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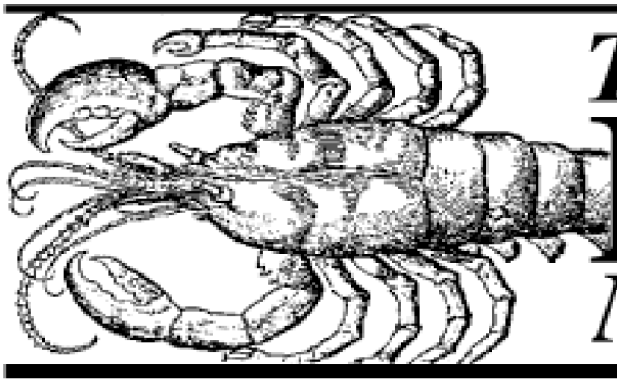

The Lobster NEWSLETTER

A New Look for *The Lobster Newsletter*! What do you think?

We finally decided to take a leap into the 21st Century and give ***The Lobster Newsletter*** a new format. We're eager to know what you think. This new MailChimp format has some important advantages. Chief among them for our readers is the ability to scroll through the articles in the body of an engaging email format and link directly to articles of interest. MailChimp also provides valuable analytics on viewership. And it still can be archived, as always, on the Newsletter website hosted by Western Australia Fisheries.

Let us know what you think!

Send your comments and questions to the editors,

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Happy reading!

Rick & Nick

Lobster shell meal as a soil amendment for disease suppression in potatoes

From: Katherine Ashley and Jianjun Hao

It turns out that lobsters and potatoes may go together in more than just a culinary sense! Maine's cold coastal waters encourage shellfish production, including crustaceans, such as crabs and the American lobster. Lobsters are well known to be the mainstay of Maine's coastal economy, and now, their shells could play a role supporting the state's most valuable crop – potatoes! In 2019, 51,500 acres of potatoes totaling a yield of 1,673,800,000 pounds were grown in Maine (USDA 2021). As with other agricultural products, the potato industry is challenged by the ever-present issue of soilborne diseases.

A greenhouse pilot study initiated this year at the University of Maine will extend into field trials in 2023 to evaluate lobster shells as a tool for reducing potato diseases. The thought is that lobster shells ground into a fine powder, referred to as lobster shell meal (LSM; Fig. 1), could decrease the impact of soilborne diseases and consequently increase yields of potatoes. Soilborne diseases are commonly managed with various strategies, including using tolerant or resistant varieties, chemical treatments, such as soil fumigation, and cultural practices. An example of cultural practices is the addition of organic soil amendments which can stimulate disease-suppressive beneficial microbial communities in addition to improving soil quality and nutrient availability to plants (Larkin 2015).

Figure 1. Lobster shells post-processing (left), and lobster shell meal (LSM) before mixing into soil (right).

Early indications from our greenhouse studies suggest LSM amendment could have a positive effect on potato growth (Fig. 2). Depending on the source, soil amendments have different functions and effects on soilborne pathogens and potato growth and nutrition. Therefore, it is critical to understand how an amendment works before using

it. For example, an amendment such as LSM contains a high concentration of chitin, the second most common polysaccharide on earth, after cellulose; it isn't surprising therefore that many organisms have adapted to degrade chitin and utilize it as a nutrient source (Ramirez et al. 2020). Chitin-rich soil amendments can promote native communities of beneficial soil microbes, such as actinomycetes, which can degrade chitin. Once the populations of these microbes have been built through the decomposition of the shells, they are present in large numbers to suppress other chitin-containing pests, such as nematodes and fungi (Ramirez et al. 2020).

Figure 2. Potato plants with differing levels lobster shell meal (LSM) amendment; in this case without disease added. The left-hand row was not amended with LSM, the middle row was amended with a lower rate, and the right-hand row was amended with a higher rate. These plants were planted approximately one month before photographing.

There are several ways these beneficial microorganisms can suppress plant pathogens, such as directly degrading and feeding on the pathogens' cells or other structures containing chitin as a major structural component or by producing antimicrobial substances (Ramirez et al. 2020). The increase of beneficial microbial communities through the introduction of organic matter could also be described as an improvement of soil health. Soil health is a critical factor of sustainability and longevity of agricultural lands. In order for farmers to continue practicing agriculture for generations to come, sustainable practices contributing to soil health and subsequent plant health are of utmost importance (Larkin 2015). Agricultural practices which rely on the existing ecology of microbes in the soil to assist in disease suppression, as opposed to solely chemical application methods, encourage this longevity and reduce the impact on the environment resulting from chemical application.

A second aspect of this study is the innovative utilization of lobster byproducts post-processing to remove them from the waste stream. According to the Maine Department of Marine Resources, approximately 96.6 million pounds of lobsters were harvested in 2020 in the state of Maine, a portion of which were sold fresh, and another portion were processed to be distributed both nationally and internationally. Of the lobsters processed and sold by the state of Maine, a local processor estimated that shell byproducts could constitute approximately 25% of the weight. While a portion of lobster shell waste is composted, the majority is sent to landfills (Skonberg and Bolton 2012). This can become an economic challenge for processors, as disposing of lobster

shell waste can be costly. For example, it can cost a facility processing 15,000 pounds of lobster per day, upwards of $4000 per month in disposal fees (Skonberg and Bolton 2012).

Overall, this study will address two problems by both advancing sustainable agriculture and longevity through soil health and by reducing the post-processed waste stream of lobster shells. Maine is uniquely positioned as a state with a wealth of agricultural production amidst the highly valuable lobster industry. The use of lobster processing waste as a soil amendment could help build collaboration between these two vital industries in the state of Maine. While lobster shells are already used on a few farms as a fertilizer, the potential benefit of disease suppression and impacts to the native soil microbial community will be further investigated in this study. Who would have thought that lobsters and potatoes could pair so nicely before they even hit the plate?

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The Lobster Newsletter is published electronically once or twice yearly.

Contact Nick Caputi (southern hemisphere) or Rick Wahle (northern hemisphere) about article submissions and inquiries or corrections to the Lobster Newsletter mailing list.

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