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## Induction of systemic resistance in cucumber against anthracnose using Bio-Normalizer

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**Summary:** Bio-Normalizer (BN) is a fermented "health food" product from the Philippines papaya (*Carica papaya* L.), other tropical herbal plants and cereals from traditional Japanese food. Bio-Normalizer has been known to have several biological activities, which are believed to be the basis for its free radical regulating, immune modulating, and ion chelating properties. These properties of Bio-Normalizer gave us inspiration to investigate if it could induce systemic resistance in cucumber against anthracnose pathogen. Bio-Normalizer was dissolved in distilled water to prepare solutions at concentration 0.005%, 0.01%, 0.02%, 0.05% or 1% (w/v). Cucumber seeds of variety Jibai, susceptible to anthracnose pathogen were soaked in solutions of BN for 24-36 at 25 C in growth chamber. Seeds were sown in the pots containing potting media. After 21 days, the 2<sup>nd</sup> true leaf of cucumber was challenge inoculated with spores of *C. orbiculare*. After 6 days of challenge inoculation, the disease development in terms of lesion number, total lesion diameter and area were measured.

Cucumber seeds soaked in 0.01%, .02% or 0.05% solutions of BN showed consistent results in protecting cucumber plants from anthracnose disease. Least number of lesions were developed against spores 10<sup>4</sup> per ml, when cucumber seeds were soaked in 0.01% or 0.05% solution of BN. While, 100% lesions appeared in the plants, when seeds were soaked in DW. The reduction of lesion number over control was about 76- 88% in 0.05% BN treatment. However, the lesion number in the same treatment increased, when spore concentrations were increased to 10<sup>5</sup> or 10<sup>6</sup> spores per ml. The total lesion diameter and area were significantly less in plants, when seeds soaked in 0.01%, 0.02% or 0.05% solutions of BN. The reduction of total lesion number, diameter and area of anthracnose in cucumber persisted until 42 days, when the seeds were soaked in 0.01% or 0.05% solutions of BN. Bio-Normalizer did not show any antifungal activities in our study. In the preliminary study, we noticed lignification in BN treated cucumber plant at the site of pathogen attempted to infect the cell. It is assumed that generation of superoxide anion and lignification due to activity of BN may be mechanisms to induce systemic resistance in cucumber against anthracnose, The detail study to elucidate the mechanism of induction systemic resistance in cucumber against anthracnose pathogen is under investigation.