PRODUCTION AND OCCURRENCE – L18

# Chlorogenic acid, a metabolite identified in tomato fruits by a metabolomics approach, is inhibitory against the biosynthesis of alternariol by *Alternaria alternate*

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Tomato fruits and processed tomato products are often reported to contain the mycotoxins alternariol (AOH), alternariol monomethyether (AME) or tenuazonic acid (TEN). All three mycotoxins are produced by the fungus *A. alternata*. Tomato products generally contain moderate to low concentrations (Ackermann et al., 2012) but may occasionally contain very high amounts of these toxins (Ostry, 2008). According to the former publication the occurrence of AOH in tomatoes seems to be a common problem. These results show that tomatoes are a typical habitat for *A. alternata* and that the production of AOH, AME or TEN is highly dependent on the environmental conditions, e.g. the substrate composition of tomato varieties. Based on these facts tomato as substrate might either be more supportive or reductive for the biosynthesis of AOH depending on the variety. In fact in a laboratory experiment a strain of *A. alternata* showed a reduced production of AOH on a tomato model medium compared to other media. This result indicates that despite the fact that tomato is a common substrate for *A. alternata*, it might contain AOH inhibiting substances. For this reason an untargeted metabolite profiling of various tomato varieties was performed by GC x GC/MS analysis. Tomato fruits of the same set of varieties were infected with *A. alternata* in parallel. One variety proved to be more resistant against growth and AOH biosynthesis of *A. alternata*. Metabolome data visualization using volcano plots revealed that among others, the concentration of chlorogenic acid was substantially higher in this variety. In subsequent growth experiments it could be demonstrated that purified chlorogenic acid indeed has a concentration dependent moderate growth inhibiting, but a strong AOH biosynthesis inhibiting effect. Transcriptional analysis of AOH biosynthesis genes by Real Time PCR revealed a correlation between gene expression and AOH biosynthesis. These results indicate that chlorogenic acid might be one of the metabolites, which reduce alternariol biosynthesis in more resistant tomato varieties. Beside the reduction of AOH biosynthesis also a reduced colonization could be observed on this tomato genotype. This is in agreement with the recent observation that AOH is a pathogenicity or colonization factor. The presence of increasing AOH concentrations led to stronger colonization which seems to be counteracted by the presence of increased amounts of chlorogenic acid.

**References**

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