

Effects of storage conditions on aflatoxin production and expression levels of some biosynthesis genes of *Aspergillus flavus* in red pepperBanu Soylu¹, Zülal Kesmen¹, Nurdan Yapar² and Hasan Yetim¹¹Erciyes University, Turkey²Kayseri Food Control Laboratory, Turkey

The aim of this study was to determine the relationship between the aflatoxin production of aflatoxigenic *Aspergillus flavus* and expression levels of aflatoxin biosynthetic metabolic pathway genes (aflR, nor-1 and pksA) in red pepper stored under different water activities (aw) (0.80, 0.85, 0.90 and 0.95 aw) and temperature conditions (5, 15, 25 and 35°C). Cultural mould growth, aflatoxin analysis, extraction of total RNA were carried out at 0, 1, 2, 3, 4, 5, 7, 10, 15 and 20th days of incubation. Expression levels of the regulatory gene aflR and two structural genes nor-1 and pksA of the aflatoxin biosynthetic pathway were also assayed by the reverse transcription real-time polymerase chain reaction (RT-PCR). Also, response surface methodology (RSM) was applied to evaluate the effects of aw, temperature, time, genes (aflR, nor-1 and pksA) expression on aflatoxin B1 (AFB1) production of *A. flavus* and to predict AFB1 amounts of contaminated red pepper. According to the results, mould counts of samples at 0.80 and 0.85 aw decreased starting from the third day of storage for all tested temperatures, and the lowest mould counts were obtained at 0.80 aw-25°C and 0.80 aw-35°C conditions on the 20th day of storage. AFB1 contents of the samples increased with the increment of temperature for all aw levels. The lowest AFB1 production was observed under 0.80 aw-5°C conditions in the experiment while the highest AFB1 amount (61.56 ppb) was detected at 0.95 aw-35°C on 15th day and highest AFB1 amount was observed at 0.95 aw-25°C on 15th day (57.21 ppb) of storage. In terms of the model, the effects of aw, temperature and pksA gene expression were very significant ($p < 0.01$), and the effect of nor-1 gene expression was significant ($p < 0.05$), while the aflR gene expression was insignificant ($p > 0.05$) in explaining of the AFB1 occurrence in contaminated red pepper stored at 25°C. In conclusion, it can be suggested that the growth of aflatoxigenic *A. flavus*, amounts of AFB1, gene expression levels of aflR, nor-1 and pksA depending on the aw, temperature and time were monitored in red peppers and AFB1 production was modeled with RSM for the first time in this study. Determination of correlations between AFB1 production and aw, temperature, time, aflR, nor-1 and pksA expression levels could be helpful to predict potential risk AFB1 accumulation during storage of red peppers.

Biography

Banu Soylu has completed her PhD from Middle East Technical University, Ankara, Turkey. She is an Associate Professor at the Department of Industrial Engineering in Erciyes University, Kayseri, Turkey. She has been working on the subject of optimization, mathematical modeling and statistical methods of engineering.

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