*Project SENSOR. News

Volume 32 No.4 Fall 2021

WORK-RELATED ASTHMA FROM PLANTS

Environmental allergies to plants and tree pollen are well recognized. Workers in certain industries such as greenhouses, food manufacturing, spice manufacturing, herbal supplement suppliers and florists have developed asthma from working with plants, plant products and/or their seeds. These cases of work-related asthma have been documented by a combination of immunological testing (skin prick tests and/or specific IgE) and specific antigen challenge testing. There are 56 plants and/or plant products with key references for each item listed in Tables I-VI.; Table I. Flours, Table II. Food, Table III. Herbal Supplements, Table IV. Non-Food Products Derived from Plants, Table V. Plants, and Table VI. Spices. Trees, whose wood dust (e.g., ash, oak) and wood products (e.g., latex, turpentine) cause work-related asthma, were covered in the Project SENSOR News in the summer 2017 issue; 28 (3) and can be found at www.oem.msu.

Flour Dust

Exposure to flour dust in bakeries and storage facilities is a well-recognized cause of work-related asthma. The six types of flour are listed in Table 1. The actual etiologic agent in bakeries and storage facilities is not always the flour because workers may become allergic to additives to the flour such as alpha amylase derived from a fungus or insect contaminants such as storage mites in the flour.

Table I. Flours Causing Work-Related Asthma (6)		
Barley	Buckwheat	Lupine
Rye	Soya	Wheat

Baker's asthma - Brant A. Baker's asthma. Curr Opin Allergy Clin Immunol 2007;7:152-155.
Buckwheat - Park HS, Naim DH. Buckwheat flour hypersensitivity: Occupational asthma in a noodle maker. Clin. Exp. Allergy 1996;26:423–427.
Barley and Soya - Quirce S, Diaz-Perales A. Diagnosis and management of grain-induced asthma. Allergy Asthma Immunol Res 2013;5:348-356.
Lupine - Campbell CP, Jackson AS, Johnson AR, Thomas PS, Yates DH. Occupational sensitization to lupin in the workplace: occupational asthma, rhinitis, and work-aggravated asthma. J Allergy Clin Immunol 2007;119:1133-1139.
Rye - Letrán A, Palacín A, Barranco P, et al. Rye flour allergens: an emerging role in baker's asthma. Am J Ind Med 2008;51:324-328.
Wheat - Salcedo G, Quirce S, Diaz-Perales A. Wheat allergens associated with Baker's asthma. J Investig Allergol Clin Immunol 2011;21:81-92.

Food Derived from Plants

Exposure to these foods have been reported from facilities that process or package these foods (e.g., tea) but also in restaurants. The exposures in restaurants have not only been related to dusts from unpacking and handling but also from fumes produced during the cooking (e.g., broccoli/cauliflower).

Table II. Food Derived from Plants Causing Work-Related Asthma (14)		
Almond shells	Broccoli/Cauliflower	Carob bean (Locust bean gum)
Chamomile	Chicory	Coffee beans
Garlic	Grass pea (Lathyrus sativus	Pectin
Rape seed	Rose hips Sesame	Sesame Tea
Tea	Vetch	

Almond shells - Foti C, Nettis E, Cassano N, et al. Non-allergic occupational asthma because of almond shell dust. Allergy 2008; 63:1087-1094.
Broccoli/Cauliflower - Quirce S, Madero MF, Fernández-Nieto M, Jiménez A, Sastre J. Occupational asthma due to the inhalation of cauliflower and cabbage vapors. Allergy 2005;60:969-770.
Carob bean (Locust bean gum) - Hawley B, Cummings KJ, Mohammed M, Dimmock AE, Bascom R. Allergic sinusitis and severe asthma caused by occupational exposure to locust bean gum: Case report. Am J Ind Med 2017;60:658-663.

