

Aspergillus flavus

PH3

*

Aspergillus flavus (PH₃)
 / 4.5 3.5 2.5 %97 %88 %73
 Czapek %60 40% %20 84% 67% 52% B₂ B₁
 89% 73% 64% %92.6 %86.2 %77 Dox Agar

.Phosphine; Aflatoxin; *Aspergillus* :

A. flavus

PH₃

.1

(Bulla *et al.*,

1978)

B₂ B₁

acetic acid

A. flavus

PH₃

benzoic acid sorbic acid prop ionic acid ammonium nitrate

Czapek Dox

B₂ B₁

PDA
 Agar

Fumigants

Czapek Dox Agar PDA

-

(1991)

Dharmaputra

.(Lacey, 1989; Hell *et al.*, 2002)

PDA

A. flavus

7

° (2 ± 28)

Cork

0.5

(Dharmaputra *et al.*, 1992, 1997; Hocking and Banks, 1990; Maria *et al.*,2000)

PDA

9

borer

PH₃

100

Beakers

Czapek Dox Agar

50

(1)

*

° (2 ± 28)

2003/8/17

.(3·2)

.2004/6/

(B₂, B₁)

Sigma Chemical Co.

(TLC)

20 × 20

(Aluminium Silica gel 60)

Merck

0.25

-

50

Czapek Dox Agar

Scanning Densitometer

Column Chromatography

(1998) AOAC

A.flavus

(PDA)

((1))

4.38

/ 2.5

/ 4.5

0.1

5.7

1.6

/ 4.5

73

/ 3.5

/ 2.5

% 97 % 88 %

/ 4.5

< 0.05

p

B₂ B₁

Czapek Dox Agar

B₂ B₁

(2)

0.5 9.6

/ 4.5

B₂ B₁

A. flavus

Robert Paterson

B₂ B₁

(1979)

$$\%100 X \frac{(\quad)}{\quad}$$

(3)

0.2 1.5 B₂ B₁

B₂ B₁

10.09 108.87

B₂ B₁

1.09 8

. / 4.5

B₂ B₁

/ 4.5

2.5 20.5

0.4 2 B₂ B₁

B₁

% 84 % 67.7 % 52

B₁ 29 196.4

B₂ % 40 % 20 B₂

/ 4.5 B₂ 4.5 / 3.5 / 2.5 B₂ % 60

. 1.8 6.5 . /

B₂ % 92.6 % 86.2 % 77 B₁ p < 0.05

% 89 % 73.2 % 64

. / 4.5 / 3.5 / 2.5

p < 0.05

()

()

(1)

(PDA)

A. flavus

LSD 0.05					/
		()		()	
0.85	0	5.7	0	4.38	
0.85	35	3.65	73	1.15	2.5
0.15	51	2.76	88	0.5	3.5
0.47	71	1.6	97	0.1	4.5
		0.4		0.36	LSD 0.05

PDA

A. flavus

: (1)



(2)

A. flavus

B₂ B₁

Czapek Dox Agar

LSD 0.05										(/)
B ₂	B ₁	B ₂	B ₁	(ppb)		B ₂	B ₁	(ppb)		
0.94	3.05	0	0	2.5	20.5	0	0	0.5	9.6	
0.48	0.48	36	64	1.6	7.23	20	52	0.4	4.9	2.5
0.43	0.97	68	74	0.8	5.26	40	67.7	0.3	3.1	3.5
0.27	0.78	84	90	0.4	2	60	48	0.2	1.5	4.5
-	-	-	-	0.4	0.7	-	-	0.13	1.15	LSD 0.05

A. flavus B_2 B_1

(3)

LSD 0.05										(/)
				(ppb)				(ppb)		
B_2	B_1	B_2	B_1	B_2	B_1	B_2	B_1	B_2	B_1	
1.35	2.26			29	196.4	0	0	10.09	108.87	
0.54	1.6	78	77	6.3	45.13	64	77	3.59	24.84	2.5
0.35	1.08	89	87	3	25.6	73.2	86.2	2.7	15	3.5
0.32	1.35	93	91	1.8	16.5	89	92.6	1.09	8	4.5
				1.38	0.5			0.5	6.67	LSD 0.05

(Delia *et al.*, 2002)*A. flavus*

(1)

(1991)

Dharmaputra

1991)

Dharmaputra (1990) Banks Hocking
(2002) Castro (1997)

K.A. 2002. Fungi Control by Phosphine Fumigation in High Moisture Maize, *Proceedings of 8th International Conference on Stored-product Protection*. York. U.K. 2002.

