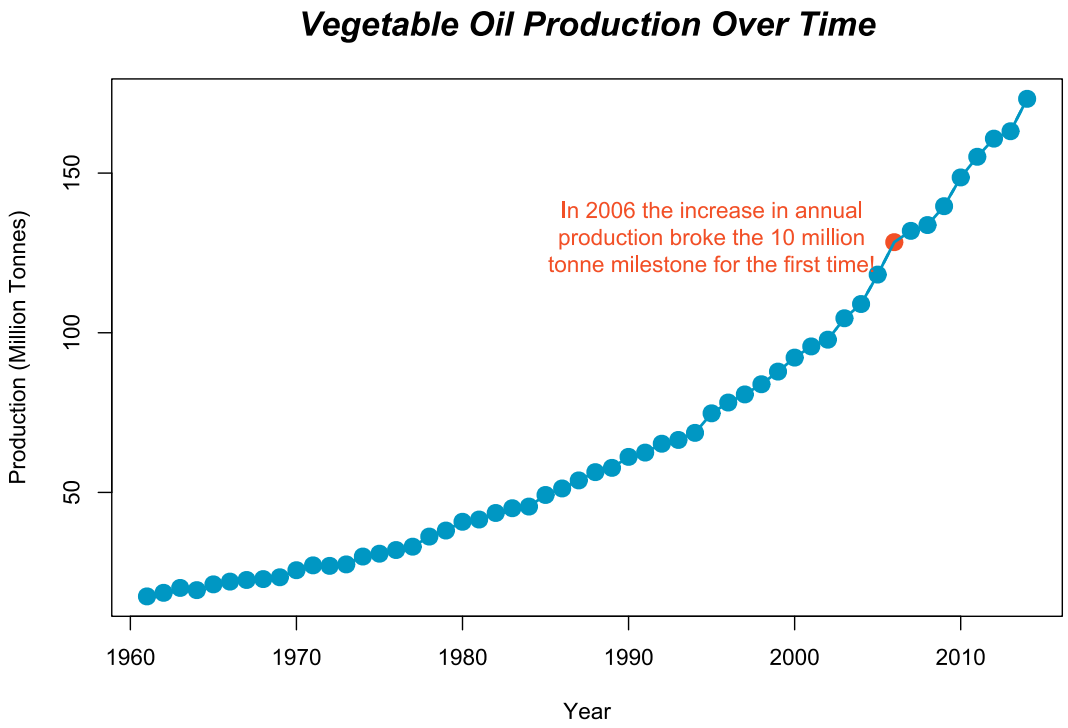
Looking for the wood for the trees with vegetable oils, is palm hurting or helping forests in the long run?

Our world depends on vegetable oils

Oils derived from plants, nuts, seeds and fruits have become an integral part of modern-day life and El Hamidi (2018) found their production has seen sizable growth globally in the last 30 years. They are used across multiple industries in numerous sectors with a wide variety of culinary uses as additives of processing agents, a variety of industrial uses in the production of cosmetics and pharmaceuticals as well as various paints and coatings as well as extensive use in biofuel production. According to Custom Market Insight (no date) The vegetable oil industry was worth an estimated 245.4 billion USD in 2022.



