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October–December 2012

Promoting
Less-Known

PINOY

Fruits



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Recognizing the Importance of Underutilized Fruit Crops

The Philippines is a tropical archipelagic country blessed with 7,100 islands. The country is also a haven for a multitude of flora and fauna. Its majestic landscape is a perfect abode for wild and domesticated plants and animals as well as for the tamed beasts and nurtured plants.

The country is also rich in biodiversity and its natural wonders have become avid attractions for everyone. One may wonder that, with 7,100 islands and islets surrounding the archipelago, how many flowers, plants and other living organisms would there be?

As a biodiversity paradise, the country's terrestrial ecosystems are home to many of the best and rarest of wildlife species. It has more than 52,177 identified species, half of which are endemic to the Philippines. There are more than 1,130 terrestrial wildlife species recorded for the country (49 percent or half are endemic); 157 are threatened (128 are threatened endemic). Floral diversity is just as extraordinary, with between 10,000 and 14,000 species of vascular and non-vascular plants, more than half of which are endemic to the Philippines. Altogether, the country is host to some five percent of the world's species of flora and is ranked 5th in the world in terms of number of plant species.

The Department of Agriculture - Bureau of Agricultural Research (DA-BAR) recognizes the importance of underutilized fruits and vegetables and believes that it has a role to play in the development of Philippine agriculture. The production, cultural management, and economic potential of these crops may still not be fully known, but what is important is taking the initial and proactive measures to set things in motion. Deliberate shifts of some of the attention from the popular or the

traditional crops to the unpopular and less-known vegetation must be given utmost importance given that these commodities will add scope and variety to our current list of major and high-value crops. Fully adopting these will also make the DA a more capable agency in addressing food security issues.

One has to emphasize the potential role of underutilized plant species to contribute to global food security and nutrition, buffering against the consequences of climate change and reductions in agricultural biodiversity. BAR believes that their potential may be unleashed through focused and extensive research and development (R&D) activities.

As the R&D arm of DA-BAR finds it but proper to produce this publication in response and in support to the directive of Agriculture Secretary Proceso J. Alcala to promote and re-discover neglected fruits and vegetables other than the familiar ones. This publication is also a direct outcome of BAR's advocacy on agricultural biodiversity conservation. We believe that it is only through the utilization of our own crops that we can assure that these unheard of, but agriculturally important crops, will survive and will be enjoyed by the next generation.

Emphasis is given to indigenous and scientific studies on the nutritional and processing value of species, product developments and approaches for developing novel products and uses. Analysis of nutritional and processing value has a direct link to food security and sustainability as well as potential markets for crops and their products.

Underutilized plant species have local or regional importance, but generally lack national recognition and appreciation. To understand the potential of a species in its current niche and beyond, this issue of the BAR R&D Digest sheds light on some of the individual characteristics, nutritional value, economic and market potential of the various fruit crops.

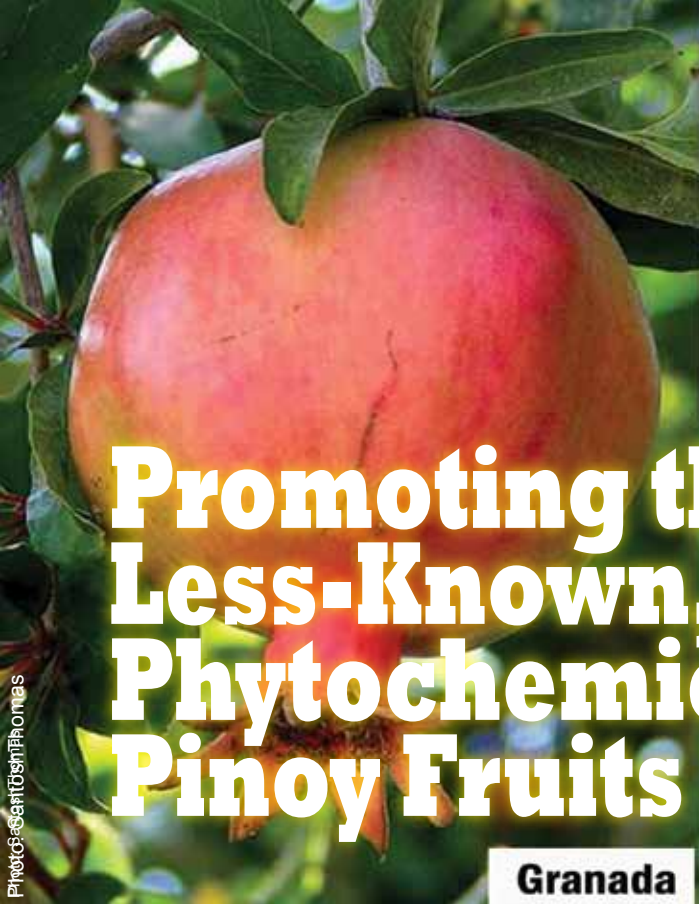
Resources available for R&D are limited and therefore investment of resources on underutilized crops calls for a national attention. Common methodology that can be applied across a range of underutilized plant species may calibrate the on-going program thrusts of the DA particularly on giving importance to high-value crops.