Delia, B., Rodriguez –Amaya and Sabino, M. 2002. Mycotoxin Research in Brazil: The Last Decode in Review. *Braz-J-Microbiol*, 33(1).

Dharmaputra, O.S., Tjitrosom, H.S.S., Sidik, M. and Umaly, R.C. 1991. The Effect of Phosphine on Some Biological

Association of Official Analytical Chemists (AOAC). 1998. Ch. 49 – 05c. International Suite. U.S.A.

Bulla, L.A., Kramer, K.J., Speirs, R.D. 1978. Insects and microorganism: Advances in Cereal Science and Technology: 91 – 121 (Pomeranz, X. Ed.) AACC. St. Paul. Minn.

Castro, M.F.P.M., Leitao, M.F.F., Oliverira, J.J. and Mills,

- Hocking, A.D. and Banks, H.J. 1990. Effect of Phosphine on the Development of Storage Microflora in Paddy Rice. *Proc. of the 5th Int. Work. Conf. on Stored Prod. Prot.* (Fleurat, F. and P Ducom, Eds.) 9-14 Sep. 1990: 823-831. Bordeaux, France.
- Lacey, J. 1989. Prevention of Mold Growth and Mycotoxin Production through Control of Environmental Factors. In: *Mycotoxins and Phycotoxins* (Natori, S., K. Hashimoto and Y. Ueno, Eds.): 161-168. Elsevier. Amsterdam. (Cited by J.D. Miller and H. L. Trenholm. 1992).
- Maria, F.P.M. Decastro, Dovale, J.O. Bragnolo, N., Anichiareo, E.S. and Mills, K.A. Effects of Phosphine in the Development of *Aspergillus flavus* Production in Maize Grain Stored at Different Moisture Contents.
- Patterson, S.P. and Robert, B.A. 1979. Mycotoxin in Animal Feed Stuffs: Sensitive Thin Layer Chromatographic Detection of Aflatoxin, Ochratoxin A, Sterigmatocystin, Zearalenone and T-2 Toxin. *J.A.O.A.C.*, 62(6): 1265-1267.
- Aspects of *Aspergillus flavus*, In: *Fungi and Mycotoxins in Stored Products. Proc. of Int. Conf.* (Champ, B.R., E.Highley, D. Hocking and J.I. Pitt, Eds.), 23 – 26 April. 1991: 244 – 248, Bangkok,Thailand.
- Dharmaputra ,O.S., Sidik, M. and Halid, H. 1992. The Effect of Phosphine and Length of Storage on Fungi, Aflatoxin and Protein Content of Soybean Meal. *Proc. of 15th ASEAN Seminar on Grain Post Harvest Technology* (Naewpanij, J.O. Ed.) 8-11 Sep. 1992:125-136. Bangkok, Thailand.
- Dharmaputra, O.S., Putri, A.S.R. and Sidik, M. 1997. Effect of Phosphine and Bag Type on Storage Fungi of Milled Rice. In: *Proc. Int. Conf. on Controlled Atmospheres and Fumigation in Stored Products.* (Danahage, E.J., S. Navarros and A. Varnava, Eds.) 21 – 26 April. 1996: 145– 155. Princtold, Nicosia, Cyprus.
- Hell, K., Fendohan, P. and Cardwell, K.F. 2000. Development of Management Options for the Control of Aflatoxin in Maize in West Africa. *Proceedings of 8th International Conference on Stored Product Protection.* York, U.K. 2002.

Effect of Phosphine Fumigation on the Growth of *Aspergillus flavus* and Aflatoxin Production

*Khalid A. Habib, Suzan A. Al-Habeeb and Khalid Al-Obaidy**

ABSTRACT

The results of this study revealed significant effect of phosphine (PH₃) on *Aspergillus flavus* growth. The percentages of growth reduction were 73%, 88% and 97% with the concentrations 2.5, 3.5, 4.5mg/ L, respectively.

The percentages of inhibition for aflatoxin B₁ and B₂ were 52%, 67%, 84% and 20%, 40%, 60%, respectively on Czapek Dox Ager medium ,while the inhibition was 77%, 86.2%, 92.6% and 64%, 73%,89%, respectively on natural rice grain medium.

The fungal growth and mycotoxin production increased again after two weeks from the exposure time, but with low level compared with control.

KEYWORDS: Phosphine; Aflatoxin; *Aspergillus*.

* Faculty of Science for Woman, Baghdad University, Iraq(1); and Grain Board of Iraq(2,3). Received on 17/8/2003 and Accepted for Publication on /6/2004.