

# PHARMACOGNOSY

## Plant Allergens and Allergenic Substances

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(12-9-2007)

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## **Introduction**

The untoward immunological reaction to an allergen seen in a patient with defective immune system is called as Allergy. The groups of substances that cause allergic manifestation are called as Allergens.

Allergies are abnormal immune system reactions to things that are typically harmless to most people. When you are allergic to something, your immune system mistakenly believes that this substance is harmful to your body. (Substances that cause allergic reactions, such as certain foods, dust, plant pollen, or medicines, are known as **allergens**.) In an attempt to protect the body, the immune system produces **Ig E antibodies** to that allergen. Those antibodies then cause certain cells in the body to release chemicals into the bloodstream, such as **histamine**. The histamine then acts on a person's eyes, nose, throat, lungs, skin, or gastrointestinal tract and causes the symptoms of the allergic reaction. Future exposure to that same allergen will trigger this antibody response again. This means that every time you come into contact with that allergen, you will have an allergic reaction.

Allergic reactions can be mild, like a running nose, or they can be severe, like difficulty in breathing. An asthma attack, for example, is also an allergic reaction to something that is breathed into the lungs in a person who is susceptible.

Some types of allergies produce multiple symptoms, and in rare cases, an allergic reaction can become very severe - this severe reaction is called **anaphylaxis**. Some of the signs of anaphylaxis are difficulty in breathing, difficulty in swallowing, swelling of the lips, tongue, and throat or other parts of the body, and dizziness or loss of consciousness. Anaphylaxis usually occurs minutes after exposure to a triggering substance, such as a peanut, but some reactions may be delayed by as long as 4 hours. Luckily, anaphylactic reactions don't occur often, and they can be treated successfully if proper medical procedures are followed.

The tendency to develop allergies is often hereditary, which means it can be passed down through your genes. A person usually doesn't inherit a particular allergy, just the likelihood of having allergies.

### **Some of the most common allergens are:**

**1. Foods:** Food allergies are most common in infants and often go away as a child gets older. Although some food allergies can be serious, many simply cause annoying symptoms like an itchy rash, a stuffy nose, and diarrhea. Most allergy specialists agree that the foods that people are most commonly allergic to are milk and other dairy products, eggs, wheat, soy, peanuts and tree nuts, and seafood.

**2. Insect bites and stings:** The venom (poison) in insect bites and stings causes allergic reactions in many people. These allergies can be severe and may cause an anaphylactic reaction in some people.

**3. Airborne particles:** These are often called environmental allergens, and they are the most common allergens. Some examples of airborne particles that can cause allergies in people are

dust mites (tiny bugs that live in house dust); mold spores; animal dander (flakes of scaly, dried skin, and dried saliva from your pets); and pollen from grass, ragweed, and trees.

**4. Medicines:** Antibiotics - medications used to treat infections - are the most common types of medicines that cause allergic reactions. Many other medicines, including over-the-counter medications (those you can buy without a prescription), can also cause allergic reactions.

**5. Chemicals:** Some cosmetics or laundry detergents can cause people to break out in an itchy rash (hives). Usually, this is because the person has a reaction to the chemicals in these products. Dyes, household cleaners, and pesticides used on lawns or plants can also cause allergic reactions in some people.

### **Types of Reactions**

The principal types of reactions observed in Allergy are as follows:

**1. Type I reactions: (immediate type) (anaphylactic) :** The allergen causes formation of tissue sensitizing antibodies that are fixed to mast cells or leukocytes. On subsequent administration, the allergen reacts with these antibodies activating the cell and causing release of pharmacologically active substances like histamine, leukotrienes etc. and causing effects such as Urticaria, Anaphylactic shock and Asthma. Allergy develops within minutes to hours.

**2) Type II reactions: (Auto allergy):** Where the allergen combines with a protein in the body, so that the body treats it as a foreign protein and forms antibodies.

**3) Type III reactions:** Where antigen and antibody form complexes and activate the complement. Leukocytes attracted to the site of reaction engulf the immune complexes and release pharmacologically active substances starting an inflammatory response.

**4) Type IV reactions:** They are the delayed type allergy in which antigen- specific receptors produce the T-lymphocytes and subsequent administration will lead to local or tissue allergy like contact dermatitis.

### **Treatment of Allergy**

The types, causes and contributing factors of allergy are numerous, so the therapy is complex and can be divided into three types:

- a. Environmental control to eliminate or minimize exposure to the allergen.
- b. Symptomatic drug therapy by use of antihistamines, corticosteroids and sympathomimetics.
- c. Specific immunotherapy.

### **Specific Immunotherapy**

The above term was introduced by Norman and associates, which was accomplished by administering gradually increasing doses of allergen over a period of months or years.

The schedule for the treatment popularly carried out is:

1. 1:500 concentration of allergen twice a week for 3 months, each dose of 1ml.
2. 1:100 concentration of allergen once a week for another 3 months, each dose of 1ml.
3. 1:50 concentration of allergen monthly once for 3 months, with 1ml dose.

4. if necessary 1:50 concentration of allergen once in a month with 1ml dose for another 3 months.

### **Mode of Action**

During immunotherapy, there is an increase in antibody, specifically directed against the injected allergen which is primarily Ig G and is the serum factor named as “blocking antibody” by Cooke. It has been reported that the patients who develop higher blocking antibody titres have fewer symptoms than those who develop lower titre values.

### **Tests Employed to Detect Type - I Hypersensitivity Reactions**

1. Prausnitz – Kustner Test ( PK-test )
2. Radio Allergo Sorbent Test (RAST)
3. Intra Dermal Test (ID – test )
4. Prick Test
5. Conjunctival Test
6. Basophil Degranulation Test
7. Histamine Release Test.
8. Monkey Ileum Sensitization Test.
9. Provocation Test

The quality of extracts, proper selection of cases, identification of extract allergens and proper planning of therapy are the requisites of an ideal specific immunotherapy program.

### **The starting dose for allergen immunotherapy can be determined based on three different approaches:**

1. **Conventional approach** - where antigen at dilution of  $1 \times 10^9$  or  $1 \times 10^6$  or  $1 \times 10^5$  are given at an arbitrary safe dose and gradual increments are given once or twice a week until maintenance dose is reached.
2. **End Point Titration approach** – where starting dose is individually determined by a bio-assay so that multiple antigens in the treatment mixture are in equivalent concentration relating to patients sensitivity.
3. **RAST based approach**- where the patients serum is made to react with antigen impregnated paper discs and the circulating Ig E antibodies are measured.

### **Status of Immunotherapy**

The status of immunotherapy presently practiced worldwide is being questioned for its safety and efficacy. In addition to being cumbersome, expensive and associated with the risk of fatal side reactions including systemic anaphylaxis, it may lead to no improvement in the patient's condition, but it is also a “time – honoured method of therapy.

