

# Plumeria



# Handbook

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## History of the Plumeria

### History:

The Plumeria is a member of the Apocynaceae family of plants, which include the Amsonia (Amsonia) Oleander (Nerium), Periwinkle (Vinca), Natal plum (Carissa), Frangipani (Plumeria), Yellow oleander (Thevetia), Crepe-jasmine (Ervatamia), and Chilean jasmine (Mandevilla). Many members of this family are poisonous when vegetative parts are eaten.

The Plumeria was named after the French botanist Charles Plumier. In the 17<sup>th</sup> century he was appointed by the King of France to make voyages to the Caribbean. From his drawings and notes, his countryman and fellow botanist, Tournefort, named the genus after him.

Frangipani (Plumeria) is native of tropical America, which includes Mexico, Central America, Venezuela, and the islands of the Caribbean. The French-speaking people of the West Indies call it Afrangipani from the French word meaning coagulated milk. In the Hawaiian Islands, Philippine Islands, and some of the Caribbean Islands, it is planted in graveyards and is known as the AGraveyard Tree. The Plumeria was introduced to Hawaii in 1860, and is now used to make the traditional lei. It has taken several generations of Hawaiians to overcome the relationship with graveyards before it became popular as the lei flower. The islanders now call it APua Melia.

### Family: Apocynaceae

### Genus: PLUMERIA (Frangipani)

#### Species:

Plumeria (inodora)

Plumeria (pudica)

Plumeria (rubra)

Nosegay Plumeria (subsessilis)

Plumeria (obtusata)

Plumeria (filifolia)

Plumeria (alba)

#### Countries:

-Columbia, British Guiana

- Colombia, Venezuela, Martinique

-Central America

-Hispaniola

- Bahama Islands, Cuba, Jamaica, Hispaniola, Puerto Rico Yucatan Peninsula and British Honduras

- Cuba

-Puerto Rico, Virgin Islands, Lesser Antilles

### **Characteristics of the species.**

#### **Plumeria (alba)**

The tree can grow to 40 feet in height. The leaves are oblong-lanceolate and can grow to 1 foot long. The leaves are long acuminate at the apex, obtuse to rounded at the base. The marginal connecting vein is not well developed. The underside of the leaf is usually covered with fine hairs (Pubescent). The flower can be up to 3 inches across and is usually white with a yellow center. Plumeria (alba) is native to Puerto Rico, Virgin Islands, and Lesser Antilles. When grown in southern California, the growth habits may change slightly due to soil and climatic conditions.

### **Common Names**

|                    |                                         |
|--------------------|-----------------------------------------|
| Australia          | Dead Man's Fingers                      |
| Brazil....         | Jasmin de Cayenne                       |
| Central America    | Amapola de Vevus                        |
| Dominican Republic | Aleli                                   |
| French Guiana.     | Frangigpaner                            |
| Guatemala....      | Flor de la Cruz                         |
| Haiti...           | Frangipani; Frangipanier                |
| Hawaii             | Pumeli or Melia                         |
| India..            | Temple tree, Pagoda Tree                |
| Indonesia.         | Kamboja                                 |
| Java.              | Semboja                                 |
| Mexico...          | Suchil, Crow-Flower                     |
| Nicaragua          | Flor de Palo, Flor de Mayo, Sacuanjoche |
| Philippines....    | Calachuchi                              |
| Puerto Rico.....   | Paucipan                                |
| Southern China     | Egg Flower                              |
| Salvador..         | Flor de Mayo                            |
| Tamil...           | Perungalli                              |
| Trinidad...        | Frangipani                              |
| Venezuela.         | Amapola, Atapaimo                       |
| Vietnam.           | Bong xú                                 |
| Yucatan.           | Flor de Mayo                            |

## How a Plumeria is Named

Family: Apocynaceae - Some plants that are in this family are: Amsonia (Amsonia) Oleander (Nerium), Periwinkle (Vinca), Natal Plum (Carissa), Frangipani (Plumeria), Crepe-Jasmine (Ervatamia).

Family: A classification of plants or animals with common distinguishing characteristics.

Genus: Plumeria

Genus: A group of plants that is separated from other groups by reproductive isolation, and that shows recognizable differences from them, in color and form. A genus is the main subdivision of a family and is made up of a small group of closely related species.

Species: Plumeria (rubra), Plumeria (pudica). Plumeria (inodora), Plumeria (subsessilis), Plumeria (obtus), Plumeria (filifolia), Plumeria (alba).

Species; Is the fundamental unit in taxonomy used to designate a population of plants that can be recognized and which reproduces itself as a unit. Species are designated by binomial names written in italics.

Variety: A group of plants less than species rank: some botanists view varieties as equivalent to sub-species, and others consider them divisions of sub-species. Abbreviated var.

Cultivar: Guillot's Sunset, Courtade Pink. Hilo Beauty, Celadine. There some 70 registered cultivars, and some pending registration this year.

Cultivar: [cultivated variety.] a group of cultivated plants which is clearly distinguished by certain characteristics and which, when reproduced asexually, retains its distinguishing characteristics.

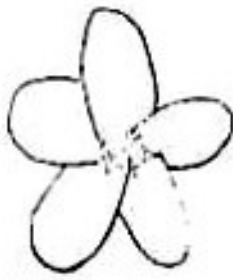
The scientific name of a cultivar includes the: (a) genus, (b) species, and (c) cultivar name, the first in the usual Latin form and the latter in words of a common language. The cultivar name can be set off by the abbreviation cv., or by single quotation marks, but not both. It can also just be attached to the common name. See illustration below.

Apocynaceae Plumeria rubra cv. Guillot's Sunset

OR

Apocynaceae plumeria rubra 'Guillot's Sunset'

# Leaf & Flower Shapes



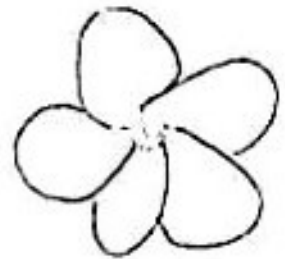
PETAL-wide  
TIP-round  
OVERLAP-areat



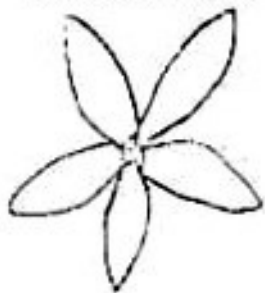
PETAL-obovate  
TIP-round  
OVERLAP-slight



PETAL-elliptical  
TIP-round  
OVERLAP-moderate



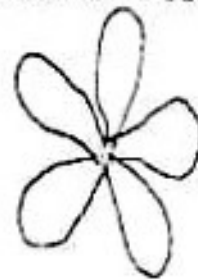
PETAL-wide  
TIP-round  
OVERLAP-great



PETAL-elliptic  
TIP-pointed  
OVERLAP-slight



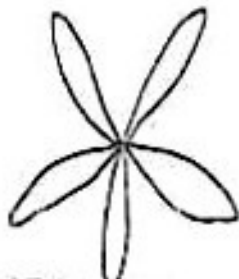
PETAL-elliptical  
TIP-pointed  
OVERLAP-moderate



PETAL-obovate  
TIP-round  
OVERLAP-slight



PETAL--narrow  
TIP-pointed  
OVERLAP-slight



PETAL-narrow  
TIP-pointed  
OVERLAP-NONE



PETAL-narrow  
TIP-twisted/narrow  
OVERLAP-slight



Acuminate  
Leaf Tip



Obtuse/round  
Leaf tip



Emarginate  
Leaf Tip



Obtuse/blunt  
Leaf Tip



Oblanceolate  
Leaf



Lanceolate  
LEAF



Acute  
Leaf Tip

## Summer Care and Flowering

Your Plumeria has three basic needs, Water, Sunlight and Food. If you provide this, they will reward you with many lovely blooms.

