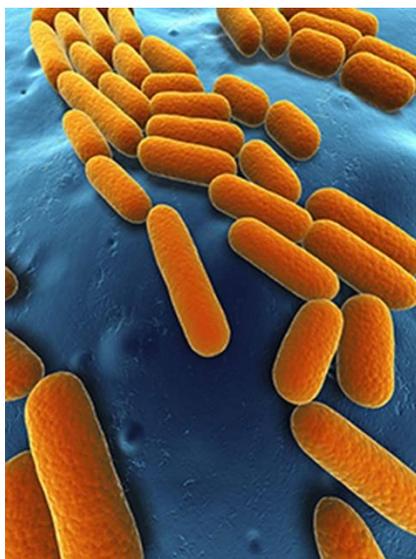


Bacillus Subtilis

Known as hay bacillus or grass bacillus, is a gram-positive, catalase-positive bacterium, found in soil and the gastrointestinal tract of ruminants and humans. A member of the genus *Bacillus*, *B. subtilis* is rod-shaped, and can form a tough, protective endospore, allowing it to tolerate extreme environmental conditions. *B. subtilis* has historically been classified as an obligate aerobe, though evidence exists that it is a facultative aerobe. *B. subtilis* is considered the best studied gram positive bacterium and a model organism to study bacterial chromosome replication and cell differentiation. It is one of the bacterial champions in secreted enzyme production and used on an industrial scale by biotechnology companies.

The main habitat of endospore forming *Bacillus* organisms is the soil. Likewise, *Bacillus subtilis* is most commonly found in soil environments and on plant undergrowth. These mesophilic microbes have historically been considered strict aerobes. Thus they are likely to be found in O and A surface horizons where the concentration of oxygen is most abundant and temperatures are relatively mild.

Consider how this organism functions in a competitive microbial community: when carbon, nitrogen, and phosphorous nutrient levels fall below the bacterium's optimal threshold, it produces spores. Antibiotic production increases *B. Subtilis* chance at survival as the organism produces spores and a toxin that might kill surrounding gram positive microbes that compete for the same nutrients. These microbes form spores in times of nutrient exhaustion. When the nutrients required for the bacteria to grow are abundant, they exhibit metabolic activity. These organisms can produce antibiotics during sporulation. Examples of antibiotics that *Bacillus subtilis* can produce include polymyxin, difficidin, subtilin, and mycobacillin. Many of the *Bacillus* microbes can degrade polymers such as protein, starch, and pectin, therefore; they are thought to be important contributor to the carbon and nitrogen cycles. When they cause contamination, they may result in decomposition. Actually, quite a few of the *Bacillus* organisms are primarily responsible for the spoilage of food.



Micro N (concentrated micronutrients)

Wastewater and soil is often depleted of key nutrients. Without these nutrients, the natural flora and bioaugmented microbes will stop dead in their tracks. The microbes are only as strong as their limiting nutrient. While a lot of focus is directed toward maintaining the correct CNP ratios, not enough attention is put on the micronutrients. Many types of wastes, especially pharmaceutical, pulp and paper and petroleum hydrocarbon waste are depleted of key vitamins and minerals. MicroN provides a basal level of over 100 essential vitamins and minerals required to support microbial life. Rather than constantly testing the wastewater or soil for missing nutrients, treatment becomes much easier by dosing MicroN on a regular basis. MicroN when applied with microbial products such as SumaGrow will make a believer out of anyone.

Common Applications

-Soil remediation

-Anaerobic digesters

-Plant soil amendments

-Accelerated waste digestion

Range of Use

- Temperature (45-120F)
- pH(4.5-10)
- Aerobic/Anaerobic
- Avoid using with harsh chemicals

Most Effective Use Ranges

- Temperature (68-104F)
- pH(6-8)
- Aerobic or Anaerobic
- 30% moisture or higher for soil
 - Use along with proper CNP adjustment