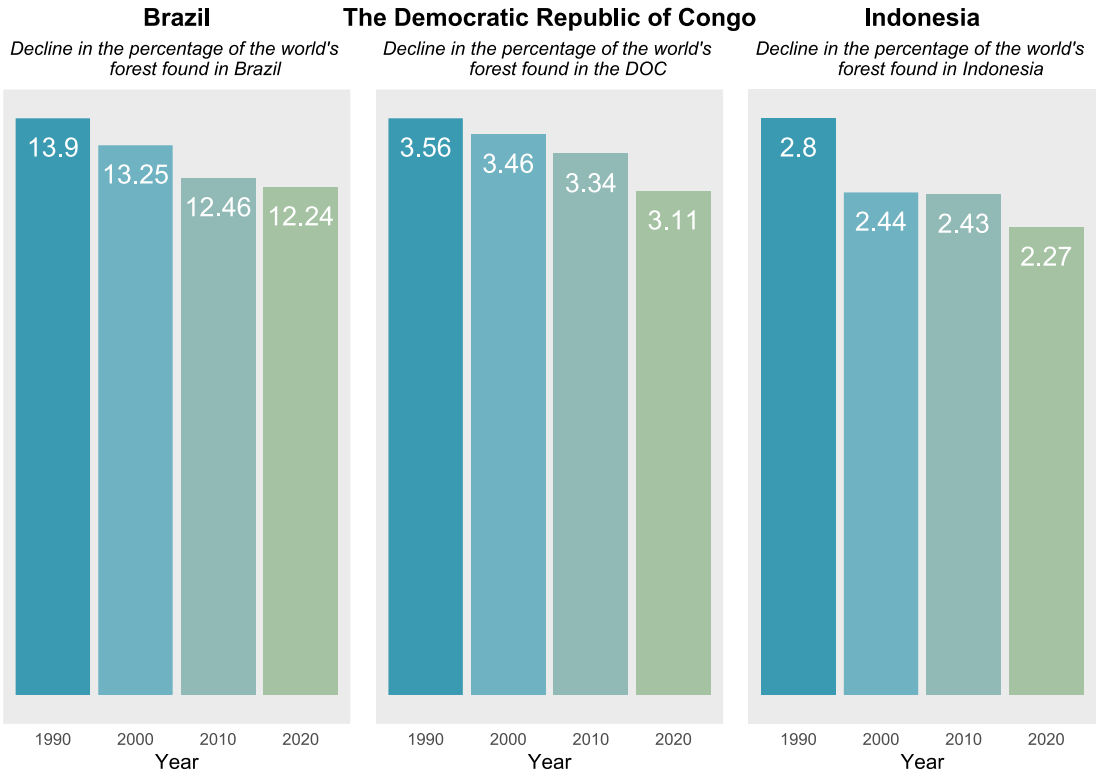
Research has shown that the consumption of vegetable-based fats and oils has significantly increased in human diets, rising by 159% since 1909 (Lee et. al., 2020). This surge is often associated with the growing intake of processed and fast foods, which are known for their high content of vegetable oils. Additionally, vegetable oils as noted earlier are not limited to food products; as the WWF (no date) points out they are also commonly found in non-food items such as soaps and lotions.

The demand for vegetable oils is projected to remain high or even increase in the future, driven by a growing global population and their diverse applications ranging from culinary uses to industrial products. However, the expansion of vegetable oil crop production has been closely associated with deforestation, as forests are cleared to make way for agricultural land. This environmental challenge underscores the critical need for maximizing the efficiency of vegetable oil crop production. By improving crop yields and adopting sustainable farming practices, it is possible to reduce the overall land required for cultivation, thereby mitigating the impact on forests and helping to curb deforestation. Addressing this issue is essential to balance the demand for vegetable oils with the urgent need to preserve our natural ecosystems.

These useful and nutritious oils have cost the earth dearly

From the beginning of the 20th century to 2018, Richie (2021) highlighted that the Earth has experienced a significant reduction in forest cover, decreasing from 48% to 38% of the land surface. This translates to a staggering loss of more than one billion hectares, an area 43.5 times larger than the United Kingdom. This decline not only represents a loss of natural habitats but also impacts climate regulation and biodiversity on a global scale.

Three nations at the forefront of global deforestation are Brazil, the Democratic Republic of Congo and Indonesia, with the Amazon, Congo Basin and Bornean rainforests suffering significant deforestation. The increase in vegetable oil production, in Brazil and Indonesia especially, concurrent to the increase in deforestation highlights how interlinked these two phenomena are.

