How Does Nitrate Absorption Differ Between the Rhizophora mangle, Laguncularia racemosa, and Avicennia germinans Over a 48 Hour Period?

Reed, Mary (School: Ridgeview High School)

Mangroves are critical members of tropical coastline ecosystems. They offer residence to various aquatic biota and protect the coastline from erosion due to their high root density. In the context of this investigation, the mangrove's substantial ability to absorb compounds will be monitored. Nitrate (NO3-) specifically, is found in excess due to largely anthropogenic means. When nitrogen-rich fertilizers are utilized, they travel via runoff into local waterways. This increases the levels of nitrogen in its inorganic form, nitrate, which promotes algal growth. Eutrophication can have adverse effects on species who inhabit the waterway (due to a drop in dissolved oxygen concentration) as well as humans (potential skin, eye, and respiratory irritation upon exposure). Thus, measures, such as implementing nitrate-absorbing plants, should be utilized to mitigate the effects of eutrophication. To determine which species of mangrove is the most effective in nitrate absorption, three samples of the red, white, and black mangrove, respectively, were gathered. Sitting in 1L of water with an initial nitrate of 20 ppm, their absorption over a 48 hour period was monitored, with nitrate tests conducted every 6 hours. The white mangrove had the fastest absorption rate in comparison to its black and red counterparts. White mangroves were the only species able to reach 0 ppm of nitrate after 48 hours, across all 3 trials. While other factors exist such as root structure and plant maturity, it can be cautiously deduced that the white mangrove would be most effective to reduce nitrates in aquatic ecosystems, upon implementation.