DIFFERENT ANTI AMYLOIDGENIC EFFECTS OF TWO ESSENTIAL OILS' COMPOUNDS, CUMINALDEHYDE AND ALPHA-TERPINEOL, ON FIBRIL FORMATION OF TWO AMYLOIDGENIC PROTEINS

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Nowadays, there is an enormous effort to find the best way to treat and control the symptoms of neurodegenerative diseases due to their occurrence fast on the world. In these cases, the amyloidogenic proteins assembled into neurodegenerative plaques in the outside or inside of the brain cells. Small molecules are the compounds which have potential aptitude to protect the proteins toward self-assembly and formation of the dangerous and cytotoxic particles such as oligomers and fibrils. This research work was focused on inhibitory effects of two important compounds of essential oils, cuminaldehydes and alpha-terpeneol, on the fibrillation pathway of alpha-synuclein as a prime candidate for Parkinson and other synucleinopathy diseases. We also examined their effects on fibril formation of lysozyme. According to standard methods which use to assay fibril formation e.g. ThT fluorescence, Congo red absorbance, AFM, and fluorescence images, it was verified that these compounds had opposite influences on the proteins fibrillation. Cuminaldehydes inhibited alpha-synuclein fibrillation strongly in a concentration-dependent manner. The best inhibition was obtained when 3 or 4 moles of cuminaldehydes was added to one mole of the protein in the solution. After fibrillation process (incubated in 37°C, fixed agitation and pH 7.2) untreated protein solution caused cell viability fell down more than 50% but treated samples with cuminaldehydes did not kill cells obviously (up to 90% viability was observed). In contrast cuminaldehyde induced fibrillation in lysozyme. Astonishingly adding alpha-terpeneol had opposite effect on amyloid fibril formation of alpha-synuclein and lysozyme. In the presence of alpha-terpineol, there was a moderate inhibition on the lysozyme fibril formation. However, it could induce fibril formation in alpha-synuclein monomers about 40% rather than control samples. These observations can warn scientists to use essential oils as a source of small molecules because they contain wide variety of small molecules. Our study showed that even though the structure of small molecules can be alike, their properties as fibrillation inhibitors might be specific for the different amyloidogenic proteins.

THE EFFECTS OF BIO FERTILIZERS AND CHEMICAL PHOSPHOROUS FERTILIZERS ON QUANTITY AND QUALITY YIELD OF JOHN'S SWORT (HYPERICUM PERFORATUM)

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In order to study the effects of bio-fertilizer on quantity and quality of John's swort, an experiment was conducted at in Shahed university in 2010. The factors were phosphoric bio-fertilizer (inoculated and non-inoculated), phosphorous fertilizer in 3 levels (0, 100, 200 kg/ha) and vermicompost (0, 5, 10 ton/ha). The experiment design was factorial experiment in the base of randomized complete blocks design with eighteen treatments and three replications. In addition, one plot was allocated to control in each replication and only chemical fertilizers (NPK: 250, 200 and 100 kg/ha) were used. Data obtained from control plots were used for comparing other plots. Results showed that the highest plant height, biological yield, hypericin yield and flowering shoot yield (kg/ha) were obtained from vermicompost (5 ton/ha). Between 5 and 10 ton/ha vermicompost were not significantly variance and harvest index were not significantly affected due to vermicompost. Interactions of two factors of phosphoric bio-fertilizer inoculation and phosphorous fertilizer were significant. Results showed that the maximum plant height, flowering shoot yield, biological yield and hypericin yield were obtained by applying 100 kg/ha P2O5 plus phosphoric bio-fertilizer. Comparison of control versus bio-fertilizer treatments was significant. Maximum flowering shoot yield, biological yield and hypericin yield was obtained by 5 ton/ha vermicompost with 200 kg/ha P2O5 and phosphoric bio-fertilizer non-inoculated. Flowering shoot yield, biological yield and hypericin yield in this treatment were higher than that of control. It seems that bio fertilizers can consider as a replacement for chemical fertilizers.

References