### **WATER:**

Water is very important to your Plumeria. Your plant must have enough water in the summer months. Without adequate water your Plumeria will go into a suspended state or dormancy. The plant will abort flower stalks and the leaves will drop. Allow Plumeria to go dry in between watering, and then a deep soaking is in order. Watering depends on the daytime temperature and humidity, a good balance is essential. Plumeria do not like standing water; do not use a catch bowl under a potted Plumeria. When the plant drops its leaves in the cool fall and winter months, **DO NOT WATER**, only enough water is necessary to keep the soil slightly moist. If the temperature in your environment drops to 32 deg the plant may be bare rooted and stored in a freeze protected area. The plant can be replanted in the spring and will do well.

### **SUNLIGHT:**

6 to 8 hours of direct sunlight is needed for good blooming of your plumeria. Some varieties require some shade from the hot inland sun in the summer months.

### **FERTILIZATION:**

To encourage blooming, Plumeria need a high phosphorus fertilizer. Refer to the N- P- K numbers on the bag. The "p" is the Phosphorus content. Superbloom, Superphosphate and Hi-Bloom are some examples. You can use a 10-52-10 water soluble fertilizer at a rate of 1 to 2 teaspoons per gallon of water. A weaker solution and using it more often gives very good results if your plants are in pots. For plants in the ground, a 3-12-12 will work well. Apply at a rate of 1 pound per inch of trunk diameter, spread evenly to the drip line of the plant. Depending on your soil type: 2 to 3 applications a year is sufficient.

## **Is it time to repot your Plumeria**

*By Carl Herzog*

When the roots are growing out of the bottom of the container, it is time to repot your plumeria. Some people like to keep their plumeria in a small pot so the size of the plant can be controlled. If this is the case, you still may want to repot the plant to the next larger size pot. Over time the soil becomes depleted and washes away from the roots. Whatever the case, the plant should be repotted from time to time.

The soil mix that you choose is very important when repotting a plant. Plumeria like a well drained loose potting mix that will retain some moisture. The three major components of a soil-less mix are; washed sand, composted organic matter and coarse aggregates such as Perlite. All major potting mixes contain these in varying percentages plus other things to stabilize the pH and add nutrients to the mix. There is no perfect mix for all conditions. If you live near the beach, with a high humidity, you will need a different mix than if you live inland with more heat and a lower humidity. Keeping this in mind, you would have to adjust the mix accordingly.

### **Characteristics of a good mix**

- It is well drained, In physical terms, this means an air-filled porosity of least 15 %
- It re-wets easily. Some peat and bark media are difficult to re-wet if they dry out,
- It does not shrink away from the side of the pot as it dries.
- It is the optimum weight; not too heavy to lift, not so light as to blow over easily.
- It has a suitable pH; between 5.0 and 6.5 is satisfactory for most plants.
- It is free of pests, for example weed seeds, fungal pathogens, or it can be sterilized without producing harmful by-products.
- It can be stored for short periods without significant changes in physical or chemical properties.
- It is readily available.
- It is not expensive.

## **A Basic Mix**

33% C Sand, this should be washed clean coarse sand.

33% C fibrous organic material such as coconut fiber, rice hulls, or compost.

33% C Perlite, redwood bark or pumice stone.

For each cubic yard, add a balanced nutrient package of the following. 1 lb. triple super phosphate C 4 oz. potassium sulphate C 4 oz. potassium nitrate C 5 lb. blood meal or bone meal. The ph should be adjusted to 6. These are only guide lines to follow when checking a bagged mix one might purchase at a garden center. None of the mixes will have the same percentages if the basic mix.