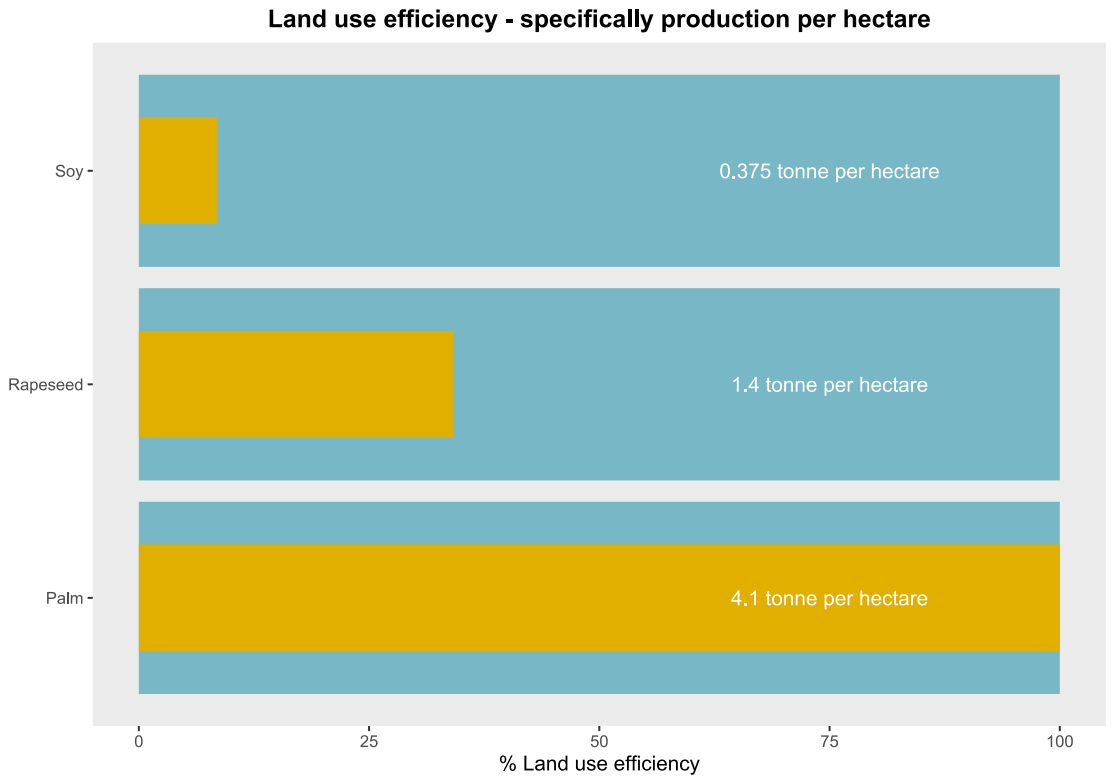


The developing nature of these countries has given rise to a complex interplay of factors that necessitate a nuanced understanding and multifaceted response strategy to the conservation needs of the forests and the people who depend on vegetable oil crop production for their livelihoods.

Unable to render graphical shiny output - please refer to 'Vis_es_p3.R' in github repository to interact with the shiny app graphic showing the production of vegetable oil over time Brazil and Indonesia

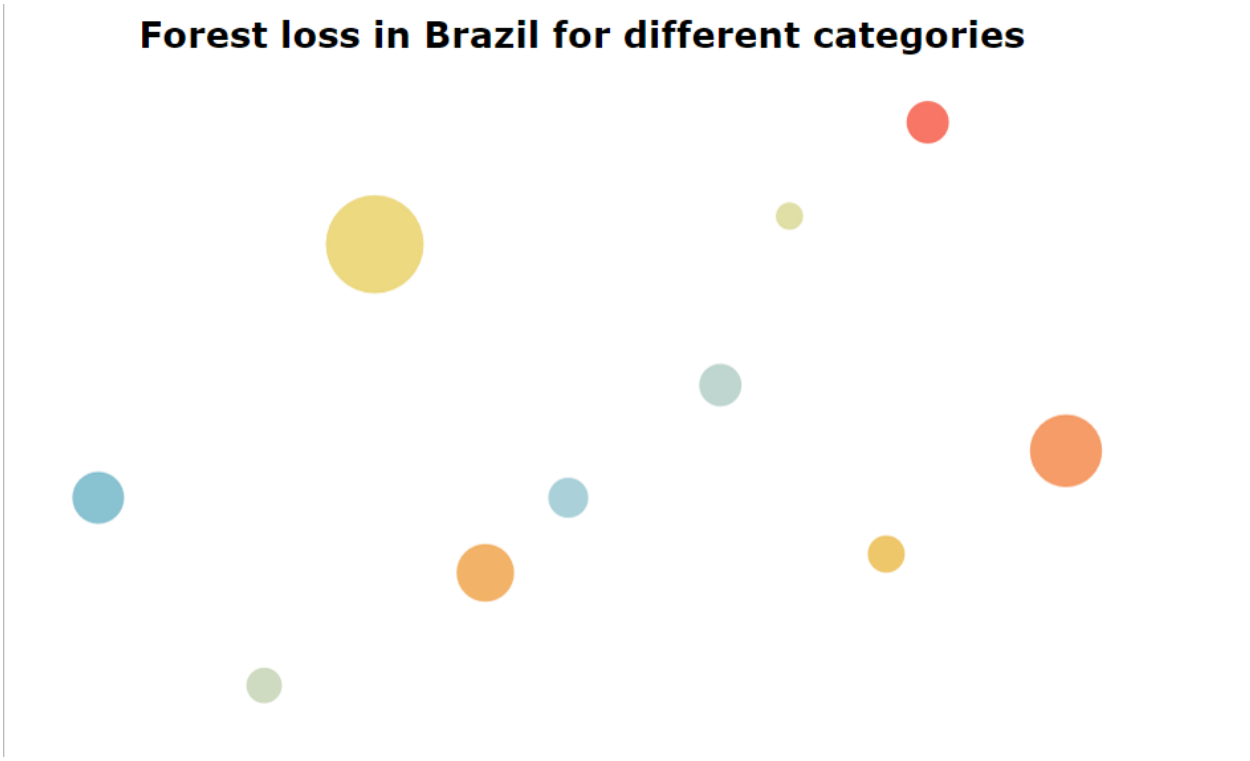
Leaving room on earth and still meeting the needs of the population may be an option