### **Pollen Grains as Aeroallergens**

Pollen grains are known to cause upper tract respiratory allergy, naso-bronchial allergy, asthma, seasonal rhinitis and various types of bronchial disorders<sup>6</sup>. Respiratory diseases caused by pollen grains are defined as a hypersensitivity to the proteins and glycoprotein's or evens a single peptide, which under favorable circumstances gets discharged by pollen grains. The allergenic

substances may differ in their immunogenicity, in the content of the general ability to stimulate Ig E – antibody response in allergic subjects due to differences in physico/chemical structures, particularly the molecular size determined by the general make-up of individual.

The organs involved in the allergic reaction are commonly called “shock organs” which include the respiratory track, lungs, skin and gastro intestinal track.

### **Allergenic Extracts**

Allergenic extracts are concentrated solutions or suspensions of allergens used for the diagnosis and treatment of allergic disease. Usually they are designated as being aqueous or glycerinated products. Normal saline or similar isotonic electrolyte solutions are the diluents. The different allergenic extracts available commercially<sup>7</sup> from licensed manufacturer are:

1. Diagnostic mixture
2. Customer treatment mixtures employed for patients having multiple allergies.
3. Scratch testing mixtures which are relatively concentrated solutions of strengths 1:5 to 1:20 which are glycerinated products.
4. Intra dermal- Test extracts which are more dilute (1:500 to 1: 5000) and supplied as aqueous solutions.
5. Therapeutic extracts, both aqueous and glycerinated are supplied in a variety of dilution vials of concentration 1:10 to 1:100.
6. Autogeneous extracts which are prepared from allergenic substances collected from the individual patient’s environment.
7. Adjuvant extracts available commercially as alum – precipitated extracts.
8. Standardized extract which have been compared to FDA-approved reference standards and have potency expressed in allergy units.

**Stability and Storage:** Allergenic extracts tend to show reduced potency within weeks or months after preparation. Both higher temperature and freezing usually have deleterious effects and the latter may cause agglomeration of adjuvant extracts. Some extracts gain proteolytic enzymes which will contribute to its decomposition. Very dilute extracts also loose there potency by adsorption to the surfaces of containers and syringes.

Where stability is considered, glycerinated and lyophilized products are more stable than aqueous extracts. Inclusion of Tween 20, Tween 80 or human serum albumin reduces surfaces adsorption, there by reducing loss of allergens. Adjuvant extracts should not be diluted with either phosphate buffered saline or coca’s solution, since they realize the allergen from the adjuvant. Instead, dilution with normal saline containing 0.4% phenol (preservative) is suggested. All allergenic extract should be refrigerated at 2 to 8° C and freezing is to be avoided.

The expiration date for aqueous extracts is usually 18 months while for glycerinated stretch test and bulk extracts is 3 years. Lyophilized products are expired in 4 years or 18 months after reconstitution.

**Characterization and Standardization of Allergenic extracts:** Most allergenic extracts are complex mixtures where in the active allergens may constitute only a small portion of total

mixture. Different manufacturers may employ different methods and sources materials to produce identically labeled allergenic extracts, thus leading to considerable lot-to-lot and manufacturer-to-manufacturer variation in potency of allergenic extracts.

The history of *in-vivo* standardization has indicated the abandonment of a method of expression of potency derived from reference, either to the extraction of allergen raw material with a solvent (i.e. wt/vol. method) or to the titre of protein nitrogen (P.N.U), both with out reference to any biological activity.

**The Following are the Different Units of Potency Defined for Allergenic Extracts:**

<b>Unit</b>	<b>Discription</b>	<b>Used</b>
Weight/Volume(w/v)	Allergen(g) per volume (ml) of extracting fluid	World wide
Protein Nitrogen unit ( P.N.U)	1mg Protein nitrogen = 100,000 P.N.U	World wide
Allergy unit (AU)	Skin testing to end point	US
Biological unit (BU)	Skin testing relative to Histamine	Europe

***In-Vitro* Methods to Characterize Allergenic Extracts**

**(i). Polyacrylamide Gel Electrophoresis (Page) in the passage of Sodium Dodecylsulphate – (SDS-Page)** : The various components of the allergenic extracts migrate on the gel in relation to their apparent molecular weight and the gel is subsequently stained to give a banding pattern. Maker proteins of known molecular weights are run on the same gel to serve as a standard.

**(ii). Thin Layer Iso - Electric Focusing: (IEF):** The various components of allergenic extracts are separated to their iso - electric point. The SDS-PAGE and IEF techniques may be combined to construct “two dimensional gels” that provide detailed finger prints of the composition of allergenic extracts, including allergenic and non allergenic proteins.

**(iii). Immunoblot Assay:** In this technique, the separated components of allergenic extracts by PAGE are transferred passively or electrophoretically to nitrocellulose papers which are segmentally reacted with Ig E- containing sera and radiolabelled or enzyme labeled anti-human Ig E to produce auto radiographs or color banding patterns. Here only the allergenic components of the extract produce visible bands.

**(iv). Crossed Immunoelectrophoresis (CIE):** The antigenic heterogeneity of allergenic extracts is studied by conducting crossed electrophoresis on a gel containing rabbit antiserum to allergen in question.

(v). **Crossed Radio Immunelectrophoresis (CRIE):** The Gel containing unstained precipitin arcs obtained by CIE are reacted segmentally with Ig E antibodies and radio-labeled anti-human Ig E to produce CRIE autoradiograph.

(vi) **High Performance Liquid Chromatography (HPLC):** HPLC is used on an analytical scale to provide a rapid method to “fingerprint” allergenic extracts or it is used on a preparative scale to isolate allergen rich fractions.

### **1. In Vitro Methods to Standardize Allergenic Extracts**

**Rast Inhibition** is used as a diagnostic test to detect the presence of allergen-specific Ig E antibodies and also to quantitate allergens or total allergenic activity in crude extracts.

**Analysis of Single Allergen** can be done incase where major allergen have been isolated and so specific antibodies can be raised to the allergens permitting subsequent quantitation by immunoassay.

### **2. In - Vivo Methods to Standardize Allergenic Extracts**

Skin testing is most widely used in-vivo methods of standardizing allergenic extracts, wherein biological proteins are assigned.

(i) **Histamine Equivalent Prick method (HEP):** The patients sensitive by clinical history and skin testing to the allergen in question are tested by prick technique to various dilutions’ of the test extracts and to histamine dihydrochloride (1-10mg/ml). The activity is 1 HEP when extracts evokes wheal equal in size to that produced by 1mg/ml histamine and the potency is labeled in biological units (BU) as  
1HEP = 1,000 BU/ml

(ii) **Intradermal Erythema method:** The patients sensitive by clinical history and skin testing to the allergen in the question are tested by intra dermal titration to various 3- fold dilutions of both the test allergens and reference extract. The resulting flare diameters are compared by parallel line bioassay.

From the above efforts of standardization, it can be expected that accuracy of diagnosis and effectiveness of allergen immunotherapy will markedly improve.