Chamomile - Vandeplas O, Pirson F, D'Alpaos V, et al. Occupational asthma caused by chamomile. Allergy 2008; 63:1090-1092.
Chicory - Pirson F, Detry B, Pilette C. Occupational rhinoconjunctivitis and asthma caused by chicory and oral allergy symdrome associated with Bet v 1-related protein. J Investig Allergol Clin Immunol 2009; 19:306-310.
Coffee beans - Osterman K, Johansson SGO, Zetterström O. Diagnostic tests in allergy to green coffee. Allergy 1985;40:336-343.
Garlic - Seuri M, Taivanen A, Ruoppi P, Tukiainen H. Three cases of occupational asthma and rhinitis caused by garlic. Clin Exp Allergy 1993;23:1011-1014.
Grass pea - Porcel S, León F, Valero AM, Calderín PM, Cuevas M, Cuesta EA. Occupational rhinitis and asthma by *Lathyrus sativus* flour: characterization of allergens. J Allergy Clin Immunol 2001;107:743-744.
Pectin - Jaakkola MS, Tammivaara R, Tuppurainen M, Lahdenne L, Tupasela O, Keskinen H. Asthma caused by occupational exposure to pectin. J Allergy Clin Immunol 1997; 100: 575-576.
Rapeseed - Suh CH, Park HS, Nahm DH, Kim HY. Oilseed rape allergy presented as occupational asthma in the grain industry. Clin Exp Allergy 1998; 28:1159-1163.
Rose hips - Kwaselow A, Rowe M, Sears-Ewald D, Ownby D. Rose hips: a new occupational allergen. J Allergy Clin Immunol 1990;85:704-708.
Sesame - Alday E, Curiel G, Lopez-Gil MJ, Carreño D, Moneo I. Occupational hypersensitivity to sesame seeds. Allergy 1996;51:69-70.
Tea, including green, oolong, and black - Cartier A, Malo JL. Occupational asthma due to tea dust. Thorax 1990; 45:203-206.
Vetch - Picón SJ, Blanco Carmona JG, Garcés Sotillos MD. Occupational asthma caused by vetch (*Vicia sativa*). J Allergy Clin Immunol 1991;88:135-136.

Herbal Supplements from Plants

Exposure to dust in facilities or laboratories processing or formulating herbal supplements or retail stores/pharmacies selling herbal supplements has been identified to cause work-related asthma. A number of these studies are from Asia presumably reflecting their more common use of these particular supplements in Asian countries.

Table III. Herbal Supplements from Plants Causing Work-Related Asthma (6)		
Banha	Brazilian Ginseng	Chlorella algae
Dangguri	Korean ginseng	Sanyak

Banha - Park HS, Kim MJ, Moon HB. Occupational asthma caused by two herb materials, *Dioscorea batatas* and *Pinellia ternata.* Clin Exp Allergy 1994;24:575-581.
Brazilian ginseng - Subiza J, Subiza JL, Escribano PM, Hinojosa M, Garcia R, Jerez M, Subiza E. Occupational asthma caused by Brazil ginseng dust. J Allergy Clin Immunol 1991; 88:731-736.
Chlorella algae - Ng TP, Tan WC, Lee YK. Occupational asthma in a pharmacist induced by *Chlorella*, a unicellular algae preparation. Respir Med 1994;88:555-557.
Dangguri - Lee SK, Cho HK, Cho SH, Kim SS, Nahm DH, Park HS. Occupational asthma and rhinitis caused by multiple herbal agents in a pharmacist. Ann Allergy Asthma Immunol 2001;86:469-474.
Korean ginseng - Kim KM, Kwon HS, Jeon SG, Park CH, Sohn SW, Kim DI, Kim SS, Chang YS, Kim YK, Cho SH, Min KU, Kim YY. Korean ginseng-induced occupational asthma and determination of IgE binding components. J Korean Med Sci 2008;23:232-235.
Sanyak - Lee JY, Lee YD, Bahn JW, Park HS. A case of occupational asthma and rhinitis caused by Sanyak and Korean ginseng dusts. Allergy 2006;61:392-393.

Non-Food Products Derived from Plants

Substances in this group have been characterized as non-food products although some are also used as additives in food products (e.g., guar gum, soybean lecithin). Exposure to non-food products causing work-related asthma has occurred across a wide array of industries reflecting the wide-spread use of these products. This includes hair salons (e. g., eugenol, henna), condom manufacturer (e.g., Lycopodium (Ground pines or creeping cedars)), Laboratories (e.g., bromelain), and pharmacies/pharmaceutical manufacturers (e.g., psyllium, senna).

