

## DETERMINATION OF TOTAL AFLATOXINS IN CEREALS BY ELISA TECHNIQUE

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Mycotoxins are extracellular metabolites of molds toxic to humans and animals. Mycotoxins can cause acute or chronic adverse effects. Today, various analytical techniques are used for mycotoxin determination. ELISA (Enzyme-Linked Immunosorbent Assay) techniques are most commonly used, but more accurate methods for mycotoxins determination involve liquid or gas chromatography. Determination of total aflatoxins was performed by ELISA technique in cereals, wheat and corn. Aflatoxins were extracted with methanol solution. The extracted aflatoxins were added to the conjugate and the mixture was transferred to antibody-coated wells. After unbound aflatoxins removal, substrate is added, which induces blue color development (color intensity is proportional to conjugated aflatoxins concentration, and inversely proportional to aflatoxins sample concentration). After adding "stop solution", the resulting color intensity is measured on an ELISA reader at 450 nm. Out of 19 wheat samples, 14 samples showed ND (not detected) value below 3 µg/kg, and five samples showed a value from 3 µg/kg to 4.55 µg/kg. Of the 16 maize samples, 10 samples showed an ND value below 3 µg/kg, and two samples a value slightly greater than 3 µg/kg and two samples a value slightly greater than 8 µg/kg. In only one sample, the MDK value was exceeded and amounted to 41.22 µg/kg. MDK of total aflatoxins for wheat is up to 4 µg/kg, MDK of total aflatoxins for corn is up to 10 µg/kg. Results obtained on ELISA reader was checked by comparative analysis using certified material, Fapas QC Material Data Sheet TCL0405QC, CL0405, matrix: Maiye Flour.

### References

1. Saeger S., Mavungu J.D., Determining mycotoxins and mycotoxigenic fungi in food and feed, Cambridge UK by Woodhead, 2011;203:135-167
2. Thanushree M.P., Sailendri D., Yoha K.S., Moses J.A., Mycotoxin contamination in food: and exposition on spices. Trends in Food Science & Technology 2019;93: 69-80

## ODREĐIVANJE UKUPNIH AFLATOKSINA U ŽITARICAMA ELISA TEHNIKOM

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Mikotoksini su ekstracelularni metaboliti plesni, koji su toksični po ljude i životinje. Uneti u organizmu mogu da izazovu akutne ili hronične štetne efekte. Danas se za određivanje mikotoksina primenjuju različite analitičke tehnike. Najčešće se koristi ELISA tehnika (Enzyme-Linked Immunosorbent Assay), ali tačnije metode određivanja mikotoksina podrazumevaju primenu tačne ili gasne hromatografije sa određenom vrstom detektora. Cilj ovog rada je bio određivanje ukupnih aflatoksina ELISA tehnikom u žitaricama, pšenici i kukuruza. Prisutni aflatoksini ekstrahovani su iz uzorka rastvorom metanola Ekstrahovani aflatoksini se dodaju konjugatu i smeša se postavlja u antitelom obložena udubljenja. Posle uklanjanja nevezanih aflatoksina dodaje se supstrat, što dovodi do razvoja plave boje (intenzitet boje je proporcionalan koncentraciji konjugovanih aflatoksina, a obrnuto proporcionalan koncentraciji aflatoksina iz uzorka). Dodavanjem kiselog "stop rastvora" boja se menja u žutu, a intenzitet boje se meri na ELISA čitaču na talasnoj dužini od 450 nm. Od 19 uzoraka pšenice, u 14 uzoraka je pokazalo vrednost ispod 3 µg/kg, a pet uzoraka vrednost od 3 do 4,55 µg/kg. Od 16 uzoraka kukuruza, 10 uzoraka je imalo vrednost aflatoksina ispod 3 µg/kg, a dva uzorka vrednost veću od 3 µg/kg i dva uzorka vrednost veću od 8 µg/kg. U samo jednom uzorku je vrednost MDK prekoračena i iznosi 41,22 µg/kg. MDK vrednost za pšenicu iznosi do 4 µg/kg, a MDK za kukuruz do 10 µg/kg. Rezultati dobijeni na ELISA čitaču su provereni komparativnom analizom korišćenjem setrifikovanog materijala, Fapas QC Material Data Sheet TCL0405QC, serijski broj CL0405, matrix: Maiye Flour.

### Literatura

1. Saeger S., Mavungu J.D., Determining mycotoxins and mycotoxigenic fungi in food and feed, Cambridge UK by Woodhead, 2011;203:135-167
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