### **Data on *Parthenium Hysterophorus***

The compositae weed *Parthenium hysterophorus*, which was introduced into India accidentally as successful colonized itself throughout the country, thus posing as an agricultural health hazard. An aerobiological survey to study the incidence and concentration of Parthenium pollen in Bangalore was conducted by Seetharamaiah et. al. and the presence of significant amounts of parthenium either as single pollen or in the form of lumps was reported during the months of June to August.

**Toxicity:** Parthenium pollen has been reported to be spherical in shape with a diameter of 18 $\mu$  containing parthenium, a sesquiterpene lactone which is responsible for allergenic contact dermatitis in humans. The allergic nature has also been studied by sub conjunctival and intra corneal test and reported to be of type IV hypersensitivity. Repeated exposure to the plant results

in chronic lichenified eczema of the exposure surface of the body not ordinarily covered by clothes. Parthenium, the contact allergen which is a potent toxin is also responsible for the manifestation of partheniosis in livestock fed on the weed. The

The mechanism of the toxic action of Parthenium has been related to its interference with oxidation phosphorylation by inhibiting 'state 3' respiration and stimulating 'state 4' respiration in rat liver and kidney mitochondria as well as ATPase activity in presence of  $Mg^{2+}$  ions.

In some cases, like food allergies, avoiding the allergen is a life-saving necessity. That's because, unlike allergies to airborne particles that can be treated with shots or medications, the only way to treat food allergies is to avoid the allergen entirely. For example, people who are allergic to peanuts should avoid not only peanuts, but also any food that might contain even tiny traces of them.

Avoidance can help protect people against non-food or chemical allergens, too. In fact, for some people, eliminating exposure to an allergen is enough to prevent allergy symptoms and they don't need to take medicines or go through other allergy treatments.

Here are some things that can help you avoid airborne allergens:

- Keep family pets out of certain rooms, like your bedroom, and bathe them if necessary.
- Remove carpets or rugs from your room (hard floor surfaces don't collect dust as much as carpets do).
- Don't hang heavy drapes, and get rid of other items that allow dust to accumulate.
- Clean frequently (if your allergy is severe, you may be able to get someone else to do your dirty work!)
- Use special covers to seal pillows and mattresses if you're allergic to dust mites.
- If you're allergic to pollen, keep windows closed when pollen season's at its peak, change your clothing after being outdoors - and don't mow lawns.
- Avoid damp areas, such as basements, if you're allergic to mold, and keep bathrooms and other mold-prone areas clean and dry.

### **Is it a Cold or Allergies?**

If the spring and summer seasons leave you sneezing and wheezing, you may suffer from allergies. Colds, on the other hand, are more likely to occur at any time (though they are more common in the colder months). Although colds and allergies produce similar symptoms, colds usually last only a week or so. And although both may cause your nose and eyes to itch, colds and other viral infections may also give you a fever and aches and pains. Cold symptoms often worsen as the days go on and then gradually improve, but allergies begin immediately after exposure to the offending allergen and last as long as that exposure continues. If you are not sure whether your symptoms are being caused by allergies or a cold, talk with your doctor.

### **Dealing with Allergies**

So once you know you have allergies, how do you deal with them? First and foremost, try to avoid things you're allergic to! If you have a food allergy, which means avoiding foods that trigger symptoms and learning how to read food labels to make sure you're not consuming even

tiny amounts of allergens. For people with environmental allergies, keeping your house clean of dust and pet dander and watching the weather for those days when pollen is high can help. Switch to perfume-free and dye-free detergents, cosmetics, and beauty products (you may see non-allergenic ingredients listed as **hypoallergenic** on product labels). Avoid contact with household cleaners and yard chemicals whenever possible.

If you're taking medication, be sure to follow the directions carefully and make sure your regular doctor is aware of anything an allergist gives you (like shots or prescriptions). If you have a severe allergy, you may want to consider wearing a medical emergency ID (such as a Medic Alert bracelet), which will explain your allergy and who to contact in case of an emergency.

If you've been diagnosed with allergies, you have a lot of company. The National Institutes of Health (NIH) report that more than 50 million Americans are affected by allergic diseases. The good news is that doctors and scientists are working to better understand allergies, to improve treatment methods, and to possibly prevent allergies altogether.

### **Plant Allergy**

Plant Allergy is a type of airborne allergies (wind-blown pollen generated by trees, grass, plants and weeds), these are a major cause of illness and disability. For the 40-50 million allergy sufferers in Americans, inhaling airborne allergens can produce a variety of allergic symptoms. Because pollen grains are small and buoyant, they can remain airborne for hundreds of miles.

Typical allergic symptoms caused by airborne allergens include sneezing, running nose and nasal congestion (allergic rhinitis or hay fever). When an allergic victim's eyes are affected, they may experience itchy, watery and red eyes. Inhaling airborne allergens may cause reduced lung capacity and difficulty breathing. Contact allergies from touching plants, grass, leaves and even substances such as latex, can trigger hives or a skin rash. Many medical personnel develop a latex allergy from latex protective gloves.

The same airborne pollens can also cause contact allergies or skin allergies when pollen comes into contact with the skin. Most people are familiar with the skin eruptions (hives) and itching from touching poison oak or poison ivy plants. However, severe and life-threatening reactions can occur if an allergy sufferer inhales poison oak or poison ivy pollen, either directly from the plant or when plants are burned and pollen is carried in the smoke.

The following plants can cause skin problems:

- Acacia
- Alstromeria
- Arnica
- Artichoke
- Asparagus
- Blackwood
- Cashew Nut
- Garlic
- Geranium
- Giant hogweed
- Ginkgo biloba
- Grevillea
- Hogweed
- Hogweed, giant
- Marigold
- Mint
- Ongaonga
- Onion
- Parsley
- Parsnip
- Peruvian lily

- Cedar
- Celery
- Chamomile
- Chestnut
- Chives
- Chrysanthemum
- Citron
- Cow parsnip
- Cyprus
- Daffodil
- Dandelion
- Dogtooth violet
- English ivy
- Fig
- French marigold
- Horse chestnut
- Ivy
- Kanuka
- Kiwifruit
- Lavender
- Leek
- Lemon
- Lettuce
- Leyland cyprus
- Lichens
- Lily
- Lime
- Liverworts
- Mango
- Manuka
- Primula
- Radiata pine
- Ragweed
- Ragwort
- Rhus tree
- Seaweed
- Strawflower
- Sunflower
- Tree fern
- Tea tree
- Toxicodendron
- Tulip
- Tree nettle
- Umbrella tree
- Western red cedar

### Examples of Some common plants causing Allergies:

#### 1. Blackwood

Common name: Australian Blackwood, Wattle or Acacia.

Botanical name: *Acacia melanoxylon*

Family: Leguminosae

Origin: Native to south-eastern Australia.

Description: An evergreen wattle with dense foliage, balls of cream flowers and twisted pods.

Height: 20 m.



Uses: Gum arabic, derived from acacia (usually *A. senegal*), is used in the printing trade, and as a binding agent in the making of some medications. Gum arabic is also commonly used as a food

additive. Because of its excellent timber properties, Australian blackwoods are increasingly being planted in New Zealand. Blackwood is used in making furniture, boats, musical instruments, etc.