Table IV. Non-Food Products Derived from Plants Causing Work-Related Asthma (11)		
Bromelain	Castor beans (Castor Oil)	Eugenol
Guar gum	Henna	Linseed oil cakes
Lycopodium Ground pines or creeping cedars	Marijuana and hemp (Cannabis sativa)	Psyllium
Senna	Soybean lecithin	

Bromelain - Baur X, Fruhmann G. Allergic reactions, including asthma, to the pineapple protease bromelain following occupational exposure. Clin Allergy 1979;9:443-450.
Castor beans (Castor Oil) - Merget R, Heger M, Wahl R, Cromwell O, Rasche K, Schultze-Werninghaus G. Seasonal occupational asthma in an agricultural products merchant--a case report. Allergy 1994;49:897-901.
Eugenol - Quirce S, Fernández-Nieto M, et al. Occupational asthma and rhinitis caused by eugenol in a hairdresser. Allergy 2008; 63:137-141.
Guar gum - Malo JL, Cartier A, L'Archevêque J, Ghezzo H, Soucy F, Somers J, Dolovich J. Prevalence of occupational asthma and immunologic sensitization to guar gum among employees at a carpet-manufacturing plant. J Allergy Clin Immunol 1990;86:562-569
Henna - Starr JC, Yunginger J, Brahser GW. Immediate type I asthmatic response to henna following occupational exposure in hairdressers. Ann Allergy 1982;48:98-99.

Linseed oil cakes - Vandenplas O, D'Alpaos V, César M, et al. Occupational asthma caused by linseed oilcake. Allergy 2008; 63:1250-1251.
Lycopodium (Ground pines or creeping cedars) - Cullinan P, Cannon J, Sheril D, Newman Taylor A. Asthma following occupational exposure to *Lycopodium clavatum* in condom manufacturers. Thorax 1993;48:774-775.
Marijuana and hemp *(Cannabis sativa*) - Vidal C, Fuente R, et al. Bronchial asthma due to *Cannabis sativa* seed. Allergy1991;46:647-649.
Psyllium – Cloutier Y, Lagier F, Cartier A, Malo JL. Validation of an exposure system to particles for the diagnosis of occupational asthma. Chest 1992;102:402-407.
Senna - Helin T, Mäkinen-Kiljunen S. Occupational asthma and rhinoconjunctivitis caused by senna. Allergy 1996; 51:181-184.
Soybean lecithin - Lavaud F, Perdu D, Prévost A, et al. Baker's asthma related to soybean lecithin exposure. Allergy 1994;49:159-162.

Plants

Exposure to plants causing work-related asthma has occurred in workers handling dried or live plants in agricultural workers (e.g., hops), florists (e.g., baby's breath or German statice), landscapers tending outdoor plants (e.g., copper leaf) or workers tending indoor plants in offices (e.g., Weeping figs) and a laboratory (e.g., Thale cress). On immunological testing the affected workers are reacting to extracts made from the leaf, seed and/or pollen.

Table V. Plants Causing Work-Related Asthma (12)		
Amaryllis	Baby's breath	Cacoon seed
Copper leaf	Freesia	German statice
Hops	Sunflower	Sweet pea
Thale cress	Tulip	Weeping Fig

