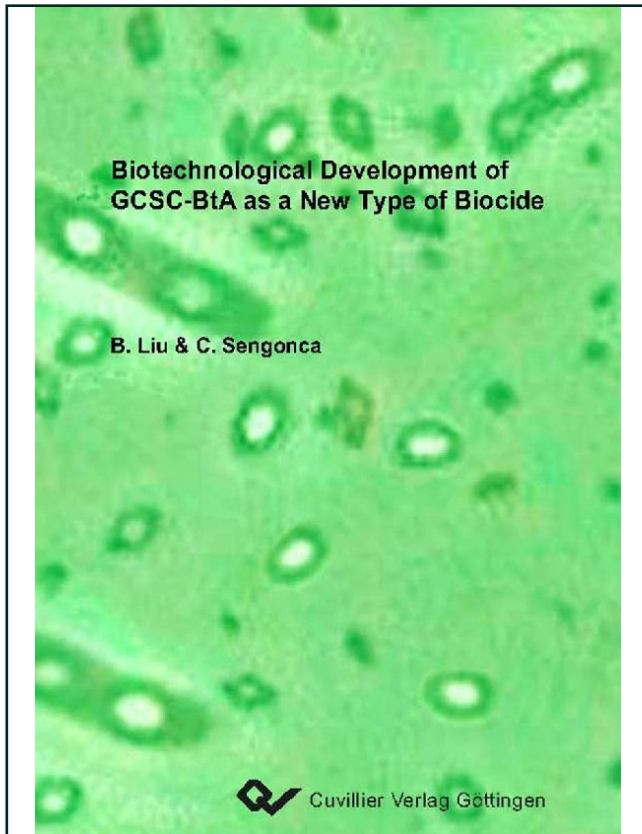




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## **Biotechnological Development of GCSC-BtA as a New Type of biocide**



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## PREFACE

Vegetables products, like in many other developing countries, are related to Chinese peoples' daily life. During growth of vegetable crops, there are many insect pests damaging to them, such as mite, homopterous, lepidopterous, coleopterous and dipterous pests, causing at least 10-30% loss of production. Conventional control method is to use broad spectrum insecticides in suppressing the pests. It leads to a variety of problems, including development of pest resistance, destruction of natural enemy populations, and contaminating food and environment.

The aim of the projects supported by DFG and BMZ in Germany and NSFC in China is to develop a new type of conjugated biocide *Bacillus thuringiensis*-Abamectin biotechnologically based on Germany-China Scientific Cooperation, named **GCSC-BtA**, alternating chemical insecticides in control of various vegetable pests with benefits to human health and environment.

The insecticidal bacterium *B. thuringiensis* (B.t.) is the most widely-used alternative control agent at present. Despite the success of B.t., its use in pest control is restricted with two weakness owing to its selectivity and limited efficacy against many economically important pests. To overcome these two weakness on B.t., a new theory of multiple toxin of biocides has been put forward to make a biochemical linkage of more than one biotoxin i.e. conjugation on a delta-endotoxin of B.t. with a toxin of Abamectin to decrease the probability of pest resistance, to widen the host spectrums to raise the controlling efficacy.

In the laboratory experiments, some new equipments for researches have been developed such as computer controlled fermenter, crystal-spore separator, molecular filter for concentration, conjugation device for biocide GCSC-BtA production, ultrasonic bioassay device, etc. Culturing of the isolated strains LSZ-9408 of B.t., fermentation technique, concentration of B.t. crystal toxin, conjugation of B.t. delta-endotoxin with Abamectin, GCSC-BtA bioassay on host spectrums and toxicity of agricultural pests, and side-effect of GCSC-BtA to natural enemies of vegetable pests etc. have been carried out.

In the field experiments, the observations on influences of GCSC-BtA on side-effect of GCSC-BtA to natural enemies in vegetable crops, vegeta-

ble pest population dynamics, spatial distribution pattern, spatial niche breadth and overlap, species evenness and diversity, etc. have been carried out. The new possibility of GCSC-BtA application in horticultural pests control, included vegetable, tea, mushroom pests, has been conducted. The successfully biological control of horticultural pests using GCSC-BtA biocide has been put into practice in integrated pest management in the fields in Fuzhou region of the southeastern China.

Finally, based on the project, the conjugated GCSC-BtA biocide has been experimentally produced, which can be used to totally alternate chemical insecticides in efficiently controlling vegetable pests in host spectrums of Acari, Homoptera, Lepidoptera, Coleoptera and Diptera. The meaning of project is not only in putting bio-technique into plant protection practice, but also in pest control with benefits to environment and human health. The success of project will leads to the new area of bio-toxins construction producing more efficient biocide applied in pest control with the easy way based on the theory of multiple toxins.

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