



NEWSLETTER

JANUARY 1988

**TAMPA BAY CHAPTER of the
RARE FRUIT COUNCIL INTERNATIONAL, Inc.**

EDITORIAL COMMITTEE: BOB HEATH
THERESA HEATH
ARNOLD STARK
LILLIAN STARK

NEWSLETTER MAIL ADDRESS: ARNOLD & LILLIAN STARK
6305 EUREKA SPRINGS RD.
TAMPA FL 33610

PRESIDENT: AL HENDRY CHAPTER MAIL ADDRESS: P.O. BOX 260363, TAMPA FL 33685
(including renewals)

MEETINGS ARE HELD THE 2nd SUNDAY OF THE MONTH AT 2:00 p.m.

NEXT MEETING JANUARY 10, 1988

MEETING PLACE COMMUNITY ROOM UNDER WEST RAMP, TAMPA BAY
CENTER SHOPPING MALL, BUFFALO & HIMES AVE.,
NEXT TO TAMPA STADIUM. (TAKE DALE MABRY TO
BUFFALO AVE., AT STADIUM.)

PROGRAM JOAN BRADSHAW, horticultural/agricultural
agent for the Pinellas County Extension
Service, will speak on passion fruit
flowers and fruits. She is a member of
the Palm Beach Chapter of the RFCI, and
an authority on tropical foliage plants.

NEW MEMBERS

Monica Brandies, 1508 Burning Tree Lane, Brandon, FL 33511
Bronislawa Levy, 3344 Sailfish Court, Spring Hill, FL 34608

DECEMBER PLANT RAFFLE

<u>PLANT</u>	<u>DONOR</u>	<u>WINNER</u>
Chayote (2 fruit)	Stark	Jim Murrie
Chayote (4 fruit)	Stark	Mendez
Spanish Red Pineapple	Stark	Jim Murrie
Spanish Red Pineapple	Stark	George Merrill
Tamarind	Mendez	Walter Vines
Carambola	RFCI	Stark
Pomegranate	Joe Constantine	Jim Murrie
Cattleya Guava	Heath	Walter Vines
Spanish Lime	Heath	George Merrill
Governor's Plum	Pearl Nelson	Al Hendry
Governor's Plum	Pearl Nelson	?
Annono	Pearl Nelson	Frank Tintera
? (herb)	Bobbie Puls	Walter Vines
Cilantro	George Riegler	Heath
Cilantro	George Riegler	Pearl Nelson
Cilantro	George Riegler	Stark
Passiflora (2)	George Riegler	Walter Vines
Murraya paniculata	George Merrill	Frank Tintera
Butterfly Ginger (many)	Walter Vines	Joan Murrie (plus others)
Lotion Ginger	Walter Vines	Bea Seekins
Lotion Ginger	Walter Vines	Jim Murrie
Lotion Ginger	Walter Vines	Leland Terrell
Lotion Ginger (several)	Walter Vines	Stark (plus others)
Center Piece	Leland Terrell	Walter Vines

CELL FUSION TECHNIQUES FOR DEVELOPMENT OF NEW HYBRIDS

by Dr. Jude Grosser

Al Wood, who passed away recently, is responsible for creating a new position at the Citrus Research Center in Lake Alfred, a position designed to apply bio-technology to the development of new citrus scion and root stocks. When the position was created in the summer of '84, Dr. Grosser was selected to fill the position and about a year later, Fred Gmitter was hired as their traditional breeder. Dr. Grosser and Dr. Gmitter work very closely together in developing citrus hybrids. Dr. Gmitter does a lot of conventional crossing and other laboratory techniques and Dr. Grosser is responsible for developing techniques that have recently been used in tobacco and other solanum species to see if they are adaptable to woody species such as citrus.

