

Effect of Homoeopathic Drugs to Control Growth and Production of *A. flavus*

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Abstract

Five common homoeopathic drugs viz., Belladonna, Bryonia, Colchicum, Colocynth and Lathyrus sat were selected and tested against growth and aflatoxin production of *Aspergillus flavus*. The result indicates that all five drugs suppressed the growth of *A. flavus*. The lower concentration of all the tested drugs induced maximum growth of fungi and maximum production of aflatoxin. However, the growth as well as aflatoxin production potentiality was considerably decreased when the concentration of the drug was increased. Out of all the five drugs, Bryonia was comparatively less effective with respect to inhibition in aflatoxin production. But Belladonna was found to be most effective drug on growth and aflatoxin production.

Keywords

Effect Homoeopathic, Drugs, Growth, Production, Aflatoxin

1. Introduction

A wide range of fungi are known to produce mycotoxin on a number of substrates. Consumption of such contaminated substrates causes different symptoms in human beings and animals. Mycotoxicosis, a toxic syndrome resulting after intake of mycotoxins by men and animals, is well known since long, yet its economic value remained neglected until aflatoxin was discovered. Aflatoxins are most harmful mycotoxin produced by toxigenic stains of *Aspergillus flavus* and *A. parasiticus*. Studies carried out during last two decades have established aflatoxins as a strong carcinogen, mutagen and teratogen on animals and human beings [1] [2]. An elaborated work has been done on the prevention of aflatoxin by fungicides, chemicals, phenols, plants/leaf extracts and antibiotics. However only few reports are available on use of homoeopathic drugs as preventing agents for aflatoxin production. So the present investigation is carried out to evaluate the efficacy of some homoeopathic drugs like Belladonna, Bryonia, Colchicum, Colocynth and Lathyrus sat on aflatoxin production by toxigenic isolates of *A. flavus*.

2. Materials and Methods

Screening of Aflatoxin production was studied by the method of [3]. Subsequently quantitative estimation of aflatoxin was done by the method of [4].

The SMKY (Sucrose Magnesium sulphate, Potassium nitrate and Yeast extract) medium was used to test the efficacy of homoeopathic drugs on growth and aflatoxin production potentiality of *A. flavus*. The mother tincture of five homoeopathic drugs viz., Belladonna, Bryonia, Colchicum, Colocynth and Lathyrus sat were separately added to make the concentration 50, 100, 150 and 200 λ /25 ml medium [3] in 250 ml conical flasks. The flasks were inoculated at 28°C \pm 1°C for 10 days. At the end of incubation period, the medium was filtered using Whatman's filter paper No. 42. The dry weight of the mycelia was determined on monopan balance after washing and drying the same at 60°C for 48 hours. The filtrate was extracted with chloroform and the extract was evaporated to dryness in a waterbath. Quantitative estimation of aflatoxin was done on TLC plates using toluene:isoamylalcohol:methanol (90:32:2 v/v) solvent systems. The chromatoplates were observed under long UV light at 360 nm. The spot of aflatoxin B₁ was scrapped and quantitative estimation was done by spectrophotometer [5].

3. Results

A perusal of **Table 1** shows that growth as well as aflatoxin production potentiality of *A. flavus* were considerably influenced by different concentrations of five homoeopathic drugs viz., Belladonna induced maximum growth inhibitions (75.84%) and aflatoxin production (56.42%) at the concentration of 200 λ /25 ml, however its lowest concentration 50 λ showed only 26.44 and 27.85 percent inhibition respectively over control. Similarly lower concentration (50 λ /25 ml) of colocynth induced 17.75% and 22.14% inhibition in growth and aflatoxin production which gradually increased with increase in the concentration of drugs. The maximum reduction in growth (63.76%) and aflatoxin production (51.42%) was noticed at 200 λ /25 ml concentration.

Table 1. Effect of Homoeopathic drugs on growth and aflatoxin production by *A. flavus*.

Name of the drug	Concentration (λ /25 ml)	Mycelial		Aflatoxin	
		Amount (mg)	% Inhibition over control	Amount in ppm	% Inhibition over control
Control	0	828		140	
Belladonna	50	609	26.44	101	27.85
	100	496	40.09	93	33.57
	150	400	51.69	85	39.28
	200	200	75.84	81	56.42
Bryonia	50	800	3.38	130	07.14
	100	725	12.43	108	22.85
	150	662	20.04	95	32.14
	200	535	35.38	80	45.85
Colchicum	50	690	16.66	109	22.142
	100	500	39.61	103	26.42
	150	446	46.13	89	36.42
	200	335	59.54	71	49.29
Colocynth	50	681	17.75	109	22.14
	100	535	35.38	101	27.85
	150	338	59.17	87	37.85
	200	300	63.76	68	51.42
Lathyrus sat	50	750	9.42	115	17.85
	100	689	16.78	105	25.00
	150	549	33.69	90	35.71
	200	468	43.47	76	45.71

Colchicum exhibited 16.66 and 39.61 percent inhibition in growth when the concentration was 50 λ and 100 λ /25 ml respectively and the percent inhibition with respect to aflatoxin production was also lowered (22.14 and 26.42 percent). The maximum loss *i.e.* 59.54 and 49.25 percent in growth and aflatoxin production was recorded at the concentration of 200 λ /25 ml. In case of Bryonia lower concentration did not induce any marked inhibitory effect on growth of *A. flavus*. The maximum inhibition in growth and aflatoxin production was noted at 200 λ /25 ml concentration where it was 35.38% and 42.85% respectively. Subsequently Lathyrus sat exhibited similar trend with respect to inhibition in growth and aflatoxin production. It was noticed maximum *i.e.* 43.47 and 45.71 percent at 200 λ /25 ml followed by 150 and 100 λ /25 ml of medium. Minimum growth and aflatoxin production was recorded at 50 λ concentration where it was 9.42 and 17.85 percent respectively in Lathyrus sat.

4. Discussion

A comparative review of results shows that addition of all the five homeopathic drugs suppressed the growth of *A. flavus*. The lower concentration induced maximum growth of fungi and subsequently maximum production of aflatoxin. The growth as well as aflatoxin production potentiality was considerably reduced when the concentration of the drug was increased. **Table 1** also indicates that out of all the drugs, Bryonia was comparatively less effective with respect to inhibition in aflatoxin production. From the above observations efficacy of all the test homeopathic drugs may be graded in descending order as Belladonna > Colocynth > Colchicum > Lathyrus sat > Bryonia.

In the light of present findings it may be stated that production of aflatoxin is directly related to the growth of *A. flavus* and lesser growth of fungi induced less synthesis aflatoxin in media [6] [7]. Some workers like [8]-[10] also used chemicals and fungicides against fungal growth and aflatoxin production and was also found effective in inhibiting the growth of fungi and aflatoxin production. [11]-[13] also worked on homeopathic drugs against growth of fungi and aflatoxin production and concluded their inhibitory role in certain intermediate biosynthetic steps. Similar observation was also noted by [14] [15] working with different food, feed and medicinal plants. [16] also stated that level of aflatoxin production depends on the genetic makeup of the host and the mould involved.

5. Conclusion

Homeopathic drugs are cheaper and have no side effects so effort was made to study the effect of *Belladonna*, *Bryonia*, *Colchicum*, *Colocynth* and *Lathyrus sat* on growth and aflatoxin production potentiality of *A. flavus*. It was observed that 200 λ /25 ml concentration of Belladonna was most effective and showed 75.84% inhibition in the mycelial growth. This was followed by Colocynth, Colchicum, Bryonia and Lathyrus sat respectively. Similar results were obtained by [17]-[19].

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