Allergens: The allergens appear to be 2,6-dimethoxy-1,4-benzoquinone, acamelin, and melacacidin (in heartwood).

Allergy: Hand dermatitis has been reported after contact with both the wood and gum arabic. Sawdust is a problem, particularly in furniture makers. Hayfever, rhinitis, conjunctivitis and other respiratory problems are of increasing concern. The prevalence of allergy to acacias, as shown in a number of Australian and Asian studies, is increasing.

Cross reactions: Meranti (*Shorea* spp.) and some kinds of Mahogany.

## 2. Arnica

Common name: Arnica, Mountain tobacco or Wolf's bane

Botanical name: *Arnica Montana*

Family: Asteraceae (Compositae)

Origin: 32 species occurring in the North Temperate regions particularly of Europe and the Arctic.

Description: It is a yellow-flowered aromatic herbaceous perennial, which tends to grow in meadows and light woodland. The stem is hard, hairy leaves in basal rosette. It flowers in early summer.



Uses: It is the major source of tincture of arnica, which is still frequently applied to sprains, bruises and wounds although the evidence of it being helpful is limited. It has been used for chilblains. Other species used for tincture of arnica include *A. longifolia*, *A. chamissonis* and *A. schalinensis*.

Allergens: Sesquiterpene lactones, helenalin, carabron, 10-acetoxy-8,9-epoxy-thymolisobutyrate.

Allergy: Allergy to arnica has been recognised for several centuries with over 100 cases reported in the literature. Most cases appear to be from self treatment with tincture of arnica. Arnica contains a group of chemicals called the sesquiterpene lactones, notably helenalin and its esters. This group of chemicals is known to be strong allergens. Other allergens have also been found.

Cross reactions: Chrysanthemum and other members of the Compositae family. Possibly to *Tagetes* as well.

### 3. Peruvian lily

Common name: Peruvian lily, Lily of the Incas, St Martin's Flower

Botanical name: *Alstroemeria*

Family: Amaryllidaceae or lily family. This very large family contains about 3,700 species in 250 genera, is as a whole cosmopolitan, but certain groups are of limited distribution. Some authors regard Alstroemeriaceae as a distinct family of 4 genera and about 150 species.

Origin: South America, particularly Chile and Peru.

Description: A herbaceous perennial with fleshy, tuberous roots. They have twisted lanceolate leaves, irregularly trumpet-shaped flowers which are born on slender leafy stems.



Uses: Floral bouquets/ornamental cut flowers. Allergens: Tuliposide A, the biosynthetic precursor of the allergenic lactone tulipalin A, has been detected in many species of *Alstroemeria* and *Bomarea* Mirb. Alpha-methylene-gamma-butyrolactone.

Allergy: Fingertip allergic contact dermatitis is caused by contact with recently damaged plants and bulbs, and gives rise to a condition known as tulip fingers. The first case reports of allergic contact dermatitis produced by *Alstroemeria* species appeared early in the 1970s. Gardeners, florists, and housewives are at most risk. Typically, patients are florists who present with red, thickened and split, tender finger tips of both hands. Airborne contact dermatitis has also been reported. This may reflect sesquiterpene lactone sensitivity. More unusually, *Alstroemeria* has been observed to cause depigmentation. A florist developed a sense of throat tightness, allergic rhinoconjunctivitis, urticaria, and facial angioedema attributable to exposure to *Alstroemeria*. For most patients, the allergy leads to a change of profession.

Cross reactions: *Bomarea*, *Dioscorea hispida*, *Erythronium*, *Gagea*, *Fritillaria*, and at least one species of onion.

### 4. Asparagus

Common name: Asparagus

Botanical name: *Asparagus officinalis*

Family: It belongs to the family Liliaceae (which includes tulips, onions and garlic).

Origin: Originates from the Mediterranean.

Description: Perennial plants produce separate male and female plants for 20 years or more. The underground portion of the plant consists of stems from which the edible 'spears' grow upward each spring; the male plants yield the best spears.

Uses: Several species of asparagus are of horticultural value, particularly as foliage for flower arranging, e.g. *Asparagus spengeri*, *A. plumosus*, and *A. medeoloides*. The young shoots of *A. officinalis* are highly esteemed as a vegetable.



Allergens: Asparagus contains asparagin, coniferin, and the glucoside, vanillin. The allergen, however, appears to be 1, 2, 3-Trithiane-5-carboxylic acid, a sulfur-containing growth inhibitor which appears to be present mainly in the early phase of the growth season.

Allergy: The first report of possible contact dermatitis to asparagus was reported in 1880. Allergy to asparagus is well recognized in Germany, particularly amongst pickers, canners and vegetable cooks. Young shoots appear to be most allergenic. It usually causes a fingertip dermatitis, which can affect the whole of the hand. Other forms of allergy to asparagus are also recognised. This includes contact urticaria (swollen lips from eating asparagus), conjunctivitis, rhinitis, and asthma. There has also been one case of acute urticaria following ingestion of asparagus.

## 5. Chamomile

Common name: Sweet (Roman) chamomile, German chamomile

Botanical name: *Anthemis nobilis*, *Chamaemelum nobile*, *Matricaria chamomilla*

Family: Belong to the Asteraceae (compositae) family of plants.

Origin: European.

Description: 25x40 cm ultra-hardy with finely cut pungent leaves, daisy-like white flowers in early to mid-summer.



Uses: There are a number of plants called chamomile (see table). Sweet chamomile has been planted in lawns since the early Elizabethan times. The dried flowers are used to make chamomile tea. Oil from the flowers is said to help 'stitches and pains in the side' among many other uses. A proprietary cream (Kamillosan) is promoted for the prevention and treatment of nappy rash and as a nipple cream.

Allergens: The allergens in chamomile include nobilin (Sweet chamomile) and desacetylmatricarin (German chamomile). Both are sesquiterpenes.

Allergy: In a six year study from Germany, 67 patients were found to be allergic to chamomile. In another very interesting study of massage in children with bad atopic eczema, the children were divided into two groups, one which received nightly massage from their parents and a second group who received nightly massage with essential oils (aromatherapy). The results showed a significant improvement in the eczema in the two groups of children following therapy, but there was no significant difference in improvement shown between the aromatherapy massage and massage only group. In fact a number of the children went on to develop worsening of their eczema due to allergy to the essential oils, including chamomile. The available proprietary chamomile cream has also been reported to cause allergic dermatitis on a number of occasions. Eye washing with chamomile tea is a folk remedy used by some to treat conjunctivitis and other ocular reactions. Unfortunately one study showed 7 hay fever patients suffered from major conjunctivitis (2 with lid angioedema) after eye washing with chamomile tea. They were, interestingly, able to drink chamomile tea with no reactions. Anaphylaxis and death have also been reported following exposure to chamomile, although fortunately this appears to be relatively rare. Cross reactions: May cross react with other Compositae (asteraceae and anthemis) such as chrysanthemum.

