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Determination and management of quorum sensing signals produced by *Pectobacterium*, a blackleg pathogen

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Blackleg, a bacterial disease caused by *Pectobacterium atrosepticum* (Pba) inflicts incredible losses to potato crop in fields. In *Pectobacteria,* pathogenicity and virulence is regulated through quorum sensing (QS) in a density dependent manner utilizing N-acyl homoserine lactones (NAHLs) as QS signaling molecules. Interference with QS through Quorum quenching (natural or engineered) is a demonstrated biocontrol tool. In this study, potato plants with characteristic blackleg symptoms from Okara district of Punjab were investigated and the pathogen responsible for the disease was identified as Pba through pathogenicity, biochemical (Crystal Violet Pectate) and tuber assays. PCR analysis of *Pectobacterium* was also done by using gene specific primers. NAHLs produced by the local Pba strains were determined and evaluated through biosensor based plate assays using *Chromobacterium violaceum* (Cv026) and *Agrobacterium tumefaciens* (NTLR-4) biosensors. Also, several NAHL degrading strains were sorted out from rhizosphere soil and their ability to degrade exogenous NAHLs was evaluated. Out of 38 bacterial isolates, eight effective quenchers were then trialed against *Pectobacterium* under plate and tuber assays that effectively reduced *Pectobacterium* based infections.

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Comparative study of the effects of five *Beauveria bassiana* (Balsamo) Vuillemin (Ascomycota: Hypocreales) strains on cabbage moth *Plutella xylostella* (L.) (Lepidoptera: Plutellidae)

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Agriculture is adversely affected by numerous pests and insects, leading to reduced yield and poor quality of the products. Use of synthetic pesticides was the most common method for pest control in many agricultural crops. These synthetic chemical has harmful effects on crops, animals and also human beings. In this research, green regulation technology was applied in order to control the harmful effects of pesticides. Also, laboratory experiment was conducted at the International Institute of Tropical Agriculture Benin, to study the virulence of *Beauveria bassiana* (Balsamo) Vuillemin (Ascomycota: Hypocreales) strains (Bb6, Bb11, Bb115, Bb116 and Bb362) on cabbage *Plutella xylostella* (L.) (Lepidoptera: Plutellidae). The doses 0 (control) 10^4 10^5 10^6 10^7 10^8 and 10^9 conidies.ml^{-1} of 5 different strains of *Beauveria bassiana* (Balsamo) Vuillemin (Ascomycota: Hypocreales) were applied topically on the third stage larvae of P. xylostella. After the application of doses, the survival rate of larvae was examined after the direct effect of doses on strains in cages at greenhouse conditions. Different types of parameters of larvae were measured in terms of mortality and sporulation rates, the number of pupae formed the number of adults that emerged and number of eggs laid by survived adults. Collected data was used for statistical analysis, using Cox-regression. The results, we concluded that Bb11 strain of *Beauveria bassiana* (Balsamo) produced virulence compared to other strains at 10^9conidia/ml. On the other hand, Bb6 strains lower virulence at 10^9conidia/ml as compared to control dose. Due to the larvicidal effect of different fungus strains, the percentage of female adult decreased significantly less of with their weight development control.

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