The bureau extends its appreciation to Dr. Roberto E. Coronel, professor at the University of the Philippines Los Baños, for sharing some of his photographs particularly, off-season fruits that were presented in this publication.

We hope that this issue of the BAR R&D Digest will do justice as a reference on the subject, elicit support from the national and local governments, and help raise the interest level among stakeholders to finally mainstream these underutilized plant species. ###



Tasting the Paratungon Wine during the the 8th National Agriculture and Fisheries Technology Forum and Product Exhibition held on 8 August 2012 at the SM Megamall. The products including wine and prunes were developed by DA-4A and WPU.



Lipote

Photo: Joji Aguilta



Sapinit

by RITA T. DELA CRUZ

Promoting the Less-Known, Phytochemical-Rich Pinoy Fruits

Granada

Most young people nowadays are familiar with apples, grapes, plums, peaches, cherries, and pears. These are fruits that the Philippines imports from other countries because they only grow in cold climates. Meanwhile, indigenous fruits like *anang*, *sapote*, *yambo*, *sapinit*, *katmon*, *kalumpit*, *lipote*, *binukaw*, or *paratungon* are often given the boggled look and are being overlooked, not because they are not as delicious and as nutritious as their imported counterparts, but because most Filipinos are not familiar with them. Also, for some, eating these less-known, never-heard-of fruits is an acquired taste which needs some getting used to.

In an effort to mainstream these Pinoy fruits to the consuming public, particularly the young people, the Department of Agriculture (DA) has intensified its campaign of promoting the Philippines' important and underutilized indigenous fruits.

In a recent pronouncement made by Secretary Proceso J. Alcala, he urged the Filipino consumers to give preference to our local fruit varieties that are produced by our farmers and orchard operators. Patronizing

them, according to the agriculture chief, will not only promote good health among our people, but will also help the production and the profitability of the farming sector, and further strengthen our nation's economy.

The secretary also mentioned the need to teach the Filipino consumers on how to appreciate these indigenous fruits because most of them are nutritious, and are high in phytochemicals and essential nutrients that are beneficial to one's health. Their unique taste gives them great potential as exports products that can be considered distinctively Filipino.

Dr. Roberto E. Coronel, author of the book, "Important and Underutilized Edible Fruits in the Philippines" cited that the country has a rich collection of fruits that few other tropical countries can surpass or even equal in number. No less than 300 species that have been reported and a good number of them are economically important but are not yet fully utilized.

Some of the economically important fruits that are locally

grown but are underutilized are: bayabas (*Psidium guajava*), atis (*Annona squamosa*), kaimito (*Chrysophyllum cainito*), chico (*Manilkara zapota*), guyabano (*Annona muricata*), duhat (*Syzygium cumini*), rambutan (*Nephelium lappaceum*), santol (*Sandoricum koetjape*), sinigwelas (*Spondias purpurea*), dalanghita (*Citrus sinensis*), avocado (*Persea americana*), mabolo (*Diospyros blancoi*), tiesa (*Pouteria campechiana*), balimbing (*Averrhoa carambola*), marang (*Artocarpus doratissimus*), aratilis (*Muntingia calabura*), mangosteen (*Garcinia mangostana*), lanzones (*Lansium domesticum*), dragonfruit (*Hylocereus polyrhizus*), and papaya (*Carica papaya*), among others.

Meanwhile, among those that are less-known or never-heard-of-fruit include: granada (*Punica granatum*), lipote (*Syzygium curranii*), kalumpit (*Terminalia microcarpa*), sapinit (*Rubus rosifolius*), yambo (*Syzygium samarangense*), paratungon (*Salacca ramosiana*), batuan (*Garcinia binuca*),

bignay (*Antidesma bunius*), yayasi (*Ficus ulmifolia*), and paho (*Mangifera altissima*) among many more.