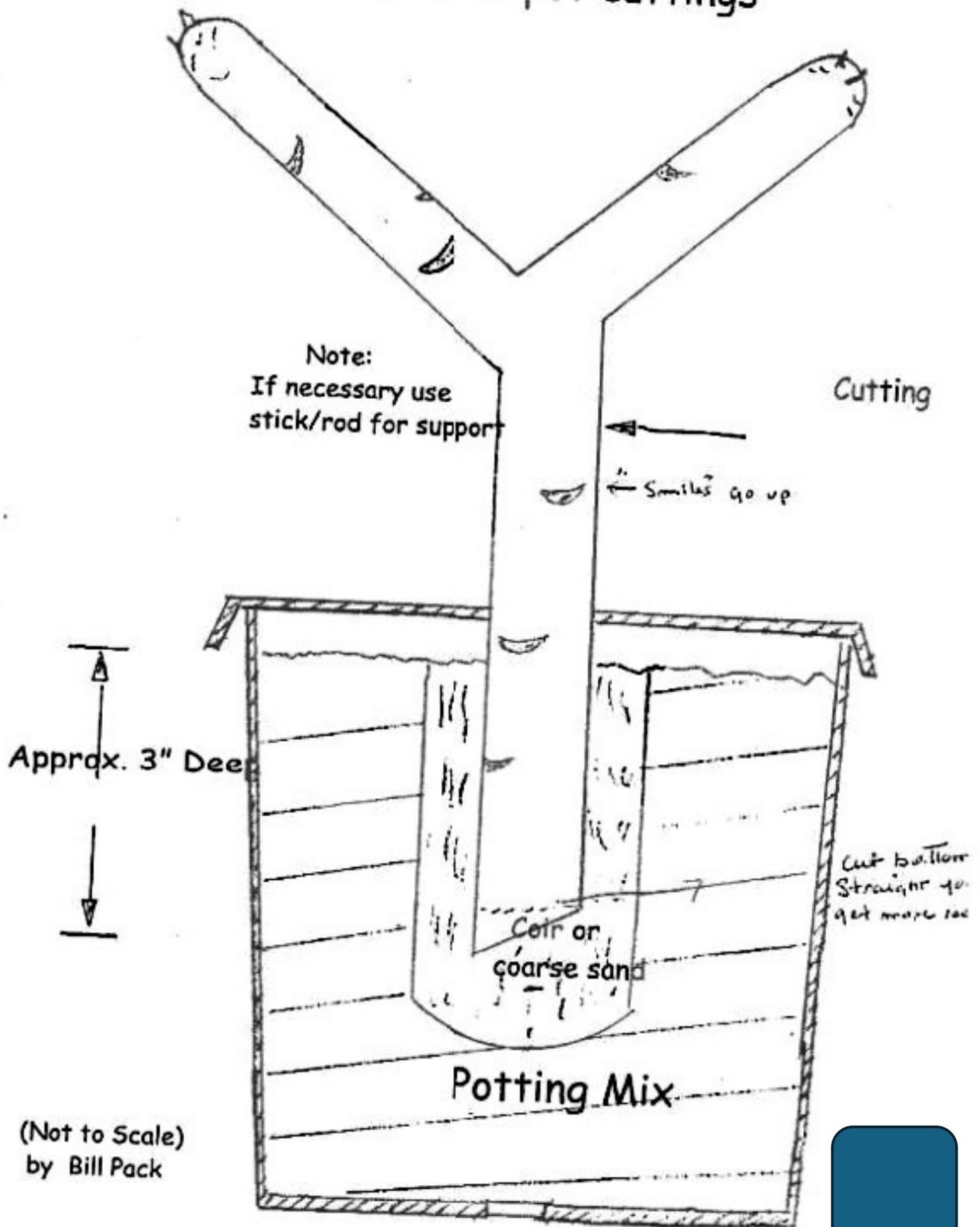
## Planting Cuttings

*By Bil/ Pack*

1. Cut the branch between "leaf scars" ("Smiley Face") at a 45 degree angle (cutting should be a minimum of 8" to 10" in length)
2. Remember to "lime paste" or seal the cut surface on the cutting and the mother plant. Be nice to the "Lady"
3. Trim all leaves & flowers to 1" stubs. (All energy will go to rooting)
4. Allow the "cutting" time to callous-scar-seal at least one week before planting. (Weeks or months should do no harm out of the sun)
5. Size your pot or container to the size of your cutting with a minimum of one gallon. Five to fifteen gallon pots for large cuttings.
6. Prepare your pot according to the drawing on the following page. Use a good draining soil mix. Commercial potting mixes are available or make your own.
7. Immediately surrounding the cutting should be a medium that has good drainage such as very coarse sand or Perlite. (Fine sand will pack, retain moisture and drown your cutting) Remember Plumeria love good drainage. Think of Hawaii ...lava rock and moisture.
8. Potting soil should be slightly damp; use a "rooting hormone" on the base of your cutting and place it at least three inches into the pot. (Deeper if it is a larger cutting)  
"Optional"...Scoring the sides of the cutting with a knife or potato peeler (one to two inches at the base about 90 degrees apart) and pasted with a rooting hormone (see page on "Rooting Hormones") will allow more rooting surfaces. Always sterilize your cutting tools.
9. Stake your large cuttings; place in a shaded warm area. Water once. Do not move or water again until you see active growth. (New leaves)
10. Mist cutting on hot days to help promote growth.

*Use cactus mix or patio plus (this was a hand written note)*

# How to pot cuttings



## **Need to Feed**

By Carl Herrog

Have you ever wondered, am I feeding too much, not enough or is my plumeria getting what it needs. Hopefully, I can explain some of the mysteries of this. Let me first start with what does my plumeria need to survive?

The basic needs, or the primary plant nutrients of a plant are, nitrogen (N), phosphoric acid (P). (P<sub>2</sub>O<sub>5</sub>), potassium (K), (K<sub>2</sub>O), air, soil and water. In addition to the primary plant nutrients, secondary plant nutrients, calcium (Ca), magnesium (Mg), and sulfur (S), are needed but in lesser amounts. Lastly the micro-nutrients, zinc (Zn), iron (Fe), manganese (Mn), copper (Cu), boron (B), molybdenum (Mo), chlorine (Cl), and nickel (Ni) in fractional amounts.

If you have an excess of one nutrient it can cause a deficiency of another, so a proper balance is very important. As an example, excess phosphorous may cause a zinc deficiency in soil that is low in zinc, or excess iron could cause a manganese deficiency.

The only sure way of determining the soil or plant element content is by soil and tissue testing, another factor in nutrient uptake is the pH of the soil or planting media. If the pH is too high or too low, the nutrients will become unavailable to the plant. The proper pH for the plumeria is 6.5 to 7.5. I try to stay closer to the 6.5.

According to published accounts, plumerias require a 10-30-10 every 3 to 4 months, at a rate of 1 lb. per inch of trunk diameter. The fertilizer should be spread around the plant to about 2 feet beyond the drip line. Obviously if your plant is in a container this does not apply. For container plants you will have to feed more often with lesser amounts, but keeping the same ratios. With my potted plants I use a water soluble fertilizer, diluted to 1/4 strength and feed every time I water. Either Grow-More 6-20-20 or Miracle-Grow 15-30-15 are good and have micro-nutrients. The choice is up to you.

Fertilizer ratios are the relative amounts of nitrogen, phosphorus and potash in a bag of fertilizer. As an example, a grade of 10-10-10 will have a ratio of 1-1-1. A grade of 12-12-12 will have a ratio of 1-1-1, A grade of 6-20-20 will have a ratio of 3-10-10. This is used in determining the amount of an element used when mixing fertilizers

The grade of a fertilizer is the listing of the primary nutrients contained in the bag, or the N.P.K. An example would be, 6-20-20, 6% nitrogen, 20% phosphoric acid and 20% potassium or potash. If a bag contains one element, it is called single grade. If a bag contains 2 or more elements it is called mixed grade. If the bag contains the three primary elements, it is called a complete fertilizer, however it does not mean it contains all of the 13 micro-nutrients. You must read the label on the bag. To determine the amount of an element

contained in a bag of fertilizer you would multiply the % of an element in the bag by the weight of the bag. If you had a 50-pound bag with 20% phosphoric acid in it, you would have 10 pounds of phosphoric acid.

If you would like to know how much the 10 pounds of phosphoric acid costs, this is how you would find the cost. The bag of 6-20-20 costs \$14.00, and you know you have 10 pounds of phosphoric acid in the bag, multiply the \$14.00 by the 20%, and you will have spent \$2.80 for 10 pounds of phosphoric acid.

By using this information, you can determine if one grade of fertilizer is more economical to use over another to get the results you want.

### **Visible signs of plumeria nutrient deficiencies**

**Nitrogen deficiencies**, slow growth, stunted plants, yellow-green color (chlorosis) and death (necrosis of tips and margin of leaves, beginning with more mature leaves. Phosphorus deficiencies, slow growth, stunted plants, poor leaf coloration on older leaves. Delayed maturity and poor seed development.

**Potassium deficiencies**, slow growth, tip and marginal chlorosis or necrosis starting on more mature leaves, weak stems and stalks and small or shriveled seeds.

**Calcium deficiencies**, tip burn on young leaves, death of growing points (terminal buds), abnormal dark green appearance of foliage and premature shedding of blossoms and buds.

**Magnesium deficiencies**, inter-veinal chlorosis in older leaves, curling of leaves upward along the margins and marginal yellowing, with a green 'Christmas tree area along the mid rib of the leaf. (The veins of the leaf look like a Christmas tree).

**Sulfur deficiencies**, retarded growth rate and delayed maturity, small and spindly plants, young leaves light green to yellowish in color. Zinc deficiencies, decrease in stem length, rosetteing of terminal leaves and mottled young leaves (inter-veinal chlorosis).

