Study of the effectiveness of bioabsorbent to absorb wastewater from rubber factories.

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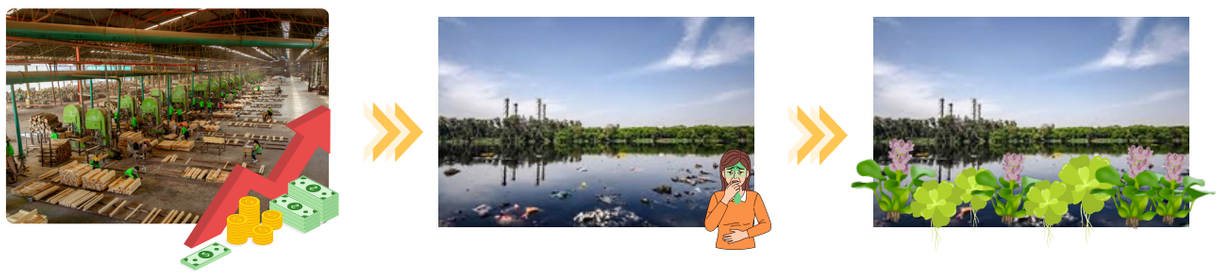
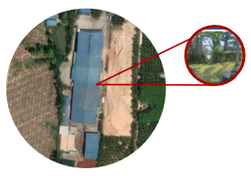
Abstract

This project, " Study of the effectiveness of bioabsorbent to absorb wastewater from rubber factories," aimed to investigate the efficiency of bioadsorbent made from water hyacinth and azolla in absorbing wastewater from rubber factories. Seven ratios of water hyacinth:azolla were tested: 100:0, 90:10, 70:30, 50:50, 30:70, 10:90, and 0:100. The experiment was divided into three stages: Stage 1 creating bioabsorbent; Stage 2 study the effectiveness of bioadsorbent by measuring DO, pH, ammonia, and nitrite at various times within 24 hours; and Stage 3 testing the effectiveness of bioabsorbent. The results showed that the bioadsorbent with a 50:50 water hyacinth:azolla ratio exhibited the highest efficiency in absorbing wastewater from rubber factories. This efficiency was significantly correlated with an increase in DO ($p < .05$) and a continuous decrease in nitrite and ammonia ($p < .05$). The findings are consistent with the biological nitrification process. Furthermore, the 50:50 ratio bioadsorbent was found to have a degradation rate of up to 61.85% within 24 hours. Therefore, the 50:50 ratio bioadsorbent is suitable for development as an absorbent material for wastewater from rubber factories and possesses the best biodegradability.

Introduction



Study Site



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Research Question

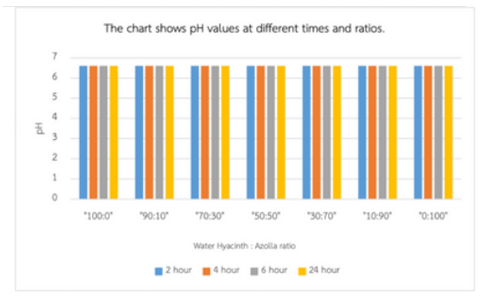
1. Do different ratios of bioadsorbent affect the absorption of wastewater from rubber factories? If so, how?
2. Does the degradation rate of bioadsorbent affect the absorption of wastewater from rubber factories? If so, how?

Hypothesis

1.Different ratios of bioadsorbent affect the absorption of wastewater from rubber factories.
2.The degradation rate of bioadsorbent affects the absorption of wastewater from rubber factories.

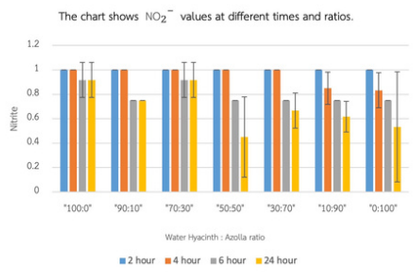
Method

Result



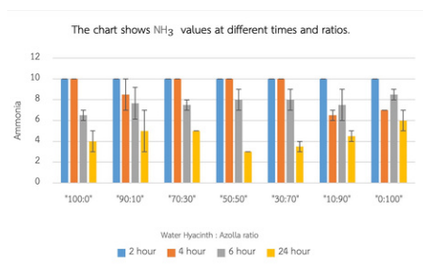
Picture 1: shows pH values at different ratios and time periods. ($p<.05$)

From Picture 1 The pH values of bioabsorbent made from water hyacinth and azolla at different time periods were not significantly different ($p > 0.05$).