BAR's Role in Promoting Indigenous Fruits

The Bureau of Agricultural Research (BAR), through its "Indigenous Plants for Health and Wellness Program (IPHWP)" is addressing malnutrition in the country by instilling greater awareness of the potentials of and intensifying consciousness on the importance of our less known and underutilized natural resources exemplified by indigenous plants. Indigenous plants are species or subspecies of wild flora naturally occurring or that have naturally established populations in the country. These indigenous plants can be tapped not only for their nutritional value (nutraceutical) but also for their healing (pharmaceutical) and beautifying (cosmeceutical) properties. And most, if not all, of them are readily available and abundant in the country.

This health-promoting, approach through the IPHWP, will contribute to sustaining of human systems and development, as well as promote the well-being, health and productivity of individuals, families, and communities, and eventually, the whole society. As the program also takes into consideration the Philippine biodiversity, specifically targeting the plant species other than the conventional food crops

that have health-promoting values, it will benefit the sustainability of the natural resource base and its usefulness to generations to come.

Phytochemical-Rich Pinoy Fruits

Plants naturally contain phytochemicals which possess health-protective or

“ IPHWP is addressing malnutrition in the country by instilling greater awareness of the potentials of and intensifying consciousness on the importance of our less-known and underutilized natural resources. ”

disease-preventing properties. Phytochemicals are bioactive compounds that naturally occur in food plants and are involved in health promotion and disease prevention. Edible plants that have health-promoting phytochemicals

on top of conventional nutrition are called functional foods- the dietary components that can provide a health benefit beyond basic nutrition.

Given the rich and vast collection of plant species of the Philippines, finding those that are both edible and nutritious is the most viable feat. We just need to be aware of them, what they look like and where they can be found. Therefore, one of the components of the IPHWP is promoting indigenous plants for their phytochemicals benefits to human health.

For our locally grown fruits, their physical colors often determine the essential phytochemicals that they contain.

The red group, which include *pakwan* and *sapinit* are rich in two phytochemicals: lycopene, which reduces the risk of cancer; and the anthocyanins, which delay several diseases associated with ageing.

Mangga, *dalanghita*, and *papaya* which belong to the yellow group are popular sources of beta carotene and flavonoids which reduce the risk of heart diseases, some cancers, and can slow down ageing.

Eating *duhat*, *lipote* and *bignay* which belong to the blue/ purple group will provide the body with anthocyanins and phenolics which help prevent cancer, heart disease and ageing. ###



YAMBO

An Indigenous Fruit Delight

by LEILA DENISSE E. PADILLA

Getting Familiar with



In a world that is truly rich and diverse in natural resources, new discoveries and breakthroughs take place anytime and anywhere.

Segue to agriculture: man continues to discover various flora and fauna that can be used for food or serve other purposes. Older species are being rediscovered with their potential to feed the ever-growing consumer populace.

In the Philippines, the Department of Agriculture (DA) is now deep in the venture to make the country self-sufficient in food. One approach is through optimizing the production of staples that can supplement rice and through tapping the potentials of other relatively unknown but equally-valuable crops.

Before 2013 began, DA Secretary Proceso J. Alcala called on all Pinoys to support our farmers through buying and preparing various indigenous fruits that are healthy and delicious as they celebrate the hope of New Year. One of the indigenous fruits mentioned by the Secretary is the delectable rose apple, locally known as yambo.

Knowing the Native Yambo

Even though it is widely known as rose apple, yambo is not related at all to the apple fruit. Yambo (*Syzygium jambos*) belongs to the *Myrtaceae* family also known as the myrtle family, where other underutilized fruits such as *binoloan*, *dayopod-mabolo*, *grumichama*, eugenia fruits, guava, psidium fruits, jaboticaba, *kamanla* and *tulanang* belong.

Native to Southeast Asia, yambo was

introduced to other regions, where it now bears new names like Malabar plum, plum rose, jambosier, water apple, pommarosa, and pomme rose.

The yambo fruit, also known as *tampoy*, is round to oblong, resembling its close relative, guava. Its thin skin is pale yellow which may or may not have a faint, pinkish pigmentation. Inside, the yellowish flesh is uniquely crisp and doughy and has a sweet, mixed apple and watermelon taste with a rosy flavor which amplifies its rosy scent.

The center is a hollow cavity that contains one to four brown, slightly round and hard, rough-coated seeds. When the fruit is shaken, the seeds easily detach, leaving seed coat fragments affixed to the cavity wall.

