Beta-hydroxybutyrate (bHB) is an intermediate metabolite during oxidation of fatty acids. Literature data indicate that bHB is not only a metabolite, but also an important signal molecule in mammalian cells. However, there is no data about the metabolism and function of this compound in plants, although there are reports that it can be synthesized from acetic acid. Preliminary studies performed by us indicate that this compound occurs naturally in flax, and plants with overproduction of the polymer of this compound are characterized by increased resistance to fungal infection of pathogens from the genus *Fusarium*. The research implied in the project will answer the question whether one of the functions of bHB is the defense of plants against pathogenic infection. The research material will be plants with altered content of beta-hydroxybutyrate. These plants will be subjected to a comparative analysis regarding alterations at the level of the genome, epigenome, transcriptome and metabolome. The main goal of the project is to determine the function of bHB in the response of flax to the fungal infection, therefore obtained plants will be exposed to the action of *Fusarium oxysporum* and *Fusarium culmorum*. The characteristics of the extent of the plant infection caused by fungi of the genus *Fusarium* will be evaluated using phenotypic analysis and determination of oxidative stress as a result of the infection. Fungi from a genus *Fusarium* are mostly responsible for the loss in the flax cultivation. Flax is a plant used in many aspects of human life. It is a valuable source of oil and fibers. In addition, raw materials obtained from flax are a rich source of compounds with widely known biomedical properties. The character of the research implied in this project is innovative, because no literature report regarding the function of beta-hydroxybutyrate in plants has been published so far.