Given the anticipated global increase in the consumption and industrial use of vegetable oils, it is imperative to recognise the disparities in the efficiency of oil crops. These differences are nuanced and can be debated at length but when specifically evaluating efficiency from the perspective of land conservation, palm oil emerges as the superior choice due to its unparalleled yield per hectare compared to other major vegetable oils worldwide.



Palm oil could become a good guy for forest conservation

Brazil is the world's third largest producer of soybean oil and 10th largest producer of palm oil and with one of the world's most important forests, the Amazon rainforest, as part of the country. The sustainable management of vegetable oil production is not only key to ensure the future of the Amazon, but also the people who earn a living from the production of vegetable oils.



Interactive visualisation available in github repository 'vis_5.html"

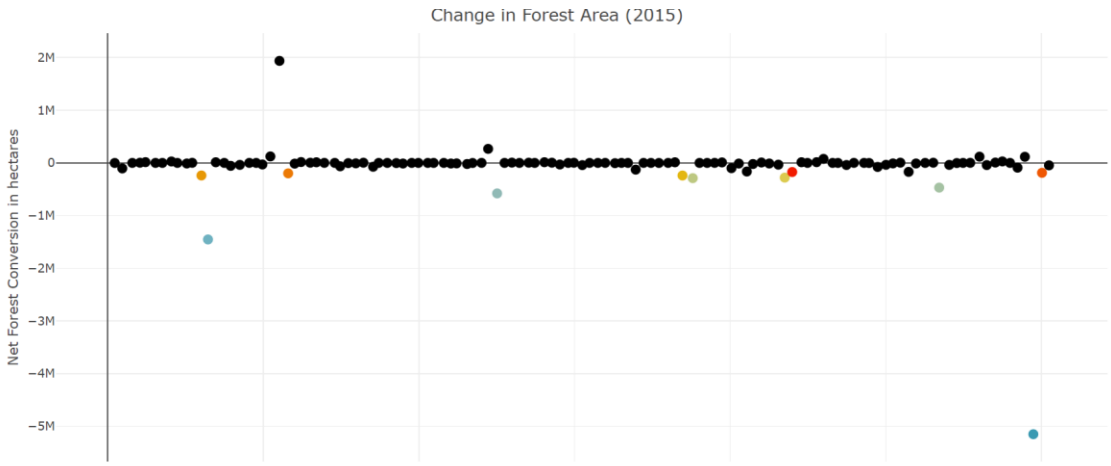
When considering land use, the shift from soybean to sustainable palm oil cultivation—where the oils are functionally interchangeable—presents an opportunity to mitigate deforestation associated with vegetable oil production. This is due to palm oil's higher yield per hectare, which can lead to a significant reduction in the land required for oil crops. The transition from soybean to sustainable palm oil production involves a multifaceted comparison that extends beyond a simple crop substitution. This transition is complex and must be approached with consideration of the environmental, social, and economic implications inherent in agricultural practices.

Reforestation is already a reality

In future there could be an opportunity to have forest and agricultural land exist within the same area, meaning one does not need to be sacrificed for the other. Agro forestry has the potential to secure the future of some of the world's forests and create new habitats in areas where monoculture agriculture has dominated.