The yambo tree is a small tropical evergreen that grows up to 7.5 to 12 meters tall. When mature, it has a thick canopy of wide-spreading branches and leathery leaves. What's interesting is that the canopy's width can exceed the tree's height, which makes it a good shade provider.

Yambo thrives best in tropical to semi-tropical agro-climatic conditions on a loamy type of soil. It can also grow in other soil types such as sand and limestone.

The peak season of yambo is between June and September. Like some fruits, yambo is highly perishable and is easily bruised which is why it is not so popular in areas far from where yambo is grown.

This characteristic limits the fruit's marketability and its culinary, industrial, and medicinal potentials.

Beneficial Uses and Functions

In areas where yambo is grown, this fruit is popularly consumed as a fresh fruit dessert but it can also be processed into jam, jelly, stews and preserves. The yambo fruit contains protein, iron, fat, carbohydrates, calcium, calories, ash, magnesium, phosphorus, sodium, potassium, carotene, thiamine, riboflavin, niacin, ascorbic acid, and fiber which make it a health food.

According to research conducted in other countries, yambo is said to be beneficial for the liver and brain as it boosts the vigor of these major organs. The fruit also has a diuretic function while the flower, when sweetened, has the ability to reduce fever. The leaf decoction can be used to relieve sore eyes and rheumatism.

Meanwhile, the seeds can aid in dysentery, catarrh (inflammation/irritation of the mucous membrane), diarrhea, and diabetes. However, it has been found that the seeds, roots, stems, leaves, and bark contain certain levels of toxic elements, which then require that precautionary procedures be followed before these are further processed and utilized.

The essential oil found in the leaves can be distilled and the

LIPOTE

The Munchy Bunch

by VICTORIANO B. GUIAM



People say that one good thing deserves another. The lipote does better than that as the fruit comes; not just as ones or pairs, but as whole clusters.

Many of us know duhat, the fruit of many childhood summers. Lipote looks similar to this tangy fruit. However, the duhat cluster has its fruits hanging more freely as each has a long stem whereas the lipote cluster is compact, almost like a ball attached to the tree branch.

Lipote is botanically known as *Syzgium curranii* and is related to duhat

and makopa which also belong to family Myrtaceae. Among Bicolanos it is called *baligang* while the Warays know it as *igot*. It is one of the fruits that the Philippines can call its very own as it is native to Luzon where it originated from primary forests at low to medium elevations.

When mature, the lipote fruit is a shiny dark red to a nearly black color. An ellipsoid berry, it is 1-2.5 cm in diameter, one-seeded, and in compact clusters that can

have 50 or more individual fruits. The flesh is rather dry, crisp and with a pleasant slightly acidic flavor.

The tree can grow up to nine meters or more in height with branches that are distinctly four-angled. The timber can be used for construction. The leaves are glabrous, oblong obovate, opposite, 20-25 cm x 6-8 cm in size on the average, pointed, leathery, dark green, and shiny. The flowers are found to be in clusters along the mature stems, trunk and branches.

properties derived can be utilized in the industry of perfume. The brown to dark red heartwood can be used in crafting furniture, boat parts, light structures, packing cases and musical instruments. The yambo tree has flexible branches which can be weaved into baskets and casks.

Tapping the Potentials of Yambo

Many Filipinos, just like many people from all over the world, are only aware of the popular typical fruits that are produced in quantity in order to meet escalating demands for these commodities.

What we should know is

that our country is a bountiful melting pot of various fruit crops, either introduced or native. Our generation and the following generations should know that there are other equally healthy and valuable fruit crops aside from mango, banana, pineapple, and *ponkan*, among others.

The Bureau of Agricultural Research (BAR), as the R&D arm of the DA, will look at the potentials of underutilized fruits like yambo that can thrive well in our lands and can potentially aid in the ultimate goal of “no more hungry Pinoy”. ###

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Lipote can be propagated through seeds or through grafting. Fruits may come 4-5 years after planting.

The lipote fruit is rather thin-skinned which limits its marketability in fresh ripe form. Lipote can still be enjoyed as a pickle, preserve, jelly, jam or beverage. It is said to be also good for wine-making. Methods for the processing of lipote into jams, jellies and juice, similar to those for duhat and guava, have been developed by the Cavite State University (CaVSU) in its effort to demonstrate the usefulness of lipote as a raw material for food processing.

