Increasing microbial diversity in sand-based soils with humic substances of APEX-10

Microorganism diversity is critical to the maintenance of healthy soils of sand-based sports turf. Complex populations of microorganisms responsible in the cycling of organic matter are involved in all aspects of soil functions and the sequestering of nutrients in all soils.

Research with APEX -10 in sand-based root zones of both cool season and warm season grasses show increases of biomass quantity and activity, while making nutrients more available to the plant and reducing the leaching of nutrients through the soil.

When the humic substances of APEX-10 were compared to the humic substances of leonardite results again demonstrated an increase in biomass and biomass activity.

Background of procedure

The Soil Foodweb Incorporated, a commercial enterprise focusing on the research and practical understanding of soil organisms, examined the effects of APEX-10 on soil microorganism reproduction and activity. All soils in the study did not receive any fertilizer nor was any vegetation grown on the soil throughout the study.

Trial standards

A base soil was mixed and tested to determine baseline levels of total and active bacteria and fungi, total protozoa, nematodes, and total available nitrogen prior to the start of the trial.

APEX-10 was applied at two different rates in three separate plots for each rate **and** three separate plots **were used** for the control, **which did not receive APEX-10**. The low rate was applied at 3 oz. per 1000 sq. ft. and the high rate at 6 oz. per 1000 sq. ft. with the control receiving water only.

The soils were assayed at 7, 30, and 60 days with three samples from each plot taken during each interval. At the completion of the study a composite sample was made of the soils of the three low rate plots and the soils of the three high rate plots, protozoa and nematodes were assayed to determine the increase in their numbers, these two composite samples were also sent to Rutgers University for chemical analysis.

At the 7-day interval an increase in fungal activity was detected in both the low and high rate plots, with a more significant increase in the high rate plots. Total fungal biomass showed very little change at the 7-day interval. The total bacterial biomass had increased nicely during the same interval, and again a more significant increase was detected at the high rate.

At the 30-day interval bacterial activity and fungal activity had increased in the low rate plots, while both bacteria and fungi activity had slowed in the high rate plots, with the total fungal biomass increasing in the high rate with.

At the 60-day interval the active fungal biomass was again increased, most likely as a result of the on-going applications of APEX-10. Total bacterial and fungal biomass increased at the low rate and high rates compared to the control, and these increases are likely a result of the higher population of protozoa and nematodes in plots treated with APEX-10, which feed on bacteria and fungi.

Summary

APEX-10 provided resources for bacteria and fungi growth and activity from the start of the project, indicating that this is a quickly colonized resource for fungi and bacteria growth. It was also observed that APEX-10 had significant growth capabilities with the fungal biomass maintaining consistent growth and activity throughout the trial.

The increase in predatory microbes (protozoa & nematodes) was significant from the beginning of the project to the end of the project and due to the increase in bacterial and fungal biomass, and the good growing conditions attributed to the food sources provided by APEX-10. This increase of predatory microbes led to very nice increases in nutrient cycling demonstrated by the available nitrogen retained in the soil by the soil predators.

Results from the chemical analysis conducted at Rutgers University yielded lower extractable micronutrients and lower extractable macronutrients in both the low-treated soils and high-treated soils. This coincides with the increase in the soil biology, indicating that the population of microorganisms in the soil is retaining higher levels of nutrients as a result of the increased biomass and activity provided by the food sources of APEX-10. ■

Biomass increases 60-day soil foodweb study

	Low Rate	High Rate
Active bacterial biomass	39%	-6%
Total bacterial biomass	46%	67%
Active fungal biomass	35%	32%
Total fungal biomass	54%	77%
Flagellates	395%	504%
Amoebae	2,480%	3,091%
Ciliates	350%	650%
Beneficial nematodes	2%	15%
Available nitrogen lbs/acre	400%	667%

Biomass increases 12-month field trial on bermudagrass

	APEX-10	Leonardite
Active bacterial biomass	31%	
Total bacterial biomass		14%
Active fungal biomass	87%	
Total fungal biomass	100%	
Flagellates		79%
Amoeba	30%	
Cilliates	142%	
Beneficial nematodes	84%	
Endo mycorrihzal colonization	260%	