Amaryllis - Jansen AP, Visser FJ, Nierop G, de Jong NW, Waanders-de Lijster de Raadt J, Vermeulen A, van Toorenenbergen AW. Occupational asthma to amaryllis. Allergy 1996;51:847-849.
Baby's breath - Schroeckenstein DC, Meier-Davis S, Yunginger JW, Bush RK. Allergens involved in occupational asthma caused by baby's breath (*Gypsophila paniculata*). J Allergy Clin Immunol 1990;86:189-193.
Cacoon seed- Rubin JM, Duke MB. Unusual cause of bronchial asthma. Cacoon seed used for decorative purposes. NY State J Med 1974;74:538-539.
Copper leaf - Pérez E, Blanco C, Bartolomé B, Ortega N, Castillo R, Dumpiérrez AG, Almeida L, Carrillo T. Occupational rhinoconjunctivitis and bronchial asthma due to *Acalypha wilkesiana* allergy. Ann Allergy Asthma Immunol 2006;96:719-722.
Freesia - Piirilä P, Keskinen H, Leino T, Tupasela O, Tuppurainen M. Occupational asthma caused by decorative flowers: review and case reports. Int Arch Occup Environ Health 1994;66:131-136.
German statice - Quirce S, García-Figueroa B, Olaguíbel JM, Muro MD, Tabar AI. Occupational asthma and contact urticaria from dried flowers of *Limonium tataricum*. Allergy 1993;48:285-290.
Hops – Reeb-Whitaker CK, Bonauto DK. Respiratory disease associated with occupational inhalation to hop (*Humulus lupulus)* during harvest and processing. Ann Allergy Asthma Immunol 2014;113:534-538.
Sunflower - Vandenplas O, Vander Borght T, Delwiche JP.Occupational asthma caused by sunflower-seed dust. Allergy 1998;53:907-908.
Sweet pea - Jansen A, Vermeulen A, van Toorenenbergen AW, Dieges PH. Occupational asthma in horticulture caused by *Lathyrus odoratus*. Allergy Proc 1995;16:135-139.
Thale cress (*Arabidopsis thaliana)* - Yates B, De Soyza A, Harkawat R, Stenton C. Occupational asthma caused by Arabidopsis thaliana: a case of laboratory plant allergy. Eur Respir J 2008;32:1111-1112.
Tulip - Piirilä P, Kanerva L, Alanko K, Estlander T, Keskinen H, Pajari-Backas M, Tuppurainen M. Occupational IgE-mediated asthma, rhinoconjunctivitis, and contact urticaria caused by Easter lily (*Lilium longiflorum*) and tulip. Allergy 1999; 54: 273-277.
Weeping fig - Axelsson G, Skedinger M, Zetterström O. Allergy to weeping fig--a new occupational disease. Allergy 1985;40:461-464.

Spices from Plants

Exposure to spice dust in facilities producing or packaging spices causing work-related asthma has been identified in multiple papers. Specific antigen challenge testing was performed to identify the specific spices causing asthma since these facilities typically handled multiple different spices.

Table VI. Spices Causing Work-Related Asthma (7)		
Aniseed	Bay leaf	Coriander
Mace (nutmeg shell)	Paprika	Rosemary
Thyme		

Aniseed - Fraj J, Lezaun A, Colás C, Duce F, Domínguez MA, Alonso MD. Occupational asthma induced by aniseed. Allergy 1996;51:337-339.
Bay leaf, Rosemary and Thyme- Lemière C, Cartier A, Lehrer SB, Malo J. Occupational asthma caused by aromatic herbs. Allergy1996;51:647-649.
Coriander, Mace, and Paprika - Sastre J, Olmo M, Novalvos A, et al. Occupational asthma due to different spices. Allergy 1996;51:117–120.

*Project S E.N.S.O.R. News

Michigan State University
College of Human Medicine
West Fee Hall
909 Wilson Road, Room 117
East Lansing, MI 48824-1316
Phone (517) 353-1846

In this issue: V32n4: Work-Related Asthma from Plants

*PS Remember to report all cases of occupational disease!

Printed on recycled paper.

The project SENSOR News is published quarterly by Michigan State University-College of Human Medicine with funding from the National Institute for Occupational Safety and Health and is available at no cost. Suggestions and comments are welcome.
(517) 353-1846
MSU-CHM
West Fee Hall
909 Wilson Road, Room 117
East Lansing, MI 48824-1316

Project SENSOR staff

At the Michigan Occupational Safety & Health Administration (MIOSHA)

Barton G.Pickleman
Director MIOSHA

At Michigan State University-College of Human Medicine

Kenneth D. Rosenman, M.D.
Professor of Medicine
Project SENSOR, Director
Mary Jo Reilly, M.S.
Project SENSOR Coordinator

Project SENSOR Office Staff:
Tracy Carey

Michigan Law Requires the Reporting of Known or Suspected Occupational Diseases

Reporting can be done by:

WEB
oem.msu.edu
E-Mail
ODREPORT@msu.edu
FAX
(517) 432-3606
Telephone
1-800-446-7805
Mail
Michigan Occupational Safety & Health Administration (MIOSHA)
Management and Technical Services Division
PO Box 30649
Lansing, MI 48909-8149

Reporting forms can be obtained by calling 1-800-446-7805