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Phytobacter diazotrophicus from intestine of *Caenorhabditis elegans* confers resistance to *Bacillus nematocida* colonization with a flagellin FliC as an inhibition factor

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To identify the strains and mechanism of the three bacterial strains with strong colonization-resistance against pathogenic bacteria *Bacillus* nematocida B16, which were isolated from intestine of free-living nematode *Caenorhabditis elegans* in rotten fruit and soil. In this study, Multilocus phylogenetic analysis was performed to study the taxonomic status of these bacterial strains base on the sequence of *16S rRNA, atpD, gyrB*, infB and *rpoB*. In addition, the digital DDH (DNA-DNA hybridization) and ANI (Average Nucleotide Identity) analysis were carried out to confirm the classification conjugating morphological characteristics including bacterial colonies, cell shape, size and motility, and physiological characteristics. The results showed that three strains SCO41, BX15, and BC7 from the intestine of *C. elegans* were classified to be *Phytobacter diazotrophicus*. The extracellular proteins presented remarkable resistance to *B. nematocida* colonization. A homogeneous extracellular protein with resistance activity was purified and the gene was cloned according to the MALDI-TOF/TOF MS and MS/MS analysis. The deduced amino acid sequence showed significant similarity with flagellin FliC. The molecular mass of the purified protein was 37 kDa. Both purified wild and heterologously expressed proteins promote adhesion of the B16 cells to affect their normal division in vitro, and inhibit B16 colonization in intestines of *C. elegans* in vivo. It is the first report of the isolation of *P. diazotrophicus* from intestinal tract, which confers resistance to pathogenic bacteria *B. nematocida* B16 infection. Our work provides novel insights about the possible ecological niches and shows potential interesting light on the lifestyle of *P. diazotrophicus*.