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# Genetic engineering and plumeria flowers future in Sindh-Pakistan

By Mrs. Farzana Panhwar, May 2005

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## Genetic engineering and plumeria flowers future in Sindh-Pakistan

### Abstract.

Sindh is lying between 23° 40' to 28° 38'N and 66° 40' to 71° 30'E. This region have sub-tropical climate receiving between 100-550 chill units and 3700-4500 heat units. The soil is silty-loam having pH-7.8. Plumeria belong to family Apocynaceae is an ornamental shrub. It is called frangipani pumeli, melia, graveyard or common yellow. It is found in Mexico, China, Indonesia, India, Pakistan, Australia, Central America, Florida (USA), West Indies, Caribbean Island and Hawaii (USA). The common hybrid usually produce by the cross of Plumeria acuminata, Plumeria obtusa and Plumeria rubra are: Kauka wilder, daisy wilcox and rainbow have a great future in Pakistan.

Plumeria have various names like:

Pomelia, tipanier, Plumeria rubra or Frangipani tree, bali, Flor de Mayo (Yucatan, Puebla, El Salvador), Flor de la Cruz (Gutemala) Pamelii or Melia (Hawaiian), Amapola (Venezuela), Tample tree. Kang Nai XIN (China), Phool (India), HOASU or HOADAI (North + South Vietnames).

Classification of Plumeria:

It is based on following characteristics:

1. Plumeria are separated on the basis of flower, size, shape, colour and vegetative traits.
2. Petals shape may be elliptical, obviate and spatulate Petal may be wide or narrow, open or twisted, tip may be wide or narrow, on this basis plumeria also divided into various groups.
3. Those flowers some times not fully-open called shell semi-shell or tulip type. Flowers can last 3 months at a time producing new blooms every day, which produce smell, sweet, jasmine, peach or citrus type.

(A) The plumeria cultivars are divided in to 10 groups according to the colour of flowers:

1. Strong red colour.  
Hilo beauty and scott pratt.
2. Moderate strong red colour.  
Cerise, Japanese lantern, donald angus, Irma bryan, Keiki (Miniature lavender).
3. Strong Reddish-Yellow.  
Kauka Wilder.
4. Blend of strong red, strong pink.  
Duke.

5. Deep pink.  
Kaneohe Sunburst, plastic pink (Royal Hawaiian).
6. Moderate pink.  
Grove farm, mela matson, moir, dean conklin.
7. Pale Pink.  
Tillie hughes.
8. Blend of moderate pink, white.  
Espinda, maui beauty (Manoa beauty), loretta, tomlinson, carmen, and ruffles.
9. Brilliant yellow.  
Puu Kahea (Q'Sullivan fiesta), Nebel's rainbow lurline, angus gold, kimo, common yellow (graveyard yellow, celadine), gold (Peterson's yellow), lolani.
10. White.  
Sherman (polynesian white), Singapore, dwarf singapore, king Kalakana (miniature white), Hausten white (willows white), elena, Samoan fluff (Tahitian white) daisy wilcox, madame poni (star, corkscre, curly holt waianae beauty), white shell, prachglow shell.

(B) Plumeria is divided on the basis of leaf, shape like: Lanceolate, oblanceolate and elliptic.

(C) Plumeria divided on the basis of leaf-tip shape like: Acute, ocuminate, emarginate, obtuse or rounded and obtuse or bount.

(D) Plumeria divided on the basis of flower shape. [Wider petals, rounded tip, highly overlapped], [elliptical petal, rounded tip, moderately overlapped], [elliptical petals, pointed-tip, moderately and slightly overlap], [narrow petals, and twisted petals, pointed tip, slightly or no overlapped]

#### Plumeria, parentage and its flower colours.

Sr. No.	Cultivars.	Flower colour	Parentage
1.	Angus Gold.	Brilliant yellow.	P. rubra x P. acuminata Ait.
2.	Carmen.	Moderate Pink or white.	P. rubra L x P. acuminata Ait.
3.	Celadine.	Brilliant yellow.	P. acuminata Ait.
4.	Cerise.	Moderate strong red.	P. rubra L.
5.	Common yellow.	Brilliant yellow.	P. acuminata Ait.
6.	Cork screw.	White.	Un-known hybrid origin.
7.	Curly Holt.	White.	Un-known hybrid origin.