Dr. Grosser's first slide was a tabulation of the six major root stocks that are being used in Florida at present. Cleopatra, Mandarin and Swingle are presently the three most popular. It might be noted at this point that Swingle was implicated with the canker fiasco. Dr. Grosser calls it "the citrus diaper rash" because it only showed up in young citrus trees and while some of them got the disease, they all seemed to grow out of it. Also, that particular disease has never been found in mature trees. It certainly seems to be limited to the nursery strain and it is becoming a political football at this time. Dr. Grosser indicated that he is trying to address what he considers the real problems in the citrus industry, namely those diseases that kill trees. To freezes alone we have lost about 220,000 acres of citrus trees and that is a tremendous amount of economic devastation when you consider that there are from 100 to 150 trees per acre and the value of a mature tree is maybe \$200.00. Multiply that out and you will get a feel for the losses due to cold weather. In addition to that we also lose about a million trees a year to citrus blight. Blight is a very interesting disease in that no one knows what organism causes it but that all citrus varieties are subject to it, no matter what you plant nor what you use for root stock or scion. If you compare different genus types and different root stock, you will find that some come down with blight earlier than others. With Swingle or Cleopatra as root stock, trees may not show effects of blight for 20 to 25 years, but with Corizo, or rough lemon, you will see a lot of blight showing up after 10 or 12 years.

There is a new virologist at the Citrus Research Center who is implicating a viral agent for blight so it may turn out to be a virus that's causing it. However, he still has considerable work to do before the agent is finally isolated.

Two of the common root stocks, Swingle and Corizo, are both hybrids of Poncirus and Citrus, which were made by conventional sexual crossing. Their first idea was to use poncirus and citrus germ plasma to combine the characteristics of poncirus and citrus in a hybrid to take advantage of the characteristics of both parents to produce a very good root stock. However, they have yet to produce a root stock that will be immune to blight.

Another disease which Dr. Grosser mentioned is tristasia. It is a viral disease which kills between 400,000 and 500,000 trees a year, usually trees that are on sour orange root stock. Sour orange has been a very popular root stock primarily because it contributes to excellent fruit quality. Sour orange root stock is still being used extensively in nurseries and because tristasia is spreading rapidly in the states, more and more trees are going to be killed by this disease. A primary direction of the root stock improvement program is to develop root stock that is resistant to blight, is resistant to tristasia, and is resistant to nematodes as well, and also possesses elevated cold hardiness. In passing, it might be noted that though Swingle is considered a recent root stock, it was actually produced by a cross made in the late 1800's by conventional crossing methods. From this you can see how long it takes to develop a new root stock by conventional methods.

Dr. Grosser next showed us a slide that lists Citrus, Poncirus and other genera that are closely related to citrus and which represent a whole range of characteristics. Two that they have been working with are *Citropsis gilletiana* and *Severinia*, commonly known as box thorn. There have been sexual hybrids made between all the genera of true citrus but there have never been any hybrids made by conventional sexual crossing between citrus and any of the near citrus fruit trees or the primitive citrus fruit trees, even though a lot of the other genera are graft compatible with citrus. So these things offer a lot of different characteristics; some of them may have blight tolerance or resistance to tristasia. The procedure which they intend to use is to develop hybrids between these other genera and citrus to try to take advantage of some of these characteristics. The technique called biotechnology is the technique of protoplast fusion. The word protoplast simply means "naked cell". As you know, all cells have cell walls. In order to get a naked cell, you simply remove the cell wall with the proper enzyme and you get what might be termed a balloon with all the interior parts of the cell along with all the genetic material. From this procedure, in order to get hybrids, one must fuse these naked cells or protoplasts together and from this, go back to a whole plant. This is the key and this is where the progress in woody species has been hampered because it is extremely difficult to go from a single cell back to a whole plant, much less from a protoplast.