**Iron deficiencies**, inter-veinal chlorosis of young leaves, veins remain green except in severe cases.

**Manganese deficiencies**, inter-veinal chlorosis of young leaves, a gradation of pale-green leaf coloration, with darker color next to the veins. No sharp color distinction between veins and inter-veinal areas as with iron deficiency.

**Copper deficiencies**, stunted growth, a dieback of terminal shoots, poor pigmentation and wilting and eventual death of leaf tips.

**Boron deficiencies**, death of terminal growth, thickened, curled, wilted and chlorotic leaves and reduced flowering

**Molybdenum deficiencies**, stunting and lack of vigor. This is similar to nitrogen deficiency, because of the key role of molybdenum in nitrogen utilization.

**Chlorine deficiencies** are rare and are not thought to be of much concern.

**Nickel deficiencies**, chlorosis of young leaves, death of the meristem.

As you can see many of the deficiencies are the same for some of the elements, so you must know what you are treating for, as you can cause more problems with too much of a good thing. This is why soil and tissue testing is so important. Keep in mind, if you feed too much of one of the micro-nutrients it will bind other nutrients in the soil, making them unavailable to the plant. If you read the percentages of micro-nutrients in a bag of fertilizer, you will see they are very small. It is not a good idea to change the ratios unless there is a good reason.

I start to feed when the new leaves on the plumeria are about 2" long. The feeding schedule depends on the weather, but I usually start at the end of March. My first feeding is with a balanced fertilizer with micro-nutrients, such as 15-15-15. Check the bag for the micro-nutrients. For the next 6-week feeding I use 6-20-20 with micro-nutrients. When bloom buds start to develop, I add triple super phosphate, 0-45-0. For the last feeding of the year I feed heavy with 6-20-20, usually at the end of October. You will have to adjust your feeding to your soil type and growing conditions.

## **What nutrients do for your plumeria**

By Carl Heraug

### Nitrogen:

- Promotes rapid growth of stems and foliage
- Gives plants their rich, green color
- Helps plants assimilate many foods such as Potassium and Phosphorus
- Promotes plant vigor

### Phosphorus:

- Stimulates early root formation
- Promotes fruiting and seed formation
- Promotes flowering, Larger and more blooms

### Potassium:

- Promotes disease resistance
- Promotes seed production
- Gives the plant strength
- Helps plants withstand frost or adverse conditions

### Sulfur:

- Promotes cell production
- Acidifies alkaline soil

### Calcium:

- Promotes cell production and vigorous growth

### Magnesium:

- Acts as a catalyst in photosynthesis

Iron:

- Promotes green color and high yields
- Essential to chlorophyll production
- Prevents chlorosis or yellowing leaves

Zinc:

- A catalyst in the utilization of other nutrients.
- Promotes quality fruit.

Manganese:

- Serves as a catalyst in the utilization of other nutrients.

Boron:

- Used for calcium utilization and seed production.

Molybdenum:

- Used for nitrogen utilization.

Copper:

- Only traces are needed to act as catalysts for various plant functions.

Cobalt:

- Plays a role in photosynthesis and the opening and closing of stomata.

Nickel:

- Plays a role in photosynthesis and the opening and closing of stomata.

*Stomata: small openings in plant leaves through which oxygen, carbon dioxide and water vapor are exchanged.*

**Caution:** do not overuse any of the micro-nutrients because they will bind other elements and make them unavailable to your plants.

## Plants and Proper Nutrition

People often confuse plant nutrition with plant fertilization. Plant nutrition refers to the needs and uses of the basic chemical elements in the plant. Fertilization refers to the application and supply of chemical elements to the environment around the plant.

To achieve suitable plant nutrition, the proper balance of nutrients is necessary in the soil. Plants need 16 elements for proper growth. Carbon, hydrogen and oxygen are found in air and water, Nitrogen, potassium, magnesium, calcium, phosphorus and Sulfur are found in the soil. These six elements are used in relatively large amounts by the plants and are called macronutrients.

The seven other elements are called micronutrients, or trace elements. They are used in much smaller amounts by the plants. The micronutrients are also found in the soil and include iron, zinc, molybdenum, boron, copper, manganese and chlorine. All 16 elements are essential for plant growth. Most of the nutrients a plant needs are dissolved in water and then absorbed by the roots. According to researchers, 98% of the plant nutrients are readily absorbed from the soil solution and two percent are extracted from the surrounding soil by the roots. *Soil Solution; the dissolved nutrients available to the plant when watered.*

Soil testing can help you ensure macronutrient and micronutrient balances and will determine the pH of your soil or planting mix. Check with your local nursery.

Chemical changes must occur before a nutrient in the fertilizer can be utilized by the plant. The nutrient elements are absorbed as charged ions, the smallest particle that can exist and still retain the characteristics of the substance. For example, nitrogen is absorbed as nitrate, an anion with one negative charge. The potassium ion is a cation with one positive charge. The balance of ions in the soil is very important. Ions of opposite charges attract each other; ions of similar charges compete for chemical interactions and reactions in the environment. Some ions are more active than others and thus compete better. To give an example, both calcium and magnesium are cations with two charges, magnesium has a smaller radius can compete better. If both are in competition to be absorbed, the magnesium will be taken up. In this case, a soil test may indicate sufficient calcium in the soil, but the plant may exhibit a calcium deficiency because of the more active magnesium.

## **Preparing your Plumeria for winter**

By Carl Herzog

In Southern California most of our Plumeria will go dormant. The exceptions are the obtusa varieties such as the Singapore. As the days grow shorter and the nights get cooler the Plumeria go dormant. The plants may look dead, but let me assure you in the spring they will come back to life and reward you with many beautiful blooms. In order for this to happen you must prepare the plants for winter and take care of them.

First you must make sure the plants are well fed before dormancy, Plumeria need phosphorous, P. the second letter of the N P K numbers on the fertilizer container. Phosphorous is the chemical that stores and transfers energy in all- living things. Other things phosphorus will do for your plant, it helps the plant to take up water, it promotes root growth, and most important it helps your Plumeria resist cold weather. Second and also important is Potassium or Pot Ash the K the last letter of the N P K numbers on the fertilizer container. Potassium promotes thicker cell walls, thereby makes the plant more winter-hardy and less likely to be injured by fall or spring frosts. Young plants should always be protected from frost. As the plant matures it can take colder temperatures.

Nitrogen should be kept to a minimum for the winter-feeding. I feed my Plumeria in mid October with a 6-20-20 with micronutrients. This will give the Plumeria what it needs for the winter dormancy. When the cool weather sets in and the bottom leaves turn yellow and start to drop off do not water your Plumeria. This is one of the best ways to kill your plant. Water your plant only when it is dry: keep only a minimum amount of moisture in the container. During the rains, if your plant is outside in a pot or in the ground make sure water does not puddle around the plant. With a little T L C you will be successful.

In southern California we have a wide range of microclimates. You must take into account the conditions in your area to best determine your water and feeding schedules.