Sr. No.	Cultivars.	Flower colour	Parentage
8.	Daisy Wilcox.	White.	P. acuminata Ait.
9.	Dean Conklin.	Moderate pink.	P. acuminata hybrid of unknown origin.
10.	Donald Angus.	Moderate strong red.	Common yellow.
11.	Duke.	Strand red or pink.	P. ruuba L x P. acuminata Ait.
12.	Dwarf Singapore.	White.	Fi-hybrid of Singapore x King Kalakauna.
13.	Elena.	White.	P. acuminata Ait.
14.	Espinda.	Moderate pink or white.	P. acuminata Ait.
15.	Fiesta.	Brilliant yellow.	P. rubra L x P. acuminata Ait.
16.	Flower Basket.	Moderate strong red.	P. rubra L.
17.	Gold.	Brilliant yellow.	P. acuminata Ait.
18.	Greveyard yellow.	Brilliant yellow.	P. acuminata Ait.
19.	Grove Farm.	Moderate pink.	P. rubra L x P. acuminata Ait.
20.	Hausten white.	White.	P. acuminata Ait.
21.	Hilo Beauty.	Strong red.	P. rubra L.
22.	Iolani.	Brilliant yellow.	Hybrid of P. obtusa x P. acuminata Ait.
23.	Irma Bryan.	Moderate strong red.	P. rubra L.
24.	Japanese Latern.	Moderate strong red.	P. rubra L.
25.	Kaneohe Sunburst.	Deep pink.	P. ruubra L.
26.	Kauka Wilder.	Strong redish yellow.	P. rubra L.
27.	Keiki.	Moderate strong red.	P. rubra L.
28.	Kimo.	Brilliant yellow.	Seedling form Gold.
29.	King Kalakauna.	White.	P. acuminata Ait.
30.	Kohala.	Strong red.	P. rubra L.
31.	Loretta.	Moderate pink or white.	P. acuminata Ait.
32.	Lurline.	Brilliant yellow.	Opne-pollinated seedling of Gold, child of Kimo.
33.	Madame poni.	White.	Unknown hybrid origin.
34.	Mano Beuty.	Moderate pink or white.	P. rubra L x P. acuminata Ait.

Sr. No.	Cultivars.	Flower colour	Parentage
35.	Mela Matson.	Moderate pink.	P. rubra x P. acuminata Ait.
36.	Miniature Lavender.	Moderate strong red.	P. rubra L.
37.	Miniature white.	White.	P. acuminata Ait.
38.	Moir.	Moderate pink.	P. acuminata Ait.
39.	Nobel's Rainbow.	Brilliant yellow.	Un-known hybrid seeds.
40.	O'Sultivan.	Brilliant yellow.	P. rubra L x P. acuminata Ait.
41.	Peachglow shell.	White.	P. acuminata Ait.
42.	Peterson's yellow.	Brilliant yellow.	P. acuminata Ait.
43.	Plastic pink.	Deep pink.	P. rubra L.
44.	Polynesian white.	White.	P. acuminata Ait.
45.	Puu Kahea.	Brilliant yellow.	P. rubra L x P. acuminata Ait.
46.	royal Hawaiian.	Deep pink.	P. rubra L.
47.	Ruffles.	Moderate pink or white.	P. rubra x P. acuminata Ait.
48.	Samoa Fluff.	White.	P. acuminata Ait.
49.	Scott Pratt.	Strong red.	P. rubra L.
50.	Sherman.	White.	P. acuminata Ait.
51.	Singapre.	White.	P. Obtusa L.
52.	Star.	Whhite.	Unknown hybrid origin.
53.	Tahitian white.	White.	P. acuminata Ait.
54.	Tillie Hughes.	Pale pink.	P. acuminata Ait.
55.	Tomlinson.	Moderate pink or white.	P. rubra L x P. acuminata Ait.
56.	Waiana Beauty.	White.	Unknown hybrid origin.
57.	White shell.	White.	Unknown hybrid origin.
58.	Willow white.	White.	P. acuminata Ait.

Plumeria plant characteristic. Plumeria rubra forma acutifolia.

In Pakistan common species is Plumeria acuminata. Since the Plumerias have many cultivars, they are different in flower shape, size, colour and plant height, but it could be go upto 30 feet high. The tree show vigorous growth, branches usually start as triangular, leaves are thick, its palms are of various shapes and sizes. If flowers, leaves or branches are broken, the tree secretes while latex. Seed pods or follicle need 8 months to mature.