The next slide showed a culture which was started from unfertilized ovules taken directly out of the fruit, a Valencia orange. The unfertilized ovule is one that has not been fertilized and no seed is being formed in the ovule. The unfertilized ovule is very small and when it is taken from the fruit and placed on a particular medium, proliferation of the little somatic embryos occurs very similar to what occurs in a seed and when they're lucky, they get the callus formations indicated on the slide. The callus is sort of like a cancerous tissue, a proliferation of single cells, that are capable of turning into embryos. Every cell in the mass of cells is capable of producing an embryo which in turn may become a true plant. This is the key procedure that they use to go from single cells back to adult plants.

If you take this kind of callus and put it in a liquid media, it causes the cells to divide extremely fast, which is very important if you are attempting to go from a single cell back to a whole plant because you have to have a certain number of cells that are viable and actively dividing in order to recover anything when you go to the naked cell level. Also, in this system it is necessary to have a method of separating the parent cells from the cells that are trying to fuse. If we are taking a Citrus group of cells, for example, and want to make a hybrid with *Severinia*, we mix cells from Citrus with cells from *Severinia* and try to fuse them together. We have to be able to tell the hybrid cells from the unfused cells so when we regenerate plants back, we don't want to have interference from the parents. When we put Citrus cells that are capable of turning into embryos in the liquid media, they are so committed to dividing that they forget how to form an embryo again. So they need to be stimulated and one way to do that is to fuse them with the other species.

The next slide showed some of the fused cells as well as some of the unfused naked cells in the medium.

Flying Dragon, one particular cultivar of *Poncirus trifoliata* which is the parent of Corrizo and the parent of Swingle, was on the next slide. It is presently being used as a dwarfing root stock in California but in Florida it seems to make trees even too small. It has unique curved thorns and a trifoliate leaf. It was selected for experimentation because it has the genes for dwarfing and also because the trifoliate leaf and curved thorns can be used as a genetic marker, to identify the hybrid plants later on and since they knew that *Poncirus* and Citrus were compatible, they started their experiments with these species. Naked cells were obtained from the flying dragon leaf. The interesting thing about the naked leaf cell is that they will not divide but since they can obtain many millions of naked cells from

one gram of leaf and they will fuse, cell division is not important. The medium is an ethylene glycol solution. It's very syrupy and the naked cells of Citrus and Poncirus are provided in this medium. In this solution many cells will fuse to produce one on one aggregations and some that have up to as many as 10 or 12 cells in one fusion. Anywhere from one to 10 percent of usable fusions occur. The trick then is to get this fused cell to put a cell wall back on and start dividing. A different, very complicated, medium is used to provide this function and in six or eight weeks you get a colony of cells. After the colony gets large enough to be seen by the naked eye it is removed and put on a solid medium and if they're lucky, they get embryo formation of hybrid embryos. Next they germinate the embryos on a gibberellic acid and hybrid plants develop which are exactly intermediate between the two parents since the hybrid has the complete gene structure of both parents. They now have hundreds of these plants and they are preparing to test them for root stock qualities.

Sweet Orange is one of the better root stocks in relation to tolerance to blight. It is, however, very susceptible to root rot, which Poncirus is not. So they have a chance of getting a citrain which has high blight resistance and also foot rot resistance and maybe tristasia resistance and hopefully elevated cold hardiness. So this is what they call their model system of producing hybrids. This same method has been used in crossing severinia with sweet orange. This required a slightly different procedure because the fusion of the sweet orange cells and buxifolia leaf cells refused to regenerate any plants. So in this case they chopped up some severinia seedling plants and by using a different medium produced a callus which was a mass of rapidly dividing cells. From this they isolated naked cells and combined them with the sweet orange naked cells, the fused cells of which did produce embryos and develop plants. This is the first time that a hybrid has ever been made between two different sexually incompatible woody species. The next slide showed this hybrid plant, biotechnology at its best. And of course if this plant should ever fruit, it should be very interesting because of the vast difference between the fruit of severinia and sweet orange. They are presently working with about 250 of these hybrids, testing them for root stock and other characteristics.

