

# HOW BIOAUGMENTATION COUPLED WITH NUTRIENTS BENEFITS WASTEWATER TREATMENT

When applied correctly bioaugmentation heavily benefits wastewater systems, and the addition of micronutrients adds to this performance. Better performing strains of bacteria coupled with beneficial micronutrients leads to improvements in water quality. These improvements include sludge digestion, odour, and hydrogen sulfide reduction as well as fat, oil, and grease digestion.

## NUTRIENTS

Microbial nutrition within wastewater treatment is made up of two main groups, **macronutrients**, and **micronutrients**. The macronutrients are carbon, nitrogen, and phosphorous. The micronutrients are many elements and compounds that are utilised in trace amounts. It's important to note that the whole microbial community benefits from the correct amount of nutrients present.

## BIOLOGY

Not all microorganisms are the same, some have the ability to digest many compounds, and others don't. It's important for microbes, that have the ability to digest many substrates and compounds, to be present in wastewater treatment. Most microbes within wastewater don't have the ability to produce a multitude of enzymes that aid in the digestion of many compounds. Bioaugmentation gives you the control to add and maintain microbes with the ability to digest more difficult-to-digest compounds. When bioaugmentation breaks complex compounds down into a usable form the whole microbial community can now utilise them, biological activity rises, and wastewater is more efficiently treated.

## BIOAUGMENTATION LEADS TO BETTER RESULTS IN MACRONUTRIENT DEPLETED SYSTEMS

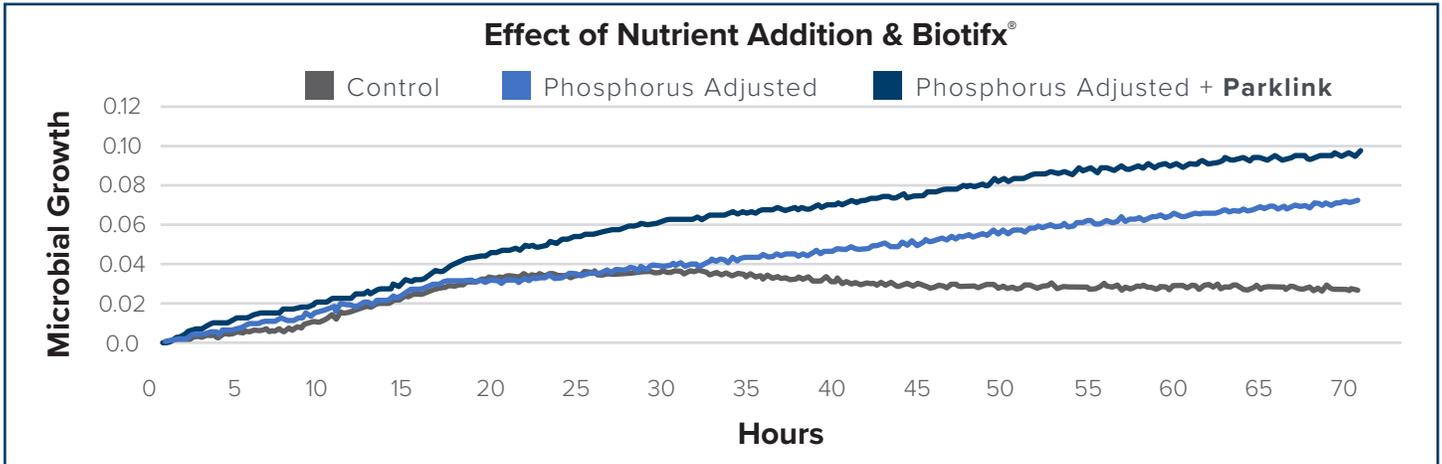
Having bioaugmentation and all the nutrients needed for microbial activity and growth allows for wastewater to be treated most efficiently. But often nutrients are limited in a system. Below, we talk about balancing those limited nutrients and how this can further be amplified with bioaugmentation.