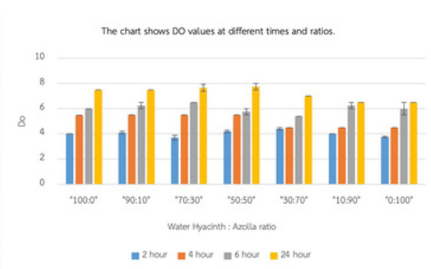
Picture 2: shows nitrite values at different ratios and time periods. ($p<.05$)

From Picture 2, nitrite values tended to decrease continuously over time across all ratios of bioabsorbent, indicating that time is a significant factor affecting nitrite reduction in wastewater at a significance level of .05. Considering the bioabsorbent ratios, the ratios combining water hyacinth and azolla, especially 50:50, yielded the lowest nitrite values.



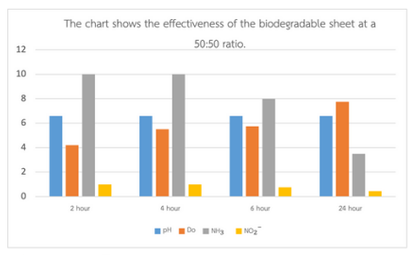
Picture 3: shows ammonia values at different ratios and time periods. ($p<.05$)

From Picture 3, ammonia values tend to decrease continuously over time across all ratios of biomass adsorbent sheets, indicating that time is a significant factor affecting ammonia reduction in wastewater at a significance level of .05. When considering the ratios of bioabsorbent, the ratios containing a mixture of water hyacinth and azolla, especially the 50:50 ratios, showed the lowest NH_3values.



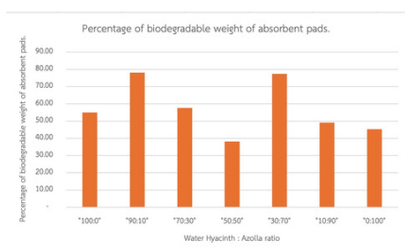
Picture 4: shows the results of DO measurements at different ratios and time periods. ($p<.05$)

From Picture 4, it can be seen that dissolved oxygen (DO) values tend to increase over time in all ratios of biomass membranes, indicating that time is a significant factor affecting DO values at the .05 significance level. When considering the ratios of bioabsorbent, it was found that the ratios combining water hyacinth and azolla, especially the 50:50 ratios, resulted in higher DO values than using a single plant species, demonstrating better efficiency in improving water quality.



Picture 5:shows the effectiveness of the biodegradable sheet at a 50:50 ratio

From Picture 5: The performance of the bioadsorbent at a 50:50 ratio showed a continuous decrease in ammonia and nitrite concentrations, while dissolved oxygen (DO) levels increased. These results indicate that the bioadsorbent at a 50:50 ratio was the most effective for absorbing wastewater from rubber factories.



Picture 6: shows the percentage of biodegradation of bioabsorbent pads at different ratios.

From Picture 6, the percentage of bioabsorbent degradation at different ratios varies, demonstrating the absorption quality. The ratio of water hyacinth to azolla with the highest to lowest percentage of bioabsorbent pad degradation is as follows: 90:10, 30:70, 70:30, 100:0, 10:90, 0:100, and 50:50.

Discussion and conclusion

The experiment showed that the 50:50 ratio resulted in a greater reduction of NH_3 and NO_2^- than the set using a single plant species, while simultaneously increasing DO levels. The different trends in NH_3, NO_2^-, and DO levels across the various ratios demonstrate that both the duration and ratio of the bioabsorbent affect the overall wastewater treatment efficiency. In the early stages of the experiment, NH_3 and NO_2^- levels did not decrease significantly because the microorganisms were still adapting. As time passed, the microorganisms multiplied and became more efficient, resulting in a significant decrease in NH_3 and NO_2^- levels between 8:00 PM and 2:00 PM the following day, while DO levels increased, consistent with the operation of a biological wastewater treatment system.

From the experimental results, it can be concluded that bioabsorbent made from water hyacinth and azolla is effective in improving the quality of wastewater from rubber factories by reducing NH_3 and NO_2^- levels while increasing Do levels. The mixed bioabsorbent ratio showed the most effective results. In particular, the 50:50 ratio demonstrates the highest efficiency in supporting such processes.

Citations

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Pridi Param Hankul, Wichai Jaiphakdi, Pornsa Ekachai, Chakri Suengram and Surasak Suthisong. (M. P. P.). Analysis of wastewater from raw rubber factories. Rubber Processing and Testing Research Group, Songkhla Rubber Research Center, Rubber Research Institute. Retrieved on December 1, 2025, from https://shorturl.asia/zLOR5