There are a number of other citrus relatives that are intended to be used in hybrid with Citrus; one of the first being tried is gillettiana which has been reported from South Africa as having high blight resistance as a citrus root stock. But it is not cold hardy so the hybrid can hopefully get cold hardiness from the Citrus and blight resistance from the Citropsis. The hybrid between Citropsis and sweet orange is very vigorous and has a trifoliate leaf which is intermediate between Citropsis and Citrus. They are presently out for field trials at this stage. Another hybrid that they have made is the Chinese wampee/sweet orange cross which doesn't seem to be very vigorous, but what is interesting is that wampee and citrus are actually in different tribes so they are very far removed although they are relatives. If this plant fruits, it will be a very interesting thing to observe.

Among the other hybrids which they are attempting to make are white sapote and all of the above mentioned citrus relatives with sweet orange and with other citrus such as grapefruit to obtain the unique characteristics of grapefruit as a root stock and also as a fruit.

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A MESSAGE FROM THE PRESIDENT

The Rare Fruit Society of Israel was established in 1985 and has 130 members, mainly farmers and researchers. The Society is open to worldwide participants. The main interest is in tropical and subtropical species. Most of their publications are in Hebrew. (Do we have a translator for that language?) Two of their unique interests are desert fruiting plants and the 35 fruiting species mentioned in the Bible and Talmud. Plans are being made to propagate these trees from original locations in Nazareth, Jerusalem, Mt. Zion, etc.

The R.F.S.I. plans an International Congress of Rare Fruit Growers in September 1989. I have written for more details and will pass them on to interested members. Also, you may write to: Ariel Shai B.Sc. Agr., M.Sc. Agr., Horticultural Research & Development, Tropical, Subtropical & Rare Fruits, Jacobson 5 St. Rehovot, Israel 76206.

THE ORIENTAL PERSIMMON (*Diospyros kaki*)

by Celso and Elisa Gomez-Sanchez.

The oriental persimmon, referred to as the "apple from the Orient", is highly acclaimed in other countries but is not properly appreciated in America. Persimmons can be classified into two major groups- *non-astringent* and *astringent*. Each group can be further classified on their response to pollination into: *pollination constant* (No change in flesh color after pollination) and *pollination variant*. (Flesh is light color when seedless and dark when seeded, especially around the seed). There are over 1000 named cultivars. Individual trees can live up to 100 years and produce up to 400 lb of fruit per year.

Oriental persimmons were brought from Japan to the USA by Commodore Perry in 1856 and imported in great quantities by the USDA late last century and up to the 1920's.

NON ASTRINGENT VARIETIES:

Fuyu (fuyugaki means "winter persimmon") is a large (1/2 lb) round, flat fruit that ripens to a deep red. It is of excellent flavor and long shelf life. The tree is vigorous and spreading with no male flowers, but some parthenocarpic ability. Pollination assures good fruit set. Unfortunately several varieties have been sold as Fuyu or Fuyugaki with fruit of varying quality. The real Fuyu is incompatible with *D. Lotus* rootstock. This is the most planted variety in Japan and the one that holds the most commercial promise here.

Jiro is an old cultivar; The fruit is slightly larger than Fuyu, oblate and characteristically segmented by eight longitudinal grooves, four of which are more prominent and pass from the fruit apex to calyx. This variety is a pollination constant. The skin is yellow-crimson, sometimes uneven; The flesh is of excellent quality.

Ichikikeljiro is an early-maturing bud mutation of the Jiro with excellent fruit quality. The tree vigor is weak, growth habit is dwarf and spreading with medium fruit set and only female flowers are produced. Fruit stores well so it is a promising commercial cultivar.

Hanagoshō (flower of the Imperial Palace) is an excellent old variety, medium, yellow fruit (1/3 lb) of excellent flavor and good storage which ripens late. The tree is vigorous and upright and has some male flowers so it can be used for pollination.

Izu is a seedling of Fuyu x Okugoshō. Fruit is medium size (1/3 lb), oblate, mottled orange-red skin and pale orange flesh. Pollination constant. Low yield.

