

# Can Fungi Help Save Us Again?

Robert Beelman, Professor Emeritus of Food Science,  
Pennsylvania State University, rbb6@psu.edu

One of the great advances in science and medicine was the result of the accidental discovery of a fungal contaminant in a Petri dish that eventually led to the development of the antibiotic penicillin. This fortunate observation by Sir Alexander Fleming occurred in 1928 and eventually resulted in him being awarded the Nobel Prize in 1945 and ushered in a revolution in medicine that saved countless lives from deadly bacterial infections.

In 1909 another fungal metabolite was discovered with little notice in Ergot fungus and it was appropriately named Ergothioneine (ERGO). For many years little attention was paid to ERGO until some curious investigators found that it occurred in relatively high concentration in some animal and human blood samples and traced it back to certain foods they consumed. Later it was determined that only fungi and a few other microbes can produce ERGO and that fungi were the primary source in the diet. In 2005 a major discovery was made that all mammals, including humans, produce a highly specific and efficient transporter for ERGO that rapidly moves it from food into red blood cells that distributes among body tissues where it has potent antioxidant and anti-inflammatory functions that appear to help mitigate chronic diseases of aging like Alzheimer's and Parkinson's Disease. This led some scientists to suggest that ERGO should be considered a longevity vitamin and spurred investigations on how ERGO in the diet might improve long-term health outcomes and increase life expectancy.

Mushrooms are by far the richest dietary source of ERGO but it has also been found in much lower amounts in numerous foods. Unfortunately, the relatively low mushroom consumption in America appears to contribute to low ERGO in our diet. A recent study estimated that we only consume about 1 mg per day while other countries consume over 4 mg per day. This led our researchers at the Center for Plant and Mushroom Foods for Health at Penn State to ponder factors that contribute to ERGO levels in our food supply. We hypothesized that ERGO must be coming from fungi in soil that pass it on to plants through their roots and that farming practices that adversely affect healthy soil-borne fungal populations could negatively impact ERGO levels in our food. We subsequently determined some of our conventional agricultural practices such as excessive tillage of the soil (deep plowing) appears to disrupt fungal networks in the soil and reduces ERGO content of crops. Fortunately, we have shown that some regenerative farming practices

such as minimal disturbance of soil at planting (No-Till) can mitigate this problem allowing fungi in the soil to supply more ERGO to our food crops.

Obviously, penicillin-producing fungi once had a profound impact on our health when infectious diseases were a major cause of mortality. Now, chronic inflammatory diseases are rampant with sixty percent of Americans suffering from at least one of them. Hence, ERGO-producing fungi in our farm soils will likely have a more subtle, but perhaps an even more long-lasting, improvement in our health outcomes. Also, regenerative farming practices help to reduce soil erosion and sequester more carbon in the soil that mitigates climate change helping us live longer, healthier lives.

## Further reading

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