## **Winter tips for your Plumeria**

By Carf Herzog

This is the time to start thinking about the winter and what you are going to do with your Plumeria that have been so beautiful all season. Toward the end of October, this is my last fertilizer application. I include some "triple super phosphate" 0-45-0. I use about 1 tablespoon per one gallon pot. Plants in the ground; 2 tablespoons per inch of diameter. Do not over use with the plants still growing they will take up the nutrients and store them for the next season. If you wait until the spring the plants cannot assimilate the nutrients into the bloom spikes in time for good blooms early in the season. I have done this for the past two years with good results. If you can time your fertilizer with a rain shower it is a real plus.

The proper way to fertilize your plants is to water them, wait from 2 to 3 hours, apply, your fertilizer and re-water your plants. This method helps the planter mix hold the water with the fertilizer so the plant can take it up. As the nights get cooler and the days get shorter the Plumeria will start to lose their leaves. I never remove green leaves from a plant this time of the year. Let the plant get all it can until it goes dormant. The only reason I would remove a leaf is if it had insects on some other problem. Some people remove leaves to force dormancy; unless you have a reason to do this, I just let nature take its course,

Another thing you can do if it is possible is to move your plants close to the house or onto a patio to protect them from frost. If you move them close to the house, be careful as not to place them under the eaves. Place them so the water will not drain onto them.

Another thing to consider when frost is a danger: If you have a 2 or 3 inch depression in a pot, the cold air will settle in the pot and freeze the plant at the soil level. A good remedy is to fill the container with mulch and heap it in a cone around the trunk. This way you will not trap the cold air.

When we have rain and the plants are in it you can take a piece of plastic and make a cone around the pot so the water will not enter the pot.

Probably one of the most important things you can do is to tip the pot slightly. You can use a 2X4 to raise one side of the pot. Even though you have drain holes in the pot, water will still stand in the bottom. You can build a tent structure out of plastic pipe or wood, so that you can drape a sheet or plastic over the plant. However it must be removed in the morning. A good rule to follow with Plumeria is: "no leaves - no water."

"Remember Plumeria do not like cold wet feet."

### **Winter pests:**

Red Spider Mite should be kept in check. Malathion is an effective control. Follow label instructions. They will over winter on the plants and will cause puckering of the new leaves in the spring. They are tiny and hard to see with the naked eye, if you see the damage you already have a good population of them. (Pass around leaf samples.)

Glant white fly this time of the year you will have the eggs and some of the adult flies. When the leaves fall off, pick them up and dispose of them. I place any infected leaves in a plastic bag and leave them in the sun, this will take care of them.

Soft Brown Scale on the underside of the leaves: notice small raised brown spots. You may also notice them on the tips and further down the trunk. These are the adults. They are protecting the young eggs. When they hatch they will spread fast. They are a sucking insect and will cause the trunk to become crooked. Malathion is a good control. Follow label instructions.

## **Soft Brown Scale**

### **DESCRIPTION**

**Adult-** Depending on the host plant, the adult scale may vary in size. The scale varies from 4.5 mm on Cycad to as small as 2.0 mm on Asparagus fern. Relatively hemispherical, brown, smooth, and shiny, the scale may resemble a miniature army helmet. Young females may have a pattern of ridges in the form of the letter "H" on the dorsal surface.

**Egg-** The oblong, pinkish beige eggs are about 0.7 mm long and are protected by the mother's body in a mass of hundreds

**Crawler-** The flat, pinkish beige crawler is about 1.0 mm long with two red eye spots. The antennae and legs are short and spindly. There are two small bristles protruding from the rear.

**Nymph-** Nymphs are semitransparent, light yellow or fig-pink, and flat (young) to humped (older). They are so closely attached to the host plant that the legs and antennae are concealed. Two pale lines start at the margin on each side and fade in intensity toward the middle. Nymphs and young adults may exhibit the characteristic "H" pattern of the black scale group.

### **BIOLOGY**

**Distribution-** From its probable origin in South America, the hemispherical scale insect is now found in greenhouses and house interiors throughout the United States. chrysanthemum, the myrtle of orange, iris has gardenia, honey buckler, ivy or has Plumeria and zamia.

**Damage-** The secretion of honeydew and subsequent formation of sooty mold detracts from the beauty and commercial value of the plant. Feeding causes the plant to become stunted and lose its leaves.

**Life History-** The hemispherical scale insect is a tropical insect that has become a common greenhouse pest.

In warmer temperate areas, the scale can live outside. Unlike many other scales, the hemispherical scale secretes little wax. However, the scales do produce much honeydew which allows sooty mold to grow. Males are unknown and reproduction is by parthenogenesis. Each female may deposit up to 1000 eggs. After laying the eggs, the female dies and her body shrinks to form a cup or helmet over the eggs. Development for the egg stage and the three nymphal instars requires at least 40 days and may take as long as 105 days. There may be several generations each year in the greenhouse, with all stages being present at any one time. The nymphs do not move much once they have begun to

feed. The hemispherical scale insect has a low rate of parasitism indoors, and it often becomes a serious pest.

### **CONTROL**

Hemispherical scale insects are relatively difficult to control because the eggs and young nymphs are protected by the body of the mother. For specific chemical control recommendations, see the current Cooperative Extension publications on ornamental plant pest management or consult your county Extension agent. The most important parasite of hemispherical scale in the United States is *Metaphycus hesperus* Compere.

## **Plumeria, from seed to seedling**

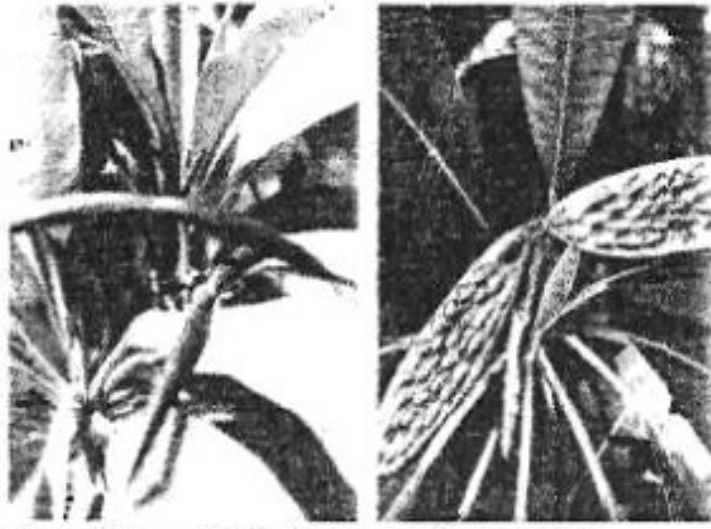
By Carl Herzog

What are those funny looking things hanging from my favorite Plumeria? They look like a giant propeller or a banana. Wow! You are in luck that is a seed pod. Not every Plumeria produces a seed pod. Some have them every year, some very rarely produce one. They will start any time during the blooming season and will stay on the plant through the winter. The pod will be a greenish-yellow or a reddish-brown. The seed pod takes 9 to 10 months to ripen. When the seed pod starts to shrivel and a crack appears down the seam it is almost ripe. At this time you can place a short woman's nylon stocking or some cheesecloth over the pod, The reason for this is to catch the seeds. If you are not there when the pod opens fully, the seeds will be scattered by the wind. You may also pick the pod if you so desire. If you watch the pod, you will see it start to split down the seam. You may remove the pod from the plant at this time. Open the pod and remove the pulpy piece that runs along the split. It is similar to the strings on a banana, only it will be larger, about 1/4 to 3/8 of an inch wide. If you do not remove this, the pod will tend to mildew, and you will have lost all of your seeds.