Suruga. Seedling of Hanagoshō x Okugoshō, the fruit is large (1/2 lb), orange red, very sweet and even better than the Fuyu with a long shelf life. The tree is vigorous, upright with good fruit set and produces only female flowers.

Shogatsu is a large, sweet fruit, ripening to deep orange red. The tree is medium size and spreading and produces many male flowers. Fruit set is medium. Quality is not as good as other varieties. It is an excellent pollinator.

Hanafuyu, "Winter flower", obliquely rounded, large (1/2 lb), sweet, juicy, reddish orange color fruit. Tree is dwarf.

Sheng. Similar to the Hanagoshō but smaller, dwarf tree size.

ASTRINGENT

Tanenashi is an early variety introduced in the USA. It is the most common variety available in Florida. The fruit is seedless, conical and of excellent taste.

Hira-tanenashi "flat seedless", the fruit is large, flat, sweet, with four sides and four shallow grooves and the skin is tough, glossy, orange red, the flesh is pale yellow orange with poor shelf life. It is the second most popular in Japan. Pollination is constant.

Saljo, "the very best one", is a medium size fruit (1/3 lb), oblong conical, four sided with deep grooves and orange skin. Pollination is constant. Fruit becomes very soft after astringency disappears.

Great Wall, is a very early ripening chinese variety with a small, very sweet, fruit discovered by explorer J Russel Smith. The tree is cold hardy.

Giombo, is a giant, conical fruit (1 lb) of excellent taste. The tree is very productive.

Yamato Hykume, is an elongated, conical, pretty fruit. The flesh turns chocolate with pollination.

Okugoshō, is medium sized, round and orange with inconsistent astringency loss.

Homestead, is a small, conical, orange red fruit with good taste. The tree is a good and consistent bearer.

Hachiya, is the most popular California persimmon. The fruit is large, conical and orange red. The tree is spreading.

Gailey, is an excellent pollinator. The fruit is small, conical and of fair quality.

Korean, is medium sized, flat, orange and sweet. The tree is productive and cold hardy.

Kung-Sun-Ban. or Kyungsun-Ban-Si, is similar to the korean and is a showy tree.

Peiping, is similar to the korean, but the tree is dwarf and fruit smaller.

Tamopan, is a large fruit shaped like an acorn cap on the top end. The tree is very ornamental. The fruit has fair flavor.

Giant Tamopan, is a very large tamopan (1 lb) bred by Dr R. T. Dunstan using colchicine.

Smith's Best, is a compact, densely branched, small prolific tree found in the farm of J. Russell Smith who was the first to popularize the persimmons. The fruit is small to medium and of high quality, chocolate colored flesh.

Tecumseh, is small to medium and of excellent quality.

San Pedro, is deep orange, oblate fruit of excellent quality.

SOURCES .

Edible Landscaping. P.O. Box 77, Afton, Va 22920.

Chestnut Hill Nursery, Inc, Route 1, Box 341, Alachua, FL 32615

Rainbow Star Nursery 2324 SW 36th Terr. Gainesville, FL 32607.

The more common are also available from Hastings in Atlanta, Stark Bros and other popular mail order outfits.

HOSPITALITY TABLE: A1 Hendry - Cassava Cake
 Pearl Nelson - Applesauce Spice Cake & Cheese Plate
 Walter Vines - Persimmonicles (frozen persimmons)

SPECIAL NOTE TO BOARD MEMBERS:

There are a few items that need the attention of the Board at this time. We are planning a Board Meeting after the regular meeting on January 10, 1988. We need a quorum, so please try to make the meeting if you can. THANKS!

A1 Hendry

Tampa Bay Chapter
 Rare Fruit Council Intl.
 P O Box 260363
 Tampa FL 33685



P. JUDSON NEWCOMBE
 314 DEER PARK AVE.
 TEMPLE TERRACE, FL 33617