## 6. Horse chestnut

Common name: Horse chestnut.

Botanical name: *Aesculus hippocastanum* (Hippocastanaceae)

Family: Horse chestnuts are classified in the division Magnoliophyta , class Magnoliopsida, order Sapindales, family Hippocastanaceae.

Origin: A native of the Balkan peninsula (Greece-Albania), it is now cultivated in many countries for shade and ornament. Other members of the family are native trees and shrubs of the north temperate zones and of South America.

Description: It can reach 30 meters tall, and has striking candles of blooms in spring and early summer. Individual flowers have crumpled white petals with a yellow basal patch that changes to a dull red colour. The fruit has a leathery case covered with short prickles. The seeds are used to play conkers.



Horse chestnuts and buckeyes (a similar but often smaller North American species of the same genus) somewhat resemble true chestnuts in appearance but are edible only after careful preparation. The wood of the horse chestnut is soft and has been used for paper pulp and carpentry, woodenware, and other similar purposes. A compound derived from horse chestnut, aesculin, is a pharmaceutical agent used as an astringent and anti-inflammatory. There is an unproven believe that Horse Chestnut increases the strength & tone of the veins in particular, so it is often used to treat phlebitis, varicose veins, and haemorrhoids.

## 7. Leyland cyprus

Common name: Cyprus

Botanical name: *Cupressocyparis leylandii*

Family: Cupressaceae

Origin: Temperate regions; Eastern Mediterranean. A nice description of the site of origin of Cupressus was provided by the Roman philosopher Plinius: "cypress trees sprout spontaneously on Mt. Ida on the island of Crete, whenever the soil level is disturbed". Leyland cypress (*X Cupressocyparis leylandii*) is an intergeneric (of two separate genera) cross between Monterey cypress (*Cupressus macrocarpa*) and Alaska Cedar (*Chamaecyparis nootkatensis*) that originated in England in 1888.

Description: A fast growing (1 metre/year) evergreen tree. Reaches 20-30 m in height. When young, the bark is reddish brown and scaly, later developing gray weathered strips. The foliage is fine, scale-like and is arranged in decussate pairs which are green to bluish-green in colour. The fruit is a brown, round, small cone, 1-2 cm diameter. The flowers are monoecious; males are small reddish brown terminal cones; females are slightly larger, round, yellow green.

Uses: It is planted on a large scale as an ornamental plant, as a windbreak and as a forest tree. Becoming popular as a Christmas Tree.

Allergens: Carvacrol, terpenes, sesquiterpenes and possibly daucadienes or acoradienes.

Allergy: Contact dermatitis to the bark has been recorded, possibly as a cross reaction to colophony. It is increasing becoming a major cause of asthma and rhinoconjunctivitis, particularly in the Mediterranean.

Cross reactions: Colophony

## 8. Daffodil

Common name Daffodil, narcissus

Botanical name: *Narcissus pseudonarcissus*

Family: They belong to the larger family Amaryllidaceae which includes bulbs such as Hippeastrum, Nerines, Clivia, Belladonna Lily and Day Lily. One of the oldest forms of daffodils is the Lent Lily, *Narcissus pseudonarcissus* which grows wild all over Europe's countryside. Its common name probably comes from its flowering at Easter in the northern hemisphere.

Origin: There are about 50 species of narcissus which are native to the Mediterranean.

Description: Strap-shaped leaves coming from the ground. Flowers have inner trumpet/cup-shaped crown surrounded by yellow, white &/orange petals, usually with one flower per stem. Very hardy.

Uses: Ornamental flower. Narcissus oil used in perfume manufacturing.

Allergy: Although beautiful, daffodils have resulted in severe allergic problems, including death. Symptoms have included allergic rhinoconjunctivitis, asthma, allergic contact dermatitis, irritant contact dermatitis (from contact with narcissus sap) and urticaria. Most patients affected work in the flower industry (bulb growers, stem pickers or florists) but there are reports of reactions from contact with narcissus oil used in perfumes and fragrances. Narcissus contains a number of alkaloids including masonin and homolycorin. This, in conjunction with crystals of calcium oxalate seems to cause the characteristic sores.



## 9. Fig

Common name: Fig (English), Higo (Spanish), Figue (French), Feige (German), Fico (Italian).

Botanical name: *Ficus carica*

Family: Moraceae (Mulberry family). Division: Magnoliophyta, Class: Magnoliopsida, SubClass: Hamamelidae, Order: Urticales, Family: Moraceae.

Origin: The fig is believed to be indigenous to western Asia and to have been distributed by man throughout the Mediterranean area. Remnants of figs have been found in excavations of sites traced to at least 5,000 B.C.



Description: The fig is a picturesque deciduous tree, up to 15m tall, but more typically to a height of 3-10m. Their branches are muscular and twisting, spreading wider than they are tall. Fig wood is weak and decays rapidly. The trunk often bears large nodal tumors, where branches have been shed or removed. The twigs are terete and pithy rather than woody. The sap contains

copious milky latex that is irritating to human skin. The bark is smooth and silvery gray. Fig trees often grow as a multiple-branched shrub. Fig leaves are bright green, single, alternate and large (to 25cm length). They are more or less deeply lobed with 1 to 5 sinuses, rough hairy on the upper surface and soft hairy on the underside. In summer their foliage lends a beautiful tropical feeling. The tiny flowers of the fig are out of sight, clustered inside the green fruits, technically a synconium. Pollinating insects gain access to the flowers through an opening at the apex of the synconium.

Uses: Edible fruit. The milky juice has been used as a destructive treatment for warts and to cure skin infections. The juice of fig leaves has long been used to treat vitiligo (psoralen).

Allergens: The furocoumarins psoralen, bergapten and the coumarins umbelliferone, 4',5'-dihydropsoralen and marmesin are present mostly in leaves and unripened fruit. Allergy: Phototoxic. Ingestion of the fruit apparently does not cause photosensitization. However, there are reports of anaphylaxis after eating figs; this may represent cross reaction with natural rubber latex.

Cross reactions: Weeping fig (*F. benjamina*, an indoor plant). Also cross reacts with natural rubber latex so rubber latex allergic individuals need to take care. Related species: Cluster fig (*Ficus racemosa*), Sycomore Fig (*Ficus sycomorus*)

Other information: The common fig bears a first crop, called the breba crop, in the spring on last season's growth. The second crop is borne in the fall on the new growth and is known as the main crop.

## 10. Garlic

Common name: Garlic.

Botanical name: *Allium sativum*

Family: Liliaceae.

Origin: Central Asia.

Description: The bulb of garlic is made up of a cluster of small bulbets (cloves). The flowers are held in an umbel.



Uses: Food. Garlic has a long history of being used as a complementary medicine to protect against coughs and colds. It is commonly used as a poultice when it can cause very nasty burns.

Allergens: Diallyl disulphide, allicin.

Allergy: Probably the most common cause of an allergic contact dermatitis on the finger tips. Most commonly it affects the thumb, index and middle fingertips of the non-dominant hand as a clove of garlic is held. Inhalation of garlic dust can cause severe asthma. Garlic poultices can cause significant burns (probably irritant). Cross reactions: Onion, leek, chives.