Now you have 30 to 40 seeds, and what do I do with them now? I place the pod in a paper bag to dry for about two weeks. Check on them occasionally to make sure they are drying properly. Plumeria seeds will stay viable for one to two years, but the sooner you can plant them, the better germination rate will be. The seed looks like a pine seed, with a head and a winged tail. Everyone has their own way of planting seeds, and this is the way I plant mine. I use 2 X 2 X 2 inch plastic starter-trays. I fill the cells about 3/4 full of perlite and dampen it. I then make a small depression in each cell and place the seed, head down, and leave about half of the tail exposed. Next I fill the cells, leaving part of the tail exposed. Then saturate the planting medium, being careful not to float the seeds. Your seeds need to be kept warm, about 70°, and damp. Your seeds should sprout in about 5 to 10 days.

When the cotyledons (green leaf-like structures) appear, the seed coat should have come off. If it has not, it must be carefully removed. I use a spray bottle to wet the seed-coat, let it sit for a few minutes and then very gently remove it, being careful not to damage the sprout.

After the first true leaves appear, I will feed them with a weak solution of Miracle Grow. When the seedling is two to three months old, I will then transplant it into a larger container of potting mix. At the time of transplanting I use solid fertilizer tablets. (Gro-Power 3-12-12) I place them one to two inches below the seedling's roots. As the roots grow down, the fertilizer will be available to them, giving them a great boost. Now all you have to do is care for the plant for the next two to three years. You may get a bloom that could be a show stopper.



*The pierune on the left is a seed pod on the plant.*

*The picture on the right is the seed pod open, showing seeds.*

## **Glossary: Terminology for Plumeria**

*The word in italics at the beginning of the definition is referring to the part of the Plumeria being described.*

Anther: (flower) the pollen-bearing part of the stamen,

Apex: (plant) the pointed end or tip. (*Plumeria* leaf or tip)

Apical Bud: (plant) a bud at the tip of the stem.

Apical dominance: (plant) the influence exerted by a terminal bud in suppressing the growth of lateral buds.

Apical meristem: (plant) the region of actively dividing cells at the growing tip of the of a stem or root.

Auxin: (chemical) [Gk, auxen, to increase) A plant growth-regulating substance; controls cell elongation.

Axil: (plant) the upper angle between the leaf and the stem from which it grows

Axillary bud: (plant) a bud occurring in the axil of a leaf.

Benign Neglect: (plant) useful in growing most anything. Don't over water

Callus: (The end of a cutting) A thick new corky tissue developed by woody species to cover wounds.

Cambium: (plant) a layer of formative cells between the wood and the bark in woody plants. A slick feeling layer located just beneath the bark.

Chlorophyll: (plant) the green pigment of plant cells, which is the receptor of light energy in photosynthesis.

Cork: (plant) a secondary tissue produced by the cork cambium: non living at maturity: the outer part of the periderm.

Corolla: (flowers) the pedals collectively; usually the conspicuously colored flower whorl.

Cotyledon: (seed) Seed leaf: a primary leaf in the embryo; generally stores food in dicotyledons.

Cultivart: (plant) a variety of plant found only under cultivation, of botanical or horticultural importance, requiring a name.

**Cytokinin:** (chemical) A class of plant hormones that promotes cell division, among other effects.

**Elliptical:** (leaf shape) Plumeria leaves having the form of an ellipse.

**Endosperm:** (seed pod) the starch and oil-containing tissue of many seeds. [A soft fleshy strip located under the seam in a Plumeria seed pod,]

**Follicle:** (seed pod) A dry, dehiscent, one- carpelled fruit with usually having more than one seed and opening along the ventral structure.

**Genus:** (plant) a more or less closely related and definable group of plants, including one or more species. The name of the genus becomes the first word of the binomial employed in horticultural and botanical literature. The Plumeria belongs to the genus Plumeria,.. Plumeria Obtusa or, P. obtusa is the SINGAPORE PLUMERIA.

**Glabrous:** (leaves and inflorescence) having a surface without hairs, projections or pubescence smooth.

**Graft:** (plant) the placement of a scion (part of a branch containing buds) onto a growing root stock to produce a plant of a known variety.

**Girdling:** (plant) from a woody stem, the removal of a ring of bark extending inward to the cambium.

**Hormone:** (chemical) A chemical substance produced usually in minute amounts in one part of an organism, from which it is transported to another part of that organism on which it has a specific effect.

**Humus:** (soil) Decomposing organic matter in the soil

**Hybrid:** (plant) Offspring of two parents that differ in one or more heritable characteristics; offspring of two different varieties or of two different species.

**Indoleacetic Acid:** (chemical) or: IAA. A naturally occurring auxin, a kind of plant hormone.

**Inflorescence:** (Flower) a flower cluster, with a definite arrangement of flowers. The flowering part of a plant. A flower cluster.

**Internode:** (Branch) a region of stem between two successive nodes.

**Lanceolate:** (leaf shape) Lance-shaped, several times longer than broad and widest below the middle, tapering with convex sides upward to the apex.

Leaching: (Soil) the downward movement and drainage of minerals from the soil by percolating water.

Leaf Scar: (branch or trunk) the scar left after the leaf has fallen off. The Plumeria has a "smile" for a leaf scar, This is one way to tell which end of a Plumeria branch cutting is up. Smiles point up.

Macro nutrients: (fertilizer) [Gk. macros, large, + L. nutrite, to nourish]: N. P. K. Inorganic chemical elements required in large amounts for plant growth. "N" Nitrogen, \*P\* Phosphorus, "K" Potassium or pot ash, also, Calcium, Magnesium and Sulfur are in this group but in lesser amounts.

Micro nutrients: (fertilizer) [Gk. mikros, small, + L. nutrite, to nourish] Inorganic chemical elements required only in very small or trace amounts for plant growth. Even though in trace amounts they are still important for the plants. Iron, chlorine, copper, manganese, zinc, molybdenum, and boron.

Node: (leaf) the part of the stem where a leaf is attached; see Internode.

Obvate: (leaf) Broader below rather than above the middle. The shape of an inverted egg

Obtuse: (leaf) Blunt, rounded leaf tip.

Pandurate: (leaf) Fiddle-shaped; obovate with a pair of well developed basal lobes.

Petiole: (leaf) the leaf stalk; the portion of the leaf which supports the blade.

pH: (soil) a symbol denoting the relative concentration of hydrogen ions in a solution, pH values run from 0 to 14, and the lower the value the more acidic a solution, that is, the more hydrogen ions it contains. pH - 7 is neutral, less than 7 is acidic and more than 7 is alkaline.

Pubescent: (leaf underside and inflorescence) Covered with soft down hairs.

Radicle: (root) [L. Radix, root] The embryonic root. The root from a seed.

