Evaluation of a Single Extraction Method for Use in Multi Mycotoxin Analysis

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Abstract

The use of a single extraction method for the analysis of multi mycotoxins within a single sample can be problematic. Typically at least two separate solvents are required to extract aflatoxins, fumonisins, zearalenone, ochratoxin, deoxynivalenol, T-2 toxin and HT-2 toxin from a matrix. An evaluation was performed to determine if a single extraction solvent could be utilized to efficiently extract the most commonly analyzed mycotoxins. Naturally contaminated mycotoxin reference materials were extracted with various ratios of solvents to determine the one solvent that would extract all the major mycotoxins with the highest recoveries. Acceptable extraction efficiency for all the mycotoxins were obtained using the extraction solvent of acetonitrile/water (80/20).

Procedure

Naturally contaminated mycotoxin reference materials were extracted using a variety of different solvents and composition ratios. The extraction solvents mostly commonly used in official methods for each mycotoxin were included in the evaluation. The extraction solvent efficiencies for each mycotoxin were compared to select a single solvent for use with a multi toxin LC-MS/MS method.

Aflatoxins
Corn reference material was extracted using 84/16, 90/10, 80/20, 70/30, 60/60, and 50/50 ratios of acetonitrile/water and analyzed by HPLC. (AOAC method 994.08)

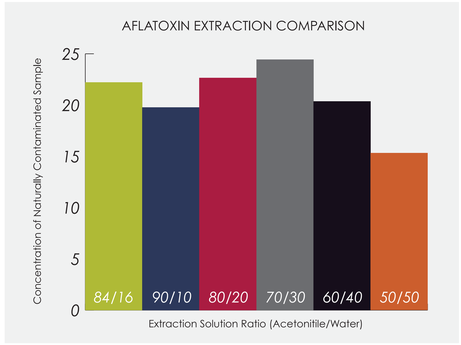
Deoxynivalenol
Wheat reference material was extracted with 84/16, 80/20, 70/30, 60/40, 50/50 ratios of a cetonitrile and analyzed by HPLC. (Journal of AOAC International, Vol. 88 No.4, 1998)

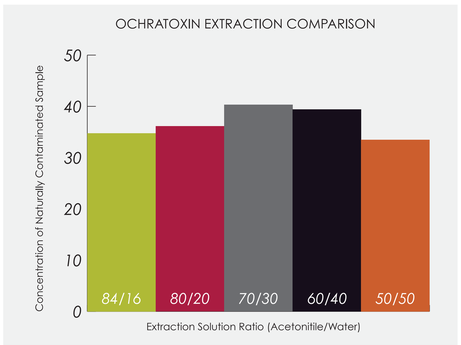
Fumonisins
Corn reference material was extracted using 3/1 methanol/water, 84/16, 80/20, 70/30, 60/40 acetonitrile/water and 25/25/50 methanol/acetonitrile/water and analyzed by HPLC. (AOAC 995.15)

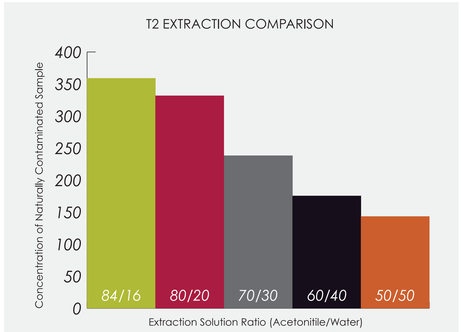
Ochratoxin A
Wheat reference material was extracted with 60/40, 84/16, 80/20, 70/30 and 50/50 acetonitrile/water and analyzed by HPLC. (AOAC 2000.03)

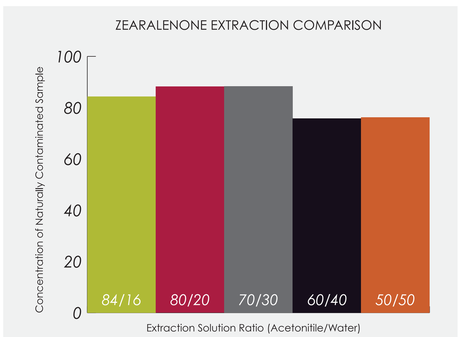
T-2 and HT-2
Corn reference material was extracted with 84/16, 80/20, 70/30, 60/40 and 50/50 acetonitrile/water and analyzed by GC. (Journal of Agriculture and Food Chemistry Vol. 42, No. 4, 1994)

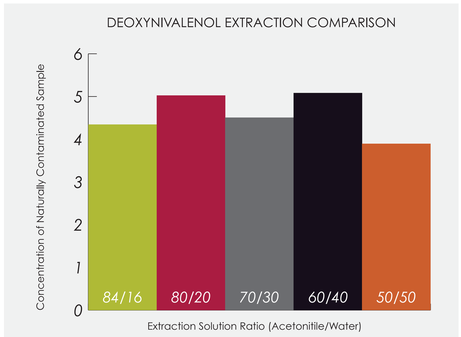
Zearalenone
Corn reference material was extracted with 84/16, 80/20, 70/30, 60/40 and 50/50 acetonitrile/water and analyzed by HPLC. (Journal of AOAC International, Vol. 88, No. 6, 2005)

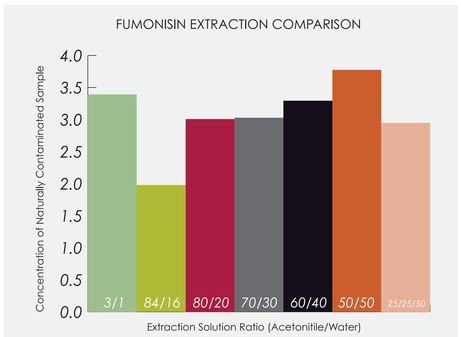


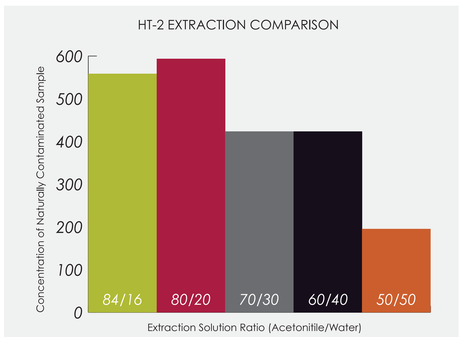












Conclusions

The extraction solvent of acetonitrile/water (80/20) was the most efficient in extracting all mycotoxins evaluated.

The extraction efficiency of the acetonitrile/water (80/20) for each toxin was comparable to the extraction efficiency of the solvents used in official analytical methods.

The precision of all the toxin analyses using acetonitrile/water (80/20) ranged from 3.0% to 6.9% with an accuracy of 91.4% to 116.2%.

The acetonitrile/water (80/20) solvent can be used for the extraction of all the major mycotoxins analyzed using a multi analyte HPLC-MS/MS method.

It has been concluded that for most sample matrices a single extract of 80% Acetonitrile and 20% Water gives an effective extraction for the above mentioned mycotoxins. By use of a single extraction the sample preparation time is lessened. Method performance provided excellent precision and comparable statistical difference for the 80/20 Acetonitrile/water extraction to the official method extraction. Naturally contaminated samples of known levels and non-contaminated samples that had been spiked with a known amount were extracted by the most common procedures and also extracted with the 80/20 Acetonitrile/water. These extracts were then analyzed and compared for recovery value and precision. The coefficient of variance ranged from 2.97% to 6.86% with accuracies obtained from 91.4% to 116.2%.