## 11. Ginkgo biloba

Common name: Maidenhair tree (living fossil).

Botanical name: *Ginkgo biloba*

Family: Ginkgoaceae belong to the class of the Ginkgophytes. This class constituted the link between the ferns and the angiosperms (flowering plants).

Origin: The *Ginkgo biloba* is the world's oldest living tree, a species whose existence can be traced back-over 250 million years! For this reason, the *Ginkgo* was referred to as living fossil (1859) by Charles Darwin. *Ginkgo* trees were common and widespread in Asia, Europe and America but disappeared from America about 7 million years ago, and from Europe about 3 million years ago.

Description: Deciduous conifer. A *Ginkgo biloba* tree can reach 30 or 40 m height and a spread of 8 meters. The trunk can become about 3 or 4 meters wide in diameter. It is straight columnar and sparingly branched. Young trees have usually a central trunk, pyramidal in shape, with regular, lateral, ascending, asymmetrical branching. The bark is brown and rough. It fissures rough furrows with the age. The leaves of this tree are interesting and unique from any other tree. They are fan-shaped, leathery and smooth. They are often deeply grooved in the middle of the leaf, producing two distinct lobes, hence the name *Ginkgo biloba* (two lobes). The leaves have a venation pattern that is open dichotomous; the veins fork in pairs from the base of the leaf, and are not cross-connected. They are bright green during the summer, turning gold before dropping in the fall.



Uses:

Ginkgo nuts have long been regarded as a delicious food by Japanese people, and these have been cooked and served in various ways depending on the time. Ginnan is the Japanese word for those seeds. The first mentioned medicinal use of *Ginkgo biloba* appears in China. Ginkgo leaf is first mentioned in Lan Mao's *Dian Nan Ben Cao*, published in 1436 during the Ming dynasty. Lan Mao notes for its external use to treat skin and head sores as well as freckles. Internal use of the leaves is first noted in Liu Wen-Tai's *Ben Cao Pin Hui Jing Yao*, an imperial commissioned work recorded in 1505. Liu Wen Tai notes use of the leaves in the treatment of diarrhoea. The leaves of ginkgo are known in Chinese medicine as bai-guo-ye. Recent clinical reports in modern China suggest that the leaves lower serum cholesterol levels and have some clinical value in angina pectoris.

Allergens: Ginkgolic acid.

Allergy: Allergic contact dermatitis has been reported particularly to the fruit and nuts of female trees. Food poisoning has occurred in Japan when too many nuts are eaten. It appears to be caused by MPN (4-O-methylpyridoxine) which has an anti-vitamin B6 activity.

Cross reactions: Cross-reacts with anacardaceae species including poison ivy, mango, rhus tree, etc.

Other information: The fruits are often produced in great abundance and becoming an abscising mushy mess in October, covering the ground with fleshy, strongly malodorous fruits. They then release a very nauseous odour, of a type of rancid butter, due to the presence of butyric acid. Moreover, as they are viscous, the presence of a great quantity of ovules on the roadway or on a pavement can be at the origin of accidents. Finally this pulp contains irritating and allergic substances for certain people; its handling starts cutaneous pruriginous injuries. In fact, urban landscapers recommend only the male tree.

## 12. Kiwifruit

Common name: Kiwi, kiwifruit, zespri, Chinese Gooseberry, Kiwi Berry, Yang-Tao

Botanical name: *Actinidia chinensis*

Family: Actinidiaceae

Origin: South east China

Description: *Actinidia chinensis* is one of 30 species of hardy and tender, deciduous, climbing plants that are natives of eastern Asia. *A. chinensis* (also known as *A. deliciosa*) is a tender, large vine that can reach a height of 8 meters. Its shoots are thickly covered with reddish hairs and its large, heart-shaped leaves grow from 15-25 cm long and up to 20 cm wide. In late summer, clusters of fragrant, 2-3cm flowers are produced. They are cream turning buff-yellow. Its edible, fuzzy-skinned fruits are green, eventually turning brown.



Uses: Used as a food. The vines are great for growing on trellises, along fences, covering walls, or tall stumps.

Allergens: The main allergen present in the fruit is the proteinase actinidin. It is one of a group of plant thiol proteinases to which papain, ficin, and stem bromelain also belong. Actinidin is composed of at least two proteolytic enzymes. Of increasing concern is the cross-reaction between these proteolytic enzymes and natural rubber latex. Individuals who have developed contact urticaria from exposure to natural latex (usually from wearing rubber gloves), need to avoid eating and handling Kiwi fruit.

Allergy: Urticaria (type I hypersensitivity), immediate contact urticaria, allergic contact dermatitis, irritant contact dermatitis, allergic contact dermatitis, oral allergy syndrome as well as asthma

Cross reactions: Natural rubber latex protein.

## 13. Lavender

Common name: Lavender (to wash)

Botanical name: *Lavendula officinalis*

Family: *Lavendula* species {Lamiaceae or mint family}

Origin: These perennials were found originally wild in the Mediterranean region. The original name comes from the Latin, to wash.

Uses: Ornamental flower. Narcissus oil used in perfume manufacturing.

Allergy: Although beautiful, daffodils have resulted in severe allergic problems, including death. Symptoms have included allergic rhinoconjunctivitis, asthma, allergic contact dermatitis, irritant contact dermatitis (from contact with narcissus sap) and urticaria. Most patients affected work in the flower industry (bulb growers, stem pickers or florists) but there are reports of reactions from contact with narcissus oil used in perfumes and fragrances. Narcissus contains a number of alkaloids including masonin and homolycorin. These, in conjunction with crystals of calcium oxalate seems to cause the characteristic sores.

Description: Lavender belongs to a genus of 28 species of hardy evergreen shrubs. Two of the more common species are English lavender (*Lavendula officinalis*) and French lavender (*L. stoechas*). The different varieties of this plant range in height from 20 cm to 1 meter in height, although some may grow taller with age. They have thin leaves and many long spikes of lavender or purple flowers that grow up from the leaf axils.



Uses: The flowers and the foliage of lavender are sweet smelling and may be used dried or fresh. They produce fragrant oil that is extracted for commercial use. Hybrids developed specifically for this purpose have a high lavender-oil content and are known as lavandins. Lavender has been used for hundreds of years in sachets, potpourris and linens and to give a light flavour to fruit dishes, sauces, cordials, and confections. Fresh sprigs are included in herbal bunches known as tussie mussies, which have been used for hundreds of years to mask unpleasant odours and ward off illness.

Allergens: The allergens in lavender oil are geraniol, linalool, linalylacetate and are well recognised in causing allergic contact dermatitis. The usual exposure to lavender is from cosmetics and fragrances containing lavender oil. However, a recent study from Japan demonstrated that 4% of patients (with cosmetic allergy) were sensitive to lavender oil. The rate of allergy increased suddenly in 1997, associated with an increase in the practice of aromatherapy. Allergy to lavender oil has also been reported following contact with a variety of medicate creams such as Difflam® gel and Phenergan® cream which contain lavender oils.