At dormant period plant does not need watering. During growth period it needs high dose of nitrogen and phosphorus to produce large clusters of flowers. All plumerias are sold as un-rooted cuttings.

The plumeria can be grown in many soil. In Sindh we have pH 7.8, with silty-loam soil, it also need an application of compost plus farm yard manure. We supply N:P:K at the rate of s 10:10:10 twice a year. The plant can stand salinity, drought but it needs frequent application of water. The plant usually does not need pruning except when the plumeria is used in land scapping the tree provides, screen, shade, accents to the yard, then it need trimming to fit in to the yard.

Plumeria usually divided into three major groups.

- (a) The Lumeria obtusa, leaves are round at the tip, but leaves are dark green and very shiny. Although its flowers are closely resemble with Plumeria acuminata, it is commonly grown in Singapre.
- (b) The Plumeria rubra, its leaves are ellipitical broad at the tip as compare to the base. But peculiar having red colour also called Hilo beauty, Japanese-hanging basket, scott pratt and Erma Bryan.
- (c) The other varieties Plumeria alba and Plumeria bahamensis are also divided on the basis of leave shape and size but these species are un-common. Plumeria species are mostly divided in to three major groups called Plumeria acuminata, Plumeria dotusa and Plumeria rubra, on the basis of leaf shape and size. In Pakistan we only have Plumeria acuminata, which have shiny leaves, light-green in colour with tip is narrow and pointed. This tree can be grow up-to 35 feet. This is also called 'graveyard' yellow, gold, Sherman and Samoan Fluff.

### **Flowers.**

One tree can be produce up-to 60 flowers. Flowers contain anthers and two lobed pistil, after fertilisation ovary produce follicles, which are usually two in numbers, having about 30 seeds in each pod, flowers are white, centre have yellow colour, with good fragrance, showing food keeping ability.

Some cultivars of plumerias produce seeds pods, which takes 8 months to reach its maturity. After one day storage the hilobeauty and scottpratt show strong pungent smell, while graveyard yellow, gold, puu kohea, rainbow, Singapore, Madameponi and Sherman gives mild and pleasant smell.

### **Insects and Diseases.**

Scale insect, beetle, thrip, bacteria, fungi, virus, soothy mold are common.

The graveyard yellow, gold and puu kahea are kept fresh for 3 days at 40°F.

### **Uses.**

Flowers are used in weeding banquets, corsages, table decoration and garlands. Its bark, leaves, flower bulb, seeds and later used in medicine, while its wood is used drum, bowl, try, cabinets and furniture making.

### **Propagation.**

Plumeria can be propagated through seed, cuttings (air-layering), grafting and hybridisation. The propagation through seeds that takes 3 years to complete the cycle, the seed germination only takes 4 - 5 days. But through cutting usually plant gives flowers within year. Usually 2 feet long cutting of well establish plants are used for this purpose. Cutting are applied with asphalt tree plant to prevent attack of infection.

Mostly used grafting scion of two desired characteristic scion join by clef or apical graft. This process takes one months to the union of graft.

The hybridisation method used to intensify some definite horticultural traits. Although hybrid seeds are unavailable but many fine cultivar resulted due to open-pollination. Its seeds remain viable for week, month or year. Hybrid varieties, star of Siam, Sun-set, Golden eye, paradise pink. Hybrid select having rose sent, deep pink or bright pink edges on the front.

The hybrid Scott Pratt with Daisy Wicox. The result was total 4 seeds pods having 283 seedlings. Most of cross made with original Morgue hybrids.

### **Genetic engineering.**

Plumeria offer negligible nectar to induce few insects and birds helps in transfer of pollens. Thrips usually do it. Rarely plumeria go for cross-pollination. The genetically evolved cultivars secrete strong smell, which attracts the insects, this will increase cross-pollination..

It is used to develop pest-resistant plumeria.

It is used to develop dwarf varieties, heavy flower production, attractive colour, pleasant fragrance and long-shelf life.

Future work is restricted due to many plumeria crosses randomly by open-pollination.

### **Conclusions.**

Plumeria can easily grown in Sindh, without any artificial light or green house help. Its flowers have big potential due to variation its colours and smell and its flowers have better shelf-life. This will help to boost. Our floriculture industry and we get better economic returns.

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