There is growing evidence showing how a close proximity of a diverse ecosystem of plants and animals often found in forests can help the productivity and resilience of commercial crops, and is paving the way to new methods of farming and therefore vegetable oil production may in future be a part of or at least exist alongside a flourishing forest.

A combination of legislative changes, increases in agroforestry and habitat rehabilitation projects have led to an increase in the share of global forest area for some countries. This is not enough to turn the tide on deforestation globally but has led to a year or year reduction in the percentage of global forest loss.



Interactive visualisation available in github repository 'vis_6.html"

In conclusion, the expansion of vegetable oil production has become a significant environmental and social issue. The global demand for vegetable oils and lack of regulation around forest conservation has led to extensive deforestation, particularly in the previously mentioned countries of Brazil, Indonesia, and the DRC. Despite the challenges, there is a growing movement towards sustainable production practices. The adoption of sustainable farming practices, such as improving crop yields and adopting agroforestry, offers a path to mitigate the environmental impact of vegetable oil production. Moreover, the push for sustainable palm oil production, as evidenced by the Roundtable on Sustainable Palm Oil (RSPO) and other initiatives, highlights the industry's efforts to balance economic growth with environmental conservation and social responsibility. As consumers become more aware of the environmental and social implications of their choices, the demand for sustainably produced vegetable oils is likely to increase, encouraging more producers to adopt responsible practices. Ultimately, the future of vegetable oil production hinges on the industry's ability to innovate and implement sustainable practices that protect the environment, support local communities, and meet global demand.

3. Critique

a) Good data visualisation

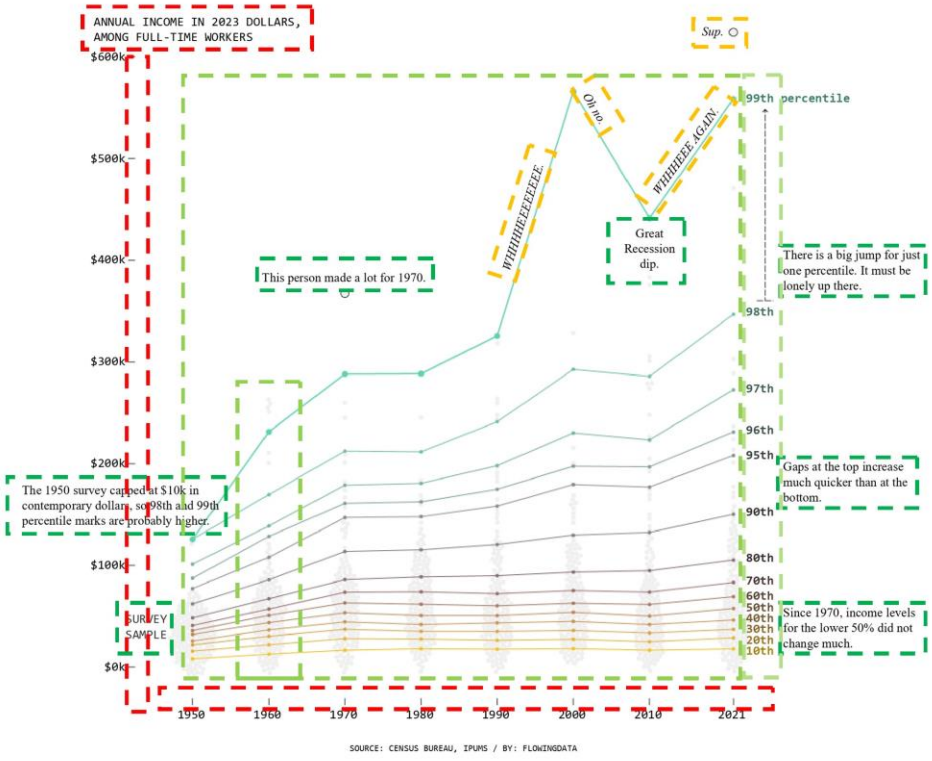
The visualisation from Yau's (no date) web page simplifies complex census data, presenting findings in an accessible and engaging way. I have used green boxes to highlight strengths, orange boxes to flag potential issues, and red boxes to show weaknesses.

The graph successfully depicts the income disparity in America from 1950 to 2021, focusing on trends rather than exact figures. Annotations provide clarity, making it user-friendly for those unfamiliar with the data. Targeted at the general public, it employs everyday language and straightforward concepts like income percentiles.