Allergy: Lavender oil (aroma therapy), Difflam gel, Phenergan cream. There do not appear to be any reports of systemic reactions due to ingestion of lavender although there are such reports following eating of both oregano and thyme, which belong to the same family.

#### **14. Lemon**

Common name: Lemon

Botanical name: *Citrus limon*

Family: Rutaceae

Origin: The true home of the lemon is unknown, although it probably comes from north-western India/Himalaya. It is supposed to have been introduced into southern Italy in 200 A.D. and to have been cultivated in Iraq and Egypt by 700 A.D. It reached Sicily before 1000 and China between 760 and 1297 A.D. Arabs distributed it widely in the Mediterranean region between 1000 and 1150 A.D. It was prized for its medicinal virtues in the palace of the Sultan of Egypt and Syria in the period 1174-1193 A.D. Christopher Columbus carried lemon seeds to the New World in 1493.

Description: The true lemon tree reaches 3-6 m in height and usually has sharp thorns on the twigs. The alternate leaves, reddish when young, become dark-green above, light-green below; are oblong, elliptic or long-ovate, 6.25-11.25 cm long, finely toothed, with slender wings on the petioles. The mildly fragrant flowers may be solitary or there may be 2 or more clustered in the leaf axils. Buds are reddish; the opened flowers have 4 or 5 petals 2 cm long, white on the upper surface (inside), purplish beneath (outside), and 20-40 more or less united stamens with yellow anthers. The fruit is oval with a nipple-like protuberance at the apex; 7 -12 cm long; the peel is usually light-yellow though some lemons are variegated with longitudinal stripes of green and yellow or white; it is aromatic, dotted with oil glands; 6-10 mm thick; pulp is pale-yellow, in 8 to 10 segments, juicy, acid. Some fruits are seedless, most have a few seeds, elliptic or ovate, pointed, smooth, 9.5 mm long, white inside.



Uses: Used as foods and garnishes. Lemon juice is added extensively to carbonated beverages, pies and tarts, as a flavouring for bakery, confectionery, preserves and pharmaceutical products. Lemon juice is a stain remover and has been used for bleaching freckles and is incorporated into some facial cleansing creams. Lemon peel oil is used in furniture polishes, detergents, soaps and shampoos. It is important in perfume blending and especially in colognes. Lemon peel, dehydrated, is marketed as cattle feed. The wood is fine-grained, compact, and easy to work. Lemon juice has traditionally been used as a diuretic, antiscorbutic, astringent, and febrifuge. In Italy, the sweetened juice is given to relieve gingivitis, stomatitis, and inflammation of the tongue. Lemon juice in hot water has been widely advocated as a daily laxative and preventive of the common cold, but daily doses have been found to erode the enamel of the teeth. Prolonged use will reduce the teeth to the level of the gums. Oil expressed from lemon seeds is employed medicinally.

Allergens: Psoralens (bergapten), geraniol, citral, D-limonene

Allergy: Citrus fruit, notably lemon and *C. bergamia* (the source of bergamot oil) are important causes of Phototoxic reactions. The peel of lemon is also irritant and may cause contact urticaria. Allergic contact dermatitis is unusual although its hand dermatitis has been reported in food handlers who had become sensitised to lemons. Citrus fruit peel is often waxed and dyed. Sensitisation may be due to carnauba wax or dyes such as carotene and Citrus Red 3 dye.

Cross reactions: Balsam of Peru

## 15. Mango

Common name: Mango, Mangot, Manga, Mangou

Botanical name: *Mangifera indica*

Family: Anacardiaceae

Origin: The mango is native to southern Asia, especially Burma and eastern India. They were taken from India to Malaya and eastern Asia in the fourth and fifth centuries BC and then to East Africa in the tenth century AD. The Portuguese carried them to West Africa and from there to Brazil in the early sixteenth century. Mangos were introduced to California in 1880.

Description: Mango trees make handsome landscape specimens and shade trees. It can grow to 20-30 meters tall and live for over 300 years. The leaves are dark green above and pale below, usually red while young. The flowers are yellowish or reddish in colour. The fruits grow at the end of a long, stringlike stem and are 5-20 cm long, kidney shaped. When ripe, the fruit is pale green or yellow, marked with red, according to the cultivar. The skin is inedible and contains a sap which is allergenic to many people. The quality of the fruit is based on the scarcity of fiber and minimal turpentine taste.

Uses: Mangos are eaten fresh. They are often used in tropical fruit salads, in Thai dishes, as mango juice and in icecreams and sorbets. Half ripe or green mangos can be eaten with salt or are cooked to make mango chutney. The sour flavouring, amchur, is made from sliced mango that has been dried and seasoned with turmeric before being ground. Kernels extracted from the woody seeds provide famine food in India or are pressed for oil which can be used in soap manufacture. Flour can be made from mango seeds. The wood is used for rafters, boats, flooring, furniture and other applications. In West Africa, the gum from the trunks is used to mend crockery. There are also many different traditional medicinal uses for all parts of the tree.

Allergens: Urushiol, cardol, limonene

Allergy: The common forms of allergic reaction to mango include bullous cheilitis, urticaria, and contact allergic dermatitis from contact with either the sap of the tree (eg woodworking or climbing the tree) or from contact with the skin of the fruit. Mango has also been associated with respiratory and food allergens. In a large study from France 6% of severe food allergies were due to mango.

Cross reactions: Other anarcadacea spp, particularly cashew nut and poison ivy (*Rhus* or *Toxicodendron*). Mango may cross react with various respiratory allergens including mugwort pollen, birch pollen, celery, and carrot. Latex allergy (and therefore possibly papaya, avocado, banana, chestnut, passion fruit, fig, melon, kiwi, pineapple, peach, and tomato).

Other information: The mango tree (*Mangifera indica*) appears in many Indian myths and legends and is considered sacred by Hindus who believe that it is a transformation of Prajapati – the lord of creatures. Its leaves and flowers are made into garlands for decorating Hindu temples.

## 16. Mint

Common name: Apple Mint, Curly Mint, Pennyroyal, Peppermint, Pineapple Mint, Spearmint, Water or Bog Mint, hortela, menta, mentha montana, menthe, nane.

Botanical name: *Mentha* spp.: *Mentha aquatica*, *M. piperita*, *M. pulegium*, *M. spicata*, *M. suaveolens*.

Family: The Labiatae (Lamiaceae) are mostly herbs or shrubs comprising about 200 genera and 3,200 species. The family is classified in eight groups based on highly technical characters. Most of the economically important species are used for their essential oils and bitter principles. Lavender, patchouli, rosemary, sage, spearmint, peppermint, basil, thyme, marjoram, savory, oregano, pennyroyal, catnip, bee balm, horehound, yerba buena, hyssop and others are important as herbs or spices or in perfumery, medicine or other minor applications.