Recurved: (flower) Curved backward or downward

Reflexed: (flower) abruptly bent or turned downward, or bent backward.

Species: (plant) [L. Kind, sort] A kind of organism brought about by reproductive isolation; designated by binomial names written in italics.

Stoma: (leaf) pi. Stomata: [Gk stoma, mouth] a minute opening bordered by guard cells in the epidermis of leaves and stems through which gasses pass. They can be blocked by soap or chemical sprays.) Stomata allows the plant to breathe.

Transpiration: (leaf) the loss of water vapor by plant parts; most transpiration occurs through stomata,

Turgid: (plant) Swollen, distended, referring to a cell that is firm due to water uptake.

Variety: (plant) a group of plants of less than species rank, Botanists view varieties as equivalent to subspecies, and others consider them divisions of subspecies.

Vegetative reproduction: (cuttings) Reproduction by means other than by seeds. (Rooting a Plumeria cutting) (A Cione)

Whorl: (plant) a circle of leaves or of flower parts.

**ROOTING HORMONES**  
**POWDERS, LIQUIDS, GELS**  
*My Bill Pack*

*(Commonly employed to induce the formation of adventitious roots in cuttings)*

- COMMERCIALLY AVAILABLE BRAND NAMES -
- CHZONTON SERES 0180% IBA) NETHERLANDS)
- CHLOROMONE" LIQUID (OSO % IBA, 050% NAA) (USA)
- CLONEX GEL" (0.3% 1BA) (USA)
- C-MONE LIQUID" (1.0 ± 2.0% IBA)
- DIP'N GRO LIQUID" (1.0% IBA) (USA)
- DOC'S CLONE GEL" (.1% 1BA) (USA)
- DYNA-GRO LIQUID" (VITAMINS WITH 0.05% 1BA) (USA)
- FARTH JUICE NATURAL CUTTING GEL" (ORGANIC) (USA)
- FERTI-LOME ROOT STIMULATOR" (4-10-3 plus B-1) (USA)
- GREEN FUSE LIQUID" (ORGANIC) (USA)
- GREENLIGHT POWDER" (IBA) (USA)
- HORMEX POWDER" (0.1%, 0.3%, 0.8%, 1.6%, 3.0%, 4.5% TBA) (USA)
- HORMODIN POWDER" (0.1%, 0.3%, 0.8% IBA) (USA)
- HORMO-ROOT POWDER" (SERIES 0.1% \* 4.0% IBA) (USA)
- HORTUS" (20% IBA Water Soluble Salts)(for Commercial Growers) (USA)
- JIFFY GROW" LIQUID (0.05% IBA, 0,05% NAA) (USA)
- KICK START LIQUID" (1-2-1) (USA)
- KYSELINA" (IBA) (Czech)
- MIGHTY MYCO GRANULES, SOLUBLE & GEL" (MYCORRHIZAL INOCULANTSKUSA,
- MIRACLE-GRO FASTROOT" (0.1% 1BA) (USA)
- OLIVIA'S CLONING GEL. & LIQUID" (USA)
- PLANTROIDS-QUICKROOTS GEL" (VITAMINS, PLUS) (USA)
- POWER CLONE ROOTING GEL & LIQUID" (ORGANIC) (USA)
- PROP-O-GATOR LIQUID" (ESSENTIAL. ELEMENTS) (USA)
- RHIZOPON POWDER" (SERIES 0.5% \*\* 8.0% IBA & 0.1% \*\* 0.2% NAA)  
(NETHERLANDS)
- ROOT JUICE GEL" (VITAMINS & MINERALS) (USA)
- ROOT MAX GEL" (0,3% IBA) (USA)
- ROOTEX CUTTING POWDER" (0.4% IBA & 0.2% NAA) (USA)
- ROOTONE POWDER" (0.1% IBA & 0.03% NAA & FUNGICIDE) (USA)

- ROOTONE F BRAND" (0.2 % NAD & 4.04 % Tetramethyl Thiuramdisulfide fungicide) (USA)
- ROOTONE 10" (0.065% ALPHA-NAPHTYL ACETAMIDE, 0.056 % IBA. 0.032 % NAA, 0.013%, 3 % 2-METHYL-1-NAPHTYL ACEDAMIDE) (USA)
- ROOTONIC" (0.8% IBA) (USA)
- ROOTS LIQUID" (0.4% IBA & ETHAZOL FUNGICIDE) (CANADA)
- SERADDEX" (1, 2, 3, B-2, B-3 IBA)
- STIM ROOT NI POWDER" (0.1% IBA) (USA)
- SUPERTHRIVE LIQUID" (.09% VITAMIN B-1 & .048% NAA) (USA)
- SYNERGOL. POWDER" (0.5% K-IBA & 0.5% K-NAA PLUS FUNGICIDES) (UK)
- TAKE ROOT POWDER" (0.1% IBA) (USA)
- VITA GROW ROOTING LIQUID" (1.0% IBA & 0.5% NAA) (USA)
- WOODS ROOTING COMPOUND" (SEE: VITA GROW same company)

|                                   |                                 |
|-----------------------------------|---------------------------------|
| "IBA" (INDOLE-3-BUTYRIC ACID)     | "IAA" (INDOLE 1-ACETIC ACID)    |
| "NAA" (1-NAPHTHALENE ACETIC ACID) | "NAN" (1-NAPHTHALENE ACETAMIDE) |
| "PAA" (PHENYL ACETIC ACID)        |                                 |

## **Plant Hormones**

### **Plant Growth Regulators Commercially Available**

*By Bill Pock*

Plants do not have the advantages that animals do. Animals have a very efficient transport system utilizing blood circulation and have a central nervous system that integrates and coordinates all physiological activities. Plants on the other hand have a cellular exchange of materials through perforations of the cell wall at regular intervals.

Plant growth regulators have at least six different molecular classes... 1) abscisic acid, 2) auxins, 3) cytokinins, 4) ethylene, 5) gibberellins, and 6) jasmonates.

**Abscisic Acid (ABA):** A naturally occurring compound in plants. Reverses the growth effect of growth stimulating hormones such as auxin, gibberellins and cytokinin. When water supply is cut-off, ABA in the plant causes the stomata to close and reduces further loss of water. Has some effect on induction and maintenance of dormancy,

**Auxins:** [Auxins derive their name from the Greek word auxano (to grow).] Have numerous plant growth process functions including cell division and elongation, autumnal loss of leaves and formation of roots, buds and flowers. In low concentrations they aid the elongation of the shoot and roots, in high concentrations the effect reverses and elongation of root and shoot is inhibited. There are about 16 commercial auxins available.

live auxins are: indole-3-acetic acid (IAA), Indole-3-butyric acid (IBA), 2-phenylacetic acid (PAA), 4-chloroindole-3-acetic acid (4-Cl-IAA)

Synthetic auxins are: 2,4-Dichlorophenoxyacetic acid (2,4-D),  $\alpha$ -Naphthalene acetic acid ( $\alpha$ -NAA), [Weed herbicide] 2-Methoxy-3,6-dichlorobenzoic acid (dicamba). [Widely used broad-leaf herbicide] 4-Amino-3,5,6-trichloropicolinic acid (or picloram tordon), [Herbicide] 2,4,5-Trichlorophenoxyacetic acid (2,4,5-T), [Defoliate for broad-leaved plants]  $\alpha$ -(p-Chlorophenoxy) isobutyric acid (PCTB, an anti-auxin) [Inhibits activity of the ethylene forming enzyme 'EFE']

**Cytokinin:** Speeds up plant growth of cells and division, buds, flowering, side branching, increases leaf surfaces, stem thickness and slows root growth. There are about 12 commercial cytokinins available. Most common are Adenine, 6-Benzylaminopurine (BAP), Kinetin, diphenylurea or thidiazuron (TDZ).

