

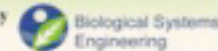


Aflatoxin contamination in peanuts: growing concern in East Africa



Virginia Tech
Invent the Future

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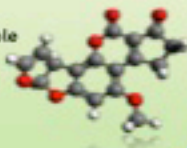


Rapid Evaluation of Aflatoxin in Peanuts using FTIR

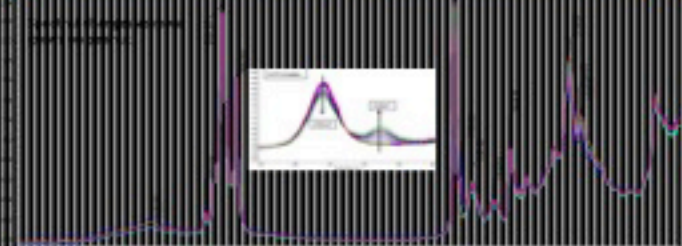
WHY FTIR?

Background: Aflatoxin

- Aflatoxins are secondary metabolites of *Aspergillus flavus* and *Aspergillus parasiticus*.
- Aflatoxin B₁ is the most potent natural carcinogen known and is usually the major aflatoxin produced by toxigenic mold strains.
- Peanuts are major source of protein in East African Countries and are susceptible for Aflatoxin contamination
- Prevalence of Aflatoxin in East Africa warrants removal of contaminated peanuts. Any rapid method for sorting would economically benefit the region.



- Non-destructive, rapid, easy, convenient method
- Allows conclusions for the sample as a whole
- Can be automated and reduce the need for solvents and toxic reagents
- The instrument is portable, making it suitable for field measurements



Sample	Actual Aflatoxin (ppb)	FTIR Predicted Aflatoxin (ppb)
1	10	10
2	20	20
3	30	30
4	40	40
5	50	50
6	60	60
7	70	70
8	80	80
9	90	90
10	100	100
11	110	110
12	120	120
13	130	130
14	140	140
15	150	150
16	160	160
17	170	170
18	180	180
19	190	190
20	200	200
21	210	210
22	220	220
23	230	230
24	240	240
25	250	250
26	260	260
27	270	270
28	280	280
29	290	290
30	300	300
31	310	310
32	320	320
33	330	330
34	340	340
35	350	350
36	360	360
37	370	370
38	380	380
39	390	390
40	400	400
41	410	410
42	420	420
43	430	430
44	440	440
45	450	450
46	460	460
47	470	470
48	480	480
49	490	490
50	500	500
51	510	510
52	520	520
53	530	530
54	540	540
55	550	550
56	560	560
57	570	570
58	580	580
59	590	590
60	600	600
61	610	610
62	620	620
63	630	630
64	640	640
65	650	650
66	660	660
67	670	670
68	680	680
69	690	690
70	700	700
71	710	710
72	720	720
73	730	730
74	740	740
75	750	750
76	760	760
77	770	770
78	780	780
79	790	790
80	800	800
81	810	810
82	820	820
83	830	830
84	840	840
85	850	850
86	860	860
87	870	870
88	880	880
89	890	890
90	900	900
91	910	910
92	920	920
93	930	930
94	940	940
95	950	950
96	960	960
97	970	970
98	980	980
99	990	990
100	1000	1000

Background: East Africa (Uganda & Kenya)

- One in three people in Africa is undernourished. This forces the rural poor to consume any food material even if molds have changed its organoleptic quality
- Hot and humid climate prevails and agricultural practices favor mold growth
- There are many studies showing the significantly high levels of aflatoxin in peanuts as well as other foods in the market of Uganda and Kenya.



PLS Regression:

- Six different *Aspergillus* spp. were analyzed.
- Aflatoxin detection in peanut complex structure can be achieved when suitable multivariate analysis methodology is employed.
- As fungal growth proceeds, hydrolysts of lipid content of peanut was observed. Relying on chemical modifications, the limiting detection level set to 20 ppb produced acceptable results.

Rapid evaluation of peanuts just in seconds!

Discriminant Analysis:

- All of the samples having lower than 20 ppb aflatoxin were classified correctly as "Acceptable" stream, and in total 98.5% correct identification was found.
- In the range of aflatoxin of 40-750 ppb, 91% of the analyzed samples correctly classified as "Moldy" and "Toxic". This means after separating clean peanuts that can be used for human consumption, rest can be used as animal feed.

**Less loss of food source!
Safer peanuts!**

