



## Why Protein Crumbles® From a Microbial Point of View

By Michael Martin Meléndrez

I'm often asked, why do we use the type of protein we have in Protein Crumbles and isn't Horticulture Grade Molasses or Fish emulsions, Chicken manure, and Feather meal just as good at feeding the microbes of the soil a nutritional calorie. In recent years the phrase Soil Food Web has been used a lot in circles of organic and sustainable agriculture. It considers the flow of nitrogen from the smallest microbial animal on up to the largest animal, with somebody getting consumed by somebody larger. At each trophic level of life an excess of nitrogen is not needed by the consumer with this excess then becoming available for plants to use. On every spot on earth where a plant can grow something has died and contributed its body parts to the feeding of the microbes. It's been my opinion for over two decades that the behavior and the health of the soil microbes is contingent upon the type of organic matter that is decomposing and that protein plays a huge role in the development of soil Recalcitrant Carbons (the Humic Acids) and the macroaggregate structure of

### Study Examines Stressful Deaths

■ *State of insect's body before death affects state of soil, environment*

By JON BARDIN  
*Los Angeles Times*

LOS ANGELES — The next time you kill an insect, you might want to do it quickly — for the sake of the environment.

New research shows that whether an animal lives in safety or is terrorized by a predator can change the biochemical trajectory of the local ecosystem where it dies.

A study published in Friday's edition of the journal *Science* shows that when a grasshopper dies, the chemical composition of its decomposing body also has a large influence on the microscopic processes going on in the area's soil. And the chemicals in the corpse are influenced by the dread of living near a killer spider.

To create a group of serious-

ly stressed-out grasshoppers, researchers in a Yale University forest field site in Connecticut placed the bugs in enclosure with spiders. (The spiders' mouths were glued shut, but the grasshoppers didn't know that.) This induced physiological changes in the scared grasshoppers that were not seen in a control group of grasshoppers, said study leader Dror Hawlena, an ecologist now at Hebrew University of Jerusalem.

The presence of spiders also changed the way the grasshoppers ate in a way that mirrors the human response to stress, said Yale ecologist Oswald Schmitz, the study's senior author.

"The grasshoppers stop eating grasses, which have lots of protein, and start eating goldenrods, which contain lots of carbohydrates," Schmitz said. That's similar to how stressed-out students reach for a bag of potato chips before exams.

This switch from a protein-rich diet to a carbohydrate-heavy one turned out to be key. Protein con-

tains enzymes and nitrogen that help microbes in the soil break down plant matter, and this process is a key part of normal ecosystem function.

The researchers ground up the grasshopper corpses and mixed them with soil. After six weeks, they added dead grass and watched to see how effectively the soil was able to break it down. They found that the dirt with the remains of calm grasshoppers was far more efficient in breaking down plant matter than the dirt containing the remains of stressed grasshoppers.

For Hawlena, the results have changed the way he sees the natural world.

"If you look around you, in pretty much every spot something at some time has died — in one place a mouse, in another a grasshopper, in another a deer," he said. "Each one of those places is going to behave totally differently from a microbial point of view. What you are seeing is the legacy of all that has died there."

soil. It's for this reason that I developed the use of Protein Crumbles as a high quality protein for feeding the microbes of the soil and the reason we try to focus on the concept that the product is truly a nutritional calorie with many characteristics and not just a source of nitrogen. Here's an interesting article that takes the concept a bit deeper, involving how a grasshopper eats and how its decomposing body impacts the soils microbiology because of what it ate. It's all about Protein being the 'Right Stuff' for feeding the soils microbiology and instigating the natural process of the Soil Food Web. The attached article is quoting published studies that have disclosed that not all decomposing organic matter is equal and when grasshoppers eat vegetation that's low in protein and high in cellulose (carbohydrates), the eminent decay of those grasshoppers impacted the eco-system function of the microbes living in that environment.

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