The chronological data presentation, and the use of a line graph for showing income changes over time, are appropriate. A secondary beeswarm plot effectively illustrates data distribution for every survey from 1950 to 2021, although this method is less precise than a boxplot.

To strengthen understanding, each income percentile is directly labelled. A colour scale on the line graph facilitates comparison across income levels, and the muted colour of the beeswarm plot does not distract from the line graph.

However, the formatting style could be adapted to improve legibility; the font size, particularly of the title, is small, and there is an absence of axis lines or titles. Some of the annotations could be considered too informal, although this may make the graph more appealing to the general public. The placement of the 1950 census cap annotation makes the visualisation untidy. This visualisation style, consistent with the flowingdata website, reflects the unique approach of data scientist Nathan Yau.



b) Bad data visualisation

This visualisation by Lemos (2024) fails to effectively represent the data it reports, disregarding key data visualisation principles. Problematic areas are marked with red boxes, and the effective area is marked with a green box.

The graph lacks essential information, making its purpose unclear. There is no title, axis labels, units, or annotations, leaving viewers guessing about the bars and the significance of the dashed line. The minimal graph annotation fails to provide necessary context.

Colour usage is ineffective; all bars are the same colour across different experimental periods. Assigning unique colours to each period could enhance comparability.

A significant flaw is the graph's violation of the proportional ink principle, crucial for bar charts. This misrepresents the data, potentially exaggerating the observed effects and misleading the viewer. Moreover, there is no indication of what the line graph represents, and thus its usage may be inappropriate.

On a positive note, the data is correctly sequenced from T2 to T6. However, the transition from T5 to T6, marking a shift from anaerobic to aerobic conditions, is crucial for understanding silage pH changes and should have been highlighted. Representing the 5 samples for each time point next to each other makes the comparison between time points difficult.

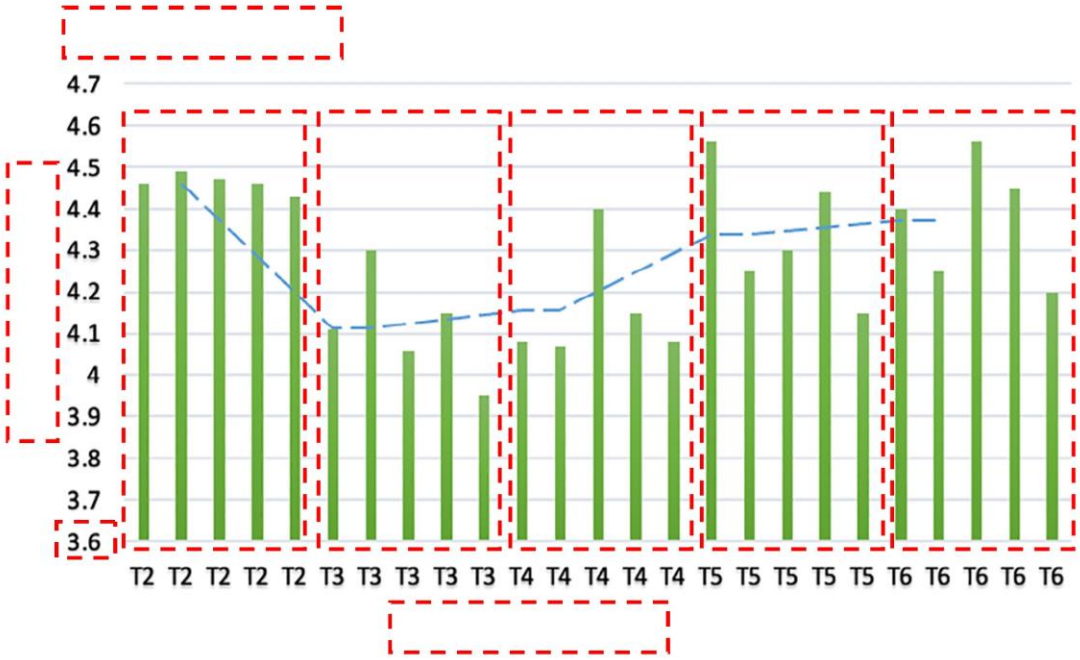


Fig. 1. pH values (y axis) of spineless cactus silage samples during the experimental periods T2 (7 days), T3 (15 days), T4 (30 days), T5 (62 days) and T6 (air exposure at 62 days).

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