



Welcome to Ground Work

Dear J.P.,

The phyllosphere is the above-ground surfaces of a plant. These aerial surfaces, which include leaves, stems, branches, fruits, and flowers, provide habitat for microbes. A numerous and diverse microbial community exists in the phyllosphere. Many different species of bacteria, fungi, yeasts, algae, protozoa, and nematodes can be found inhabiting the phyllosphere. Bacteria are by far the most numerous colonists. There are usually between 1,000,000 and 100,000,000 bacteria cells per square centimeter on an average leaf surface. That's a lot of microbes.

Bacterial populations vary greatly throughout the year. These variations are caused by fluctuations in the physical and nutritional conditions of the phyllosphere. The foliar surface of a plant is a hostile environment for microbes. There are rapid changes in temperature, humidity, moisture, and solar/UV radiation as well as a limited nutrient supply. Some microbes have adapted to these extreme conditions and are able to colonize and spread throughout the phyllosphere. Many of the bacteria that live on foliar surfaces are pigmented which protects them from UV radiation. Large fluxes of UV radiation make it difficult for some non-pigmented microbes to live in the phyllosphere.

Plant species influence the microbial carrying capacity of the leaf. One study found that total numbers of bacteria recovered from broad-leafed plants such

as cucumber and beans were significantly greater than numbers recovered from grasses or waxy broad-leaf plants. They also found that young leaves tend to have greater diversity than old leaves.

Pathogens are also able to colonize the phyllosphere. There are many diseases in plants caused by bacteria and fungi that live on foliar surfaces. Several human pathogens, including Salmonella and E. coli, have the ability to colonize corn and beans under humid conditions. That's why it is important to have a healthy and diverse population of beneficial microbes inhabiting the phyllosphere. If there are beneficial microbes living on the leaf surface, it makes it harder for the pathogens to get established.

Make sure you and your customers utilize the benefits of SP-1 in your fertility programs throughout the growing season. The microbes in SP-1 will benefit your crops, both in the soil and on the leaf surface. Including SP-1 in foliar applications this summer will put beneficial microbes in the phyllosphere where they will:

- consume nutrients/sugars/carbon exuded by the plant
- fix nitrogen from the atmosphere which can then be absorbed by the plant
- catch nutrients that leak out of a plant and slowly release those nutrients back to the plant during their life cycle