When nutrients in wastewater are limited, microbial growth and activity will slow down which reduces wastewater treatment. But equally important is having microbes with the ability to digest a multitude of organic material within wastewater.

**In a system with the following ratio of macronutrients:**

**1,000mg/L BOD, 300mg/L Nitrogen, and 1mg/L Phosphorus**

In this case, phosphorus is limiting because its below the optimal level needed to digest 1,000mg/L BOD, and that will stall microbial growth (**Figure 1**). This holds true with other nutrients, but is most dramatic with macronutrients like carbon, nitrogen, and phosphorus.



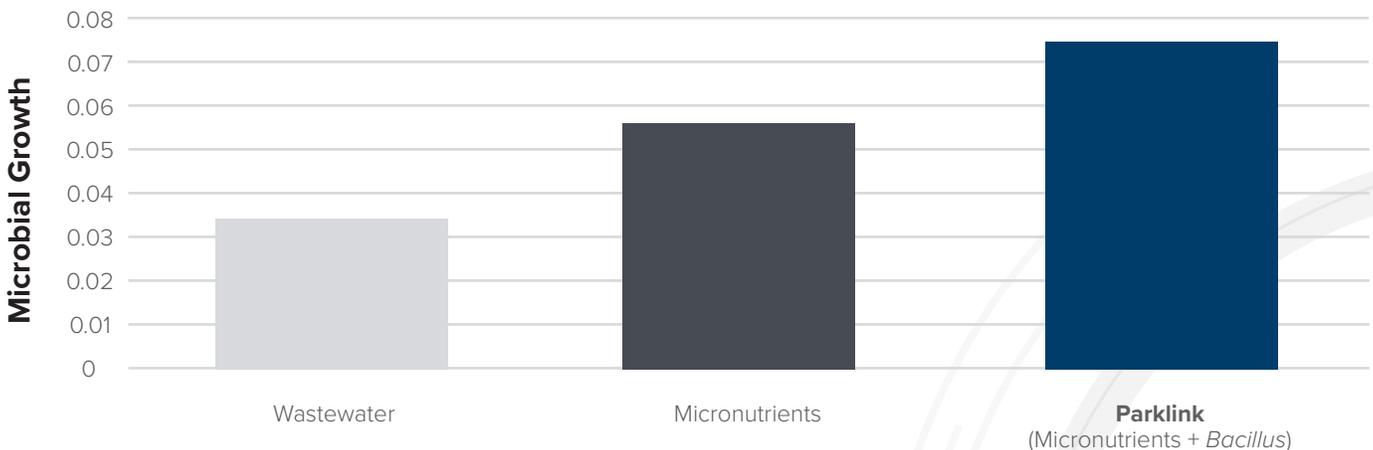
**Figure 1:** In this example, phosphorus is limited, and here we can see how microbial activity is improved by supplementing phosphorous. Furthermore, this improvement is further amplified with our bioaugmentation.

### BIOAUGMENTATION + MICRONUTRIENTS BENEFITS MORE THAN MICRONUTRIENTS ALONE

Micronutrients can only help the organisms already present in a given system. Many microbes are not high performers in their ability to produce enzymes, digest complex organic material, or withstand severe environmental changes. Many organisms don't have the genetics to produce a multitude of enzymes to break down fats, oils, and grease, sludge, digest odorous compounds, or prevent hydrogen sulfide. This is why we've cultivated the strains we add to our products, because they do have these highly beneficial abilities.

Micronutrients are built into our products because we know how beneficial they are. At Parklink, we work to ensure our clients are always getting the most benefit in wastewater treatment.

### Benefits with Micronutrients and Bioaugmentation



**Figure 2:** Wastewater activity increased with micronutrients, but it further improved with added organisms that genetically have more ability to do more work within wastewater.

### SUMMARY

In summary, micronutrients are good but adding high-performing bioaugmentation is better. Better strains of bacteria coupled with excellent micronutrients and balanced macronutrients leads to better performance.