

ALLERGENICITY AND TOXICITY CHIA SEED

Cytotoxicity

The bioassay carried out was based on the cytotoxic effects of mycotoxin on mammalian cells in cell culture analyzed by the method of Sanders, 1984. The BHK – 21 (C –13) Cell Assay was carried out on the Chia seeds at the Agriculture and Food Science Centre (Department of Agriculture and Rural Development, Northern Ireland). This involves preparing an extract from the seeds and examining the growth of baby hamster kidney cells when subjected to the seed extract. When a toxic compound is present, the cells are either killed or their metabolic activity reduced. The results from this assay showed that no substances inhibitory to BHK – 21(C – 13) were detected.

Mycotoxin Screening

A composite sample of Chia seed was tested for Aflatoxin B1, B2, G1 and G2, Ochratoxin, DON (vomitoxin). None of the mycotoxins were detected. [Appendix 1]

Allergenicity

An extensive allergenicity study was carried out on the Chia seed at BIBRA, International Ltd., Surrey and King College, London. (*Potential Allergenicity of Chia Seed -Salvia Hispanica-, 2005*)

- i) An initial IgE binding screen using sera tested against a panel of 30 allergens by MAST and selected on the basis of their reactivity to peanut.
- ii) IgE binding analysis using sera from double blind placebo food challenge individuals.
- iii) Analysis of the effects of peptic digestion on IgE binding.
- iv) Skin prick tests carried out in order to determine if the IgE binding observed was clinically significant.

The proteins present within the Chia extracts ranged from between 6 and 65 kD in size. The majority of Chia proteins were found to be susceptible to proteolytic digestion.

A total of 26 sera from food allergic individuals were used, covering a range of food plant sensitivities. However, given that the Chia is a seed, it was considered that the most appropriate approach would be to concentrate on peanut and tree nut sensitivities, which are an important group of allergens in the UK and the most likely source of cross-reactivity.

Immunoblotting using sera from peanut and tree nut sensitive individuals showed binding of IgE to various Chia proteins, the majority of which were non-specific in nature.

Skin prick tests of 12 peanut and tree nut sensitive individuals revealed a low-level response in 2 individuals who were at the most broadly sensitive end of the spectrum of sensitivities.

Examination of the SPT positive sera showed moderate IgE binding to a 15 kD protein. Binding of IgE to this protein band could not be excluded as non-specific and may represent a cross-reacting protein. However, this protein was shown to be susceptible to peptic digestion and therefore probably does not represent a food allergy hazard.

Adverse Effects Study

The effects of dietary intervention with Chia on selected markers of coagulation and immune function in humans was examined in a large trial conducted at the School of Biomedical Sciences, University of Ulster, Coleraine. (*The effects of dietary intervention with Chia (Salvia hispanica L.) on selected markers of coagulation and immune function in humans, 2004*)

The study was a placebo controlled dietary supplementation trial carried out on 100 male and female subject's aged between 21 and 65 from differing socio-economic groups within the Coleraine area. A 4-week dietary intervention of the Chia seed was undertaken, with the subjects being allocated at random to one of the four intervention groups. The supplements were included in a breakfast cereal and Chia intake was 2.5, 5.0 or 10.0 g per day. The control group received 4.0 g of sunflower seeds per day. Blood samples were taken at baseline and 4 weeks and assessed for haematological parameters, plasma lipid profiles and lymphocyte sub-set typing. In addition, full anthropometric data, a lifestyle and food questionnaire and a questionnaire monitoring any possible adverse effects of the Chia seed was administered to each subject.

Overall, the results of the blood analysis indicated that there were no significant health related effects associated with even consumption of high levels of the novel food. Analysis of the adverse effects questionnaire showed a significant effect of consumption of 5.0g per day of the novel food on tiredness and fatigue. However, since this was a single response and there was no dose related effect, it was considered an anomalous result. It may therefore be concluded from this extensive study that, intake of the Chia seed, even at levels much exceeding the anticipated daily intake, has no adverse effects on human health and well being.

Appendix I.



ORIGINAL

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SERVICIOS DE LABORATORIO - CT802121

Final

PRODUCTO	SEMILLA DE CHIA BENEXIA	MUESTRAS	1
EMP. SOLICITANTE	FUNTIONAL PRODUCTS TRADING S.A.		
AT. SR/IA.	CAROLINA CHICA		
DIRECCION	AV. EL BOSQUE NORTE # 0140 OF. 43, LAS CONDES	INGRESO	08-05-2008
CIUDAD	SANTIAGO	INICIO	08-05-2008
REFERENCIA	1252	TERMINO	23-05-2008
MUESTREADO POR	EL CUENTE		

Resultados Quimicos

Metodo Clave COSECHA 2007 SEMILLA DE CHIA BENEXIA

Aflatoxinas Totales

Aflatoxina B1	ppb	ND
Aflatoxina B2	ppb	ND
Aflatoxina G1	ppb	ND
Aflatoxina G2	ppb	ND

Ocratoxinas ND

Metodologia:

Aflatoxinas B1-B2-G1-G2	1100611147. Método HPLC/Fluorescencia. Columna inmunofinidad. LO: 5 ppb
Ocratoxina	Official Methods of Analysis of AOAC International 17th Edition-2000. Method 991.44 Adaptado. HPLC/Fluorescencia.

Observaciones:

ND: No Detectado
200833



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 Sector Agriculture CTS
 SGS Chile Ltda.

SGS
 LABORATORIO QUIMICO
 CONCEPCION

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