Commentary

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Acetic Acid Treatment with Drying Treatment

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Description

Although the biopesticide Bacillus thuringiensis has been widely used in pest control, large-scale production is costly due to the high costs of the medium and production method. We tried to grow Bacillus thuringiensis using inexpensive penicillin fermentation waste in this study. Under the following conditions, the waste samples from the penicillin fermentation without pretreatment, with Na2CO3, acetic acid, and drying treatments, respectively. The waste product of penicillin fermentation treated with Na2CO3 produced the highest cell counts. By cultivating B. thuringiensis 2387 in a medium containing 5% penicillin fermentation waste matter, a maximum spore count of 24.5108cfu/ml was achieved. Bacillus thuringiensis biopesticide (Bt insecticidal concentrate) had a potency of approximately 8,000 IU/mg. In the field trial, the Bt insecticidal concentrate was effective against Pieris rapae, Plutella xylostella, and Heliothis virescens to 77–90 percent.

Harmful Hemipterans in Agricultural Environment

A new option that has the potential to lessen the need for chemical pesticides is bio-pesticides, which make use of beneficial microbial agents. This study uses Cry gene content and toxicity evaluation to select and characterize Bacillus thuringiensis strains in order to make crop pest control easier. Helicoverpa armigera is the end result, a pest control polyphagous lepidopteran that is safe and effective. We selected ten soil bacteria samples from ten distinct agricultural regions in Queretaro State, Mexico; to accomplish this goal. SDS-PAGE analysis of spore-crystal mixtures confirmed the presence of 65 and 130 kDa protein bands. Maximum mortality was observed with bio pesticides whose efficacy was 4 g/L effective water. The tomato fruit borer larvae were eliminated in average by 64.88 percent. The distance between the 16S rRNA gene sequences of Bacillus thuringiensis and the PCR sequences of the bacterial strain that was compared was 98–99 percent. It is common knowledge that the toxins produced by Bacillus thuringiensis kill Lepidoptera, Diptera, and Coleoptera. However, the sap-sucking insects known as Hemiptera are not particularly vulnerable to the toxins produced by Bt. One of the most harmful hemipterans in the agricultural environment, Myzus persicae, was killed by Cry toxin from Bt strain GP919, as we show. At a concentration of 10 ng/l and a LC50 of 9.01 ng/l, the mortality bioassay demonstrates that the strain results in mortality rates greater than 80 percent; whereas Spodoptera frugiperda, a lepidopteran, was not harmed by it. Purification, solubilization, and trypsin digestion were performed on this strain's mayor protein (130 kDa), and ion-exchange chromatography was used to purify the band of 65 kDa that was used to feed the aphid. At a concentration of 10 ng/l, the bioassay reveals mortality rates greater than 85 percent and an LC50 of 6.58 ng/l. Mass spectrometry was used to find the digested fragment, and the candidate protein shared a 100% amino acid sequence with the previously identified Bt protein Cry1Cb2. We also document the signs of infection caused by the GP919 strain, which was used in Koch's postulated as well. This is the first report of a Cry1Cb2 protein that is toxic to sucking insects. This protein has the potential to become a promising, low-impact method for controlling M. persicae and possibly other pests of sucking insects.

B. Thuringiensis Strains Found in Food

Bacillus thuringiensis-based plant protection products have been used to combat agricultural pests for decades and are the most widely used biopesticide in the world. However, there is increasing concern that food-borne B. thuringiensis residues may occasionally cause human diarrhea. This has recently sparked a slew of research projects and lively discussions among scientists, authoritative authorities, and the general public.We provide a structured overview of the current understanding of B. thuringiensis as a cause of foodborne infections in humans and identify research gaps that need to be filled for improved risk assessment to support this discussion. We look at recent changes to the B. cereus group's taxonomy; B. thuringiensis's contribution to the transformation of agrosystems and important factors to take into account when evaluating the risk posed by B. thuringiensis strains found in food. We conclude the B. cereus taxonomy is deteriorating, B. thuringiensis based biopesticides are crucial to the achievement of the United Nations' sustainable development goals and risk assessment must shift from taxonomy-driven considerations to strain-specific identification of virulence and pathogenicity traits. Additionally, we provide an overview of pertinent risk-related data for commonly used biopesticide strains. Recycling precious metals from waste and remediating the environment both

require microbial reduction, which is a sustainable method. Such a strategy is the mildly induced, bacteria-mediated reduction of palladium ions in wastewater. However, palladium bio reduction typically requires external electron donors. Bacillus thuringiensis Y9 a novel gram-positive bacterium, was found to use endogenous electron donors to convert Pd2+ into palladium nanoparticles (Pd-NPs).443 and 439 differentially expressed genes were found to be affected by palladium treatment in anaerobic and aerobic conditions, respectively, according to transcriptomic analyses. In B. thuringiensis Y9, the genes ribE, NADH-quinone oxidoreductase, dehydrogenases, cytochrome c reductase, cytochrome c oxidase, quinone cycle, and palladium reduction were found to have a strong positive relationship. B. thuringiensis Y9's palladium removal efficiencies reach as high as 93 mg g-1 in anaerobic conditions and 60 mg g-1 in aerobic ones. Additionally, the bio reduction process relies heavily on hydrogenase. Using response surface methodology (RSM), the primary influencing factors were used to achieve the maximum Pd removal ratio of 99.18 percent.A novel and long-term strategy for recovering Pd from wastewater is presented in our study. The transcriptome data are useful for comprehending the palladium microbial conversion's global bio reduction mechanism. Extracellular microbial polysaccharides have a number of good properties and could be used as a prebiotic. High-cell-density fermentation was used to isolate the extracellular polysaccharide BPS-1 from Bacillus thuringiensis and optimize its production using response surface methodology. Rhamnose, arabinose, glucosamine, galactose, glucose, and mannose all make up BPS-1, a heteropolysaccharide with a molecular weight of 35.6 kDa and molar ratios of 3.7:1.7:4.5:1:3.1:1.1. NMR and FT-IR analysis revealed its structural characteristics and functional groups. The HcoEpiC and LoVo cell lines were used to test BPS-1's cytotoxicity. In an in vitro fermentation model, BPS-1 was also examined for its potential effects on human gut microbiota.BPS-1 significantly enhanced the production of short-chain fatty acids and increased the relative abundance of beneficial bacterial genera during 48 hours of anaerobic fermentation by healthy human fecal bacteria. This is the first report of BPS-1's prebiotic potential produced by Bacillus thuringiensis, laying the groundwork for its use in the food industry.