Origin: The 25 to 30 species of *Mentha* are native or naturalized to north temperate regions, Australia and South Africa. They may have originated from the Mediterranean.

Description: Mints are branching herbs or shrubs. Many are perennials with leafy runners, stolons or underground rootstocks. Almost all have essential oils and half a dozen species are cultivated. The leaves are opposite or whorled, and are simple or occasionally pinnately compound; stipules are absent. The flowers are bisexual and zygomorphic. The fruit consists of four 1-seeded nutlets that rarely may be fleshy and drupaceous.

Uses: Ornamental flower. Narcissus oil used in perfume manufacturing.

Allergy: Although beautiful, daffodils have resulted in severe allergic problems, including death. Symptoms have included allergic rhinoconjunctivitis, asthma, allergic contact dermatitis, irritant contact dermatitis (from contact with narcissus sap) and urticaria. Most patients affected work in the flower industry (bulb growers, stem pickers or florists) but there are reports of reactions from contact with narcissus oil used in perfumes and fragrances. Narcissus contains a number of alkaloids including masonin and homolycorin. These, in conjunction with crystals of calcium oxalate seems to cause the characteristic sores.



Uses: Peppermint oil has long been an extremely popular flavoring agent in products ranging from chewing gum to after-dinner mints. Medicinally, it is mainly used to aid the various processes of digestion although, in 1990, the United States Food and Drug Administration declared peppermint oil to be ineffective as a digestive aid and banned its use as a nonprescription drug for this purpose. The active constituents are found in the essential oil, mainly menthol and carvone.

Allergens: Menthol and L-carvone appear to be the main allergens. Mint also contains 1,8-cineole, acetaldehyde, acetic-acid, alpha-amorphene, alpha-cadinene, alpha-carotene, alpha-copaene, alpha-gurjunene, alpha-pinene, alpha-terpinene, alpha-terpineol, alpha-thujone, alpha-tocopherol, aluminum, amyl-alcohol, amyl-valerate, anethole, azulene, benzoic-acid, beta-

betulenol, beta-carotene , beta-caryophyllene, beta-copaene, beta-ionone, beta-pinene, beta-thujone, beta-ylangene , betaine, bicycloelemene, bisabolene, cadinene, calcium, camphene, carvacrol, carveol, carveol-acetate, carvone, caryophyllene-oxide, cedrene, cedrol, choline, chromium, cineole, cinerol, cinnamic-acid-methyl-ester, cis-piperitol, cis-roseoxide, cis-sabinol, citronellol, cryptone, flavons hymenoxin, iron, isoamyl-phenylacetate, isobutyric-acid, isomenthol, isomenthol-acetate, isomenthone, isomenthyl-acetate, isopulegol-acetate, isorhoifolin, isovaleraldehyde, isovaleric-acid, isovaleric-acid-n-octyl-ester, jasmone, lavandulol, ledol , limonene, linalool, luteolin, menthol, menthone, menthoside, menthyl-acetate, menthyl-isovalerate, menthyl-valerate, myrcene, myrtenol, neoisomenthol-acetate, neomenthol, neomenthone, neomenthyl-acetate, nerolidol, nevadensin, octan-3-ol, p-cymene, p-cymol, pectin, pent-cis-2-en-1-ol, perillyl-alcohol, phellandrene, phenylethanols, phenyl-propyl-pyridines, phosphorus, pinene, piperitenone, piperitone, piperitone-oxide, pulegone, pyridine, rosmarinic-acid, sabinene, sabinene-acetate, sabinene-hydrate, salvigenin, sideritoflavone, silicon, terpinolene, thymol, trans-piperitol, trans-roseoxide, vanillin, viridiflorol, xanthomicrol

Allergy: Irritant and allergic contact dermatitis have both been reported. Dermatitis in two bartenders was attributed to contact with *Mentha citrata* (Bergamot mint). Menthol, the chief constituent of Oil of Peppermint (*Mentha piperita*), is irritant in high concentration especially if evaporation from the skin is prevented. Perfumes and colognes containing menthol and/or Oil of Peppermint can produce dermatitis in some individuals. Dermatitis has been reported in workers in candy factories whilst adding peppermint to lollies. A finisher of chewing gum with contact dermatitis had positive patch test reactions to diluted spearmint (*Mentha spicata*) flavouring. The leaf of *Mentha longifolia* is said to be irritant to the skin. Ingestion of *Mentha saturioides* (Penny royal mint) was suspected as a cause of hepatic photosensitisation in sheep. Essential oils from these plants are noted in many reviews of cosmetic dermatitis as allergenic.

## 17. Manuka

Common name: Tea-tree. Note, there are 3 different species of Myrtaceae growing in Australia and New Zealand known as 'Tea-tree': the Australian Tea tree (*Melaleuca alternifolia*), the New Zealand Manuka (*Leptospermum scoparium*) and Kanuka (*Kunzea ericoides*)

Botanical name: *Leptospermum scoparium*

Family: Myrtaceae

Origin: New Zealand and Australia, but new cultivars being developed in USA and United Kingdom.

Description: A medium sized evergreen shrub which can grow up to 5 meters tall and 3 meters wide. Leaves are variable in shape and size; they may be elliptical, broadly lanceolate or obovate and from 7 to 20 mm long. White flowers, occasionally tinged with pink and rarely red, 1 cm in diameter, occur in spring and early summer. Many different highly ornamental cultivars are now available. The bark is stringy and peels in long flakes.

Uses: Mostly grown as an ornamental plant. Manuka is a nursery tree and often forms large areas that protect regenerating forest seedlings and form a shelter for native orchids and other small plants. Manuka wood is red coloured, hard and durable. It has been used for fencing, for tool handles and as a firewood. Manuka was used traditionally by Maori for a variety of ailments from urinary complaints, head colds, sedation to skin disorders. Infusions and poultices were made from the leaves and inner bark and the seed capsules and sap were chewed. Early european migrants produced a tea from Manuka leaves (hence it's name). Today's modern uses are focused on topical applications for skin, cosmetic, fungal conditions and topical anti-histamine use.

However, the variability in Manuka essential oils suggests caution in their usage, as does the fact that the oils have not been tested for toxicity. Manuka honey can be eaten, used in cooking or used externally.

Allergens: Manuka essential oils include sesquiterpene hydrocarbons (> 60%), oxygenated sesquiterpenes/triketones (approx 30%), and monoterpenes (< 3%). Individual components include: monoterpene hydrocarbons,  $\alpha$ -cubebene,  $\beta$ -pinene,  $r$ -cymene,  $g$ -terpinene,  $\alpha$ -copaene,  $\beta$ -caryophyllene, aromadendrene, calamanene, limonene, myrcene,  $\delta$ -cineole, linalool esters, copaene, elemene, gurjunene/aromadendrene, farnesene/ caryophyllene, selinene, and cadinene skeletons.

Allergy: Allergic contact dermatitis has been reported to essential oils used in aromatherapy, from soaps/cosmetics and oils used therapeutically.

Cross reactions: *Melaleuca alternifolia*

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