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TITLE: WHEY-BASED FUNGAL MICROFACTORY TECHNOLOGY FOR ENHANCED BIOLOGICAL PEST MANAGEMENT USING FUNGI

INVENTOR: Scott Costa

DESCRIPTION: Whey-based fungal microfactory technology targets improvement in field deployment of fungi for biological pest management of insects, weeds, plant diseases and other pests. This technology relies on the nutritive value of sweet whey, which allows fungi to grow in tiny droplets after their application into environment, such as when sprayed onto leaves in agricultural fields or forests. The tiny fungal factories spontaneously activate under suitable environmental conditions and produce dramatic increases, as much as 100-fold, in the number of fungal spores for pest management. The additional fungus increases the dose available for infecting the pest. When fully developed, whey-based fungal microfactory technology should enhance the effectiveness and commercial potential of the many beneficial fungi under development for pest management worldwide.

ADVANTAGES: Most fungi used for biological pest management are relatively simple to mass-produce but production processes are space intensive and may involve costly growth substrates. This can make their final cost comparatively more expensive than chemical pesticides, and often limits fungal commercialization to only smaller, high value markets. Whey-based fungal microfactories rely on sweet whey, an inexpensive by-product from cheese manufacturing. The intention is to shift a significant portion of fungal production to post-application, out of 'brick and mortar' facilities and into nature. The tailoring of this technology to different fungi should dramatically improve the cost effectiveness of fungal biological control agents and enhance their contribution to environmental quality by reducing pesticide usage.

For fungi to be effective, the 'infectious units' must come into direct contact with the target pest. Fungal microfactories should allow greater opportunity for fungus/pest contact because of the high level of fungi produced and thus overcome physical and economic constraints of current strategies based on directly applying large amounts of fungi. In addition, some pests live in places that are difficult to reach and the additional fungi from microfactories would further enhance pest contact.

Pesticide failures and environmental concerns generate considerable incentive to commercialize the many fungi identified to target members of most pest classes, e.g., insecticide resistant whitefly in cotton, methyl bromide replacement, mycotoxins reduction in stored grains, plant re-growth along power lines and combating invasive pests. For fungi targeting insects, the past 4 decades have seen 80 companies worldwide manufacture or develop 168 fungal myco-insecticides. Yearly, US-EPA grants registration to fungi for pest management, and the scientific literature is replete with publications on numerous mycopathogens for biological pest management. Current fungal microfactory research is directed at the hemlock woolly adelgid, an invasive insect of forests, with recent press releases having generated considerable interest (see link). Whey-based microfactory technology has the potential to facilitate widespread expansion in the adoption fungi for biological pest management. http://www.uvm.edu/~uvmpr/theview/

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