**Ethylene:** Ethylene is a gaseous hormone, which makes it different than the rest of plant hormones. It is usually associated with fruit ripening. The Ancient Egyptians would gas figs to nulate ripening, the Ancient Chinese ripened pears with it. Ripening fruits give off ethylene giving rise to the saying "One rotten apple can ruin the whole basket" - over

ripening the rest of the fruit. Ethylene stimulates flower opening, flower and leaf senescence.

**Gibberellic Acid:** Gibberellins are naturally occurring plant hormones that can influence seed germination, increase plant growth and can change the gender of the plant (low dose - female, high dose - male). Do not use during flowering as it will generate growth and have less energy for the flowers. There are over 126 known Gibberellic Acids (GA1 \* GA126) GA3 is the most commonly available. Some plants can have over 12 different types of Gibberellic Acid in their makeup.

**Jasmonic Acid:** Jasmonates have hormone properties, regulate growth and development and participate in leaf senescence (The state of growing old; decay by time.) and in the defense mechanism against fungi.

### **Other Growth Factors**

**Brassinolide:** Brassinolide (a naturally occurring plant steroid) Increases plant growth, improves resistance to disease, strengthens immunity to drought, salinity and cold.

**Chitosan (Chitin):** Improves disease resistance, root development, and seed germination. Ingredient in commercial products. Currently produced from the processing waste of crabs, shrimps, oysters and fungi. ("Rage" - brand name)

**Fulvic Acid:** Fulvic acid is naturally created in soil by composting and is full of minerals and trace elements. Decomposed plant matter contains "Humic Acid", with

Fulvic Acid being the most active component.

**Gamma-Aminobutyric Acid ('GABA'):** When plants are under stress, they naturally produce GABA, however, if the stress is too great, the plant cannot produce enough GABA to counteract it. A patented synthetic GABA, new to the market (Michigan), when applied to plants, promotes high levels of GABA in the leaves and in turn results in resistance to heat, cold damage, and pathogens.

**Triacontanol:** Improves photosynthesis. (a.k.a. - melissyl alcohol)

**Validamycin:** Validamycin protects cuttings and seeds against damping-off. An antibiotic for fungus that attacks roots. (May work on black tip?)

**Notes:** All growth factors are used/added in "PPM" (parts per million) or as a percentage (%) of the liquid/powder. See page on "Rooting Hormones" for % examples in the use of auxins.

## **Tips 'n Tricks**

*By Bill Pock*

- Use environmentally friendly and organic products to kill insects/ants. Bon-Neem Insecticidal Soap, Bonide Rotenone-Pyrethrins and Concern D.E. all kill insects (and ants) on contact, without harming people, plants, pets or the environment. (Neem oil is excellent, there is even Neem Oil Soap and Lotions for human skin care)
- Driving a pipe or 3/8" rebar rod through your plastic pot and about a foot into the ground can thwart "Midnight Plumeria Thieves". Leave about 3" sticking above the soil. To remove the pipe/bar use a pipe wrench and twist back and forth as you pull up. Should they cut off your plant you will still have a good rootstock that will branch again and give blooms.
- Hydrogen Peroxide (Costco) is a good disinfectant for tools and cuttings... (Also the main ingredient in teeth whiteners)
- Do not over water...DO NOT OVER WATER!!!
- Foliar Spraying of nutrients such as Fulvic Acid, Chitosan (chitin), kelp extract (not kelp meal) and micronutrients (Spray-N-Gro\*) can be helped with delivery agents such as "Dutch Master Penetrator" or "Coco-Wet"
- "Humidity Domes" are available at garden supply companies that fit some of the commercial growing trays. You can also make your own out of 5-gallon water jugs by cutting off the bottoms. Smaller diameter mini-hothouses can also be made from a 64 oz juice bottle (about 4 1/2" diameter)... Trader Joes "Unfiltered Cranberry Juice & Grape juice" bottles if cut at the right spot will "snap" together and give you any height you want for a Plumeria (single branch) cutting... Cut off the tops and bottoms of the lower sections and only the bottom of the top piece. Use a box cutter for the juice bottles and a saw for the water jugs. Keep the bottoms of the 5-gallon water jugs for use as a saucer/tray.
- Magnesium sulfate (Epsom Salt) can be sprinkled at the base of your plants. It is one of the three secondary plant nutrients (sulfur "S", calcium "Ca", magnesium "Mg"). Mg deficiency begins in older leaves and moves to younger leaves. Symptoms are loss of healthy green color between veins. Mg is a key player of the photosynthesis process and is the central atom in the chlorophyll molecule..... After a hard day in the garden, also

sprinkle some in your bath water and relax. During the Shakespearean days, magnesium sulfate was mined near the "Health Spas" in Epsom, England. People would go the "Epsom Health Spas" to get their "Epsom Salts" in a warm bath... "Magnesium sulfate", good for your body, good for your plants. Makes your mind feel better also.

- Remember to protect the cut end(s) of your cutting with lime paste or a bacterial salve. The cut end of the mother plant can also be protected with the use of "Dap" bathroom caulk, which won't wash off from watering or rain... Lime paste (hydrated lime with red coloring) in Asian food stores is not really used for cooking, it is used for chewing Betel Nuts (Areca nuts), with Betel leaves: giving a slight (caffeine/cigarette) "high" and reddish-brown teeth.
- Bloom Food is available in a 0-50-30 mix.
- Rooting Hormone powder can also be applied to roots and root balls by use of an old saltshaker.
- Keep weeds out of your plants with Newspapers: Wet newspapers, layer around the plants, overlapping as you go, cover with mulch and forget about weeds. Weeds will get through come gardening plastic they will not get through wet newspapers.
- "AGRI-FOS" systemic fungicide (Mono- and di-potassium salts of Phosphorous Acid 45,8%) as a foliar spray or soil drench for crown rot/root rot and damping off.
- "Blue Plastic" → Worth a try...UV light slows plant growth and damages DNA. Blue Plastic gives added benefit of increased blue light to encourage diameter growth in plants, giving stronger stems and trunks. Try on cuttings. (Developed for use on grape Cuttings in the wine industry)
- "Latex from Plumeria or Euphorbia" is best cleaned off your skin by first applying Detergent soap then washing off with water. (Using water first tends to set it)
- Get Rid of Ants: Put small piles of cornmeal where you see ants. They eat it: take it home, can't digest it so it kills them. It may take a week or so, especially if it rains, but it works, and you don't have the worry about pets or small children being harmed!