Hypocreales) can endophytically colonize a wide array of plant species. For a couple of crop plants it has been proven that endophytic *B. bassiana* can provide a systemic protection against damage by various insect pests or might trigger induced systemic resistance mechanisms against plant pathogens. Currently, it is unknown whether *B. bassiana* can exist as an endophyte in grapevine, *Vitis vinifera* (L.) plants and still maintains its antagonistic potential against insect pests. In the present study, greenhouse experiments were conducted to verify endophytic establishment of the entomopathogenic fungus *B. bassiana* in grapevine plants after inoculation. Therefore, a commercialized *B. bassiana* strain (ATCC 74040) was applied as a conidial suspension or as the formulated product Naturalis® on the upper and lower leaf surfaces of potted grapevine plants. To determine if endophytic colonization of grapevine leaves by *B. bassiana* was successful, leaf disks of surface sterilized control and inoculated plants were obtained and placed on a selective medium. Verification of endophytic establishment of *B. bassiana* was achieved by the amplification of strain-specific microsatellite markers or a nested PCR protocol. The antagonistic activity of endophytic *B. bassiana* against putative target pest insects like the vine mealybug *Planococcus ficus* was assessed using surface sterilized leaves for a bioassay. Possible effects of endophytic *B. bassiana* on the feeding preference of black vine weevil *Otiorhynchus sulcatus* choosing between control and inoculated plants were examined through choice assays. Endophytic survival of *B. bassiana* inside leaf tissues was evident at least 28 days after inoculation, irrespective of the inoculum used. A significant effect of endophytic *B. bassiana* on growth and on mortality of *P. ficus* one week after the initial settlement of the vine mealybugs was evident. Adult *O. sulcatus* chose significantly more often the control plants as a host plant compared to grapevine plants with endophytic *B. bassiana.* Endophytic establishment of an entomopathogenic fungus such as *B. bassiana* in grapevine plants would represent an alternative and sustainable plant protection strategy, with the potential of reducing pesticide applications in viticulture.

Investigations on the applicability of the entomopathogenic fungus *Isaria fumosorosea* for control of fruit moths

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Within a national funded project for biological control of the plum fruit moth (*Cydia funebrana)* we investigated the potential of artificial hideouts treated with the entomopathogenic fungus *Isaria fumosorosea*. Assuming that larvae of *C. funebrana* pupate at the bark of the tree or closed to the stem one control strategy by treating these or artificial hideouts with entomopathogenic fungi is under discussion. Experiments on the persistence of *Isaria fumosorosea* on mulch was investigated over two months in 2010 and 2011 under semi-field conditions. Because the persistence and efficacy of biocontrol agents is influenced by the

produced inoculum and the type of formulation liquid and solid state fermented spores formulated in oil or water were mixed with or sprayed on bark mulch. After exposure in the field mulch samples were transferred to the lab and were offered for pupating to larvae of the model insect *C. molesta.* Afterwards, the number of hatched moths was determined. In both years, bark mulch treated with rape seed oil alone resulted in a high reduction of number of hatched moths. In contrast, the water based formulation itself did not show any clear effect. When lipophilic solid state fermented conidia were formulated in oil the number of hatched larvae was reduced over more than four weeks. But this effect was mainly caused by the oil itself. For water based formulations of both, conidia and submerged spores, a dramatic reduction of hatched moths was monitored. Independently of using solid state produced conidia or liquid fermented submerged spores, only 20 % of the released larvae developed to adults over the whole experimental time (except the last sample). Additionally, always *I. fumosorosea* grown out of the cocoons was found. When two application strategies -mixing with or spraying on the mulches- were compared, a slightly better effect was achieved, when the bark mulch was mixed with the formulation. This can be explained by a better distribution on the mulch. Although the mulch-temperature reached temperatures higher than 45°C, the fungus was still effective over eight weeks. The results indicate that submerged spores were as persistent and effective as solid state fermented conidia. This is important, because this strain can be easily produced in liquid culture and therefore an industrial production of this strain seems to be possible.

Life history table analysis to investigate reproduction potential of entomopathogenic nematodes

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Life history traits (LHT) of a hybrid strain of the entomopathogenic nematode *Steinernema riobrave* were assessed at 25°C using a hanging drop technique with three different bacterial food densities prepared from its symbiotic bacteria *Xenorhabdus cabanillasii* in semi-fluid nematode growth gelrite (NGG). The hybrid had been produced by round-robin mating of 12 strains and was compared with wild type strain Sr 7-12, which was selected based on its better performance in virulence and *in vivo* reproductive potential. Experiments indicated that increasing food densities had a significant positive influence on offspring production and net reproductive rate (R_0) on both, the hybrid and strain Sr 7-2. All other population growth parameters such as intrinsic rate of natural increase (r_m), population doubling time (PDT), the cohort generation time ($T_{0/}T_c$), mean generation time (T_1), the age of the mother of an average new-born in an exponentially growing population *(T*) and average life span were not influenced by bacterial food densities in both strains.