According to Dr. Roberto Coronel, the ripe lipote fruit has 83 percent edible portion which contains (per 100 g) 83.4g water, 77 kcal energy, 0.7g protein, 2.5 g fat,

12.9 g carbohydrates, 1.7 g crude fiber, 93 mg calcium, 22 mg phosphorus, 0.2 mg iron, 50 µg β-carotene, 10 µg total Vitamin A, 0.01 mg thiamin, 0.02 mg riboflavin, 0.3 mg niacin, and 16 mg ascorbic acid.

As is true with many indigenous trees, lipote is now rarely found in its natural habitat, a fact that drives home the need to implement conservation measures. For agriculture, the best way to do this is to promote its usefulness as a highly nutritious food source. With better appreciation, demand will come leading to its wider propagation in the country. In its processed form, lipote may find its way into the local and export markets once entrepreneurs have looked into its economic potential.

Our elders may reminisce how they once tasted lipote. It is not too difficult to bring back the taste of lipote once more. ###

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Photo: Joji Aguilá





Simply Kalumpit

by DIANA ROSE A. DE LEON

Ever heard a fruit tree name, Kalumpit?

It is described by those who have already seen it as having a fruit that tastes and looks like a cherry. Interesting, right?

It is believed that kalumpit is an endemic fruit tree, and like other indigenous fruit trees, its economic potentials remain unrealized and sadly, underutilized.

The Local Cherry

Kalumpit (*Terminalia microcarpa* Decne.) is found commonly in dipterocarp forests of the country at low and medium elevations and is grown as backyard fruit trees in parts of the country. Surprisingly, despite its wide distribution, not many Filipinos have known or seen a kalumpit tree or even got the taste of its fruit.

Kalumpit is a large tree that can reach as high as 35 meters and its canopy spread as wide as 15 meters in radius. It is a deciduous tree, meaning

it sheds off its foliage seasonally and has a pronounced buttress. It can be propagated by seed and grafting. The wood from kalumpit tree can be used for light construction.

Its fruit is described as small, oval-shaped, velvety purple to dark violet in color and fleshy. Its taste can be compared to strawberry and other berry-type fruits which are sweet and citrusy. The fruit is about three cm wide, smooth, and when fully ripe turns to a nice burgundy red and stains red when popped. It has a single, inedible hairy seed.

In some municipalities of Batangas, kalumpit trees are teeming. This is why kalumpit is sometimes known as Batangas Cherry. Its fruit reminds the people of summer as fruiting peaks only from April to May, the summer season. In this time of the year,

the fruits can be found and bought in the local markets of Batangas.

“ In some municipalities of Batangas, kalumpit trees are teeming. This is why kalumpit is sometimes known as Batangas Cherry. ”

Kalumpit fruit can be eaten raw. Some people just wash it and pop them inside the mouth like you would eat candies. Some prefer to dip it in salt or roll it in granulated sugar. It also can be enjoyed in processed form such as preserves, jams, and dehydrated kalumpit. As it is a seasonal fruit, the fruits are sundried for longer shelf-life. It is also used to flavor and age lambanog (coconut liquor) and for wine-making.

Usually, the fruit is picked by shaking the tree to make the ripe fruit fall to the ground. As kalumpit fruit is prone to worms, it is advised to choose only the hard ones with no puncture holes (especially when bought in the market). To ensure that the fruits are worm-free, just soak these in water with salt repeatedly to eliminate the worms.

Eating the fruit can be beneficial to one's health as it is rich in ascorbic acid, enzymes, bioflavonoid, chromium, potassium, magnesium, B vitamins and amino acids.

Aside from being nutritious, kalumpit is very effective in treating

eczema and other skin diseases. The fruit is used as eyewash like the *Acacia farnesiana*. It is also used as a lotion in cases of humid herpeticism. The fruit pulp finds use by Hindu physicians as an astringent and laxative.

Furthermore, the bark can be used to make tannin extract or for direct use in leather tannery as it has high tannin content which can be as high as 34–42 percent.

The seed is claimed to yield an oil content of 40 percent with a fatty-acid methyl ester that can meet major biodiesel requirement. The leaves are good as cattle fodder.

There are plenty of other indigenous fruit trees, which are nutritious and equally delectable, that are just waiting to be introduced to the public like the case of kalumpit. But why don't you try to look in your own backyard. Maybe you already own one. ###

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Eating the fruit can be beneficial to one's health as it is rich in ascorbic acid, enzymes, bioflavonoid, chromium, potassium, magnesium, B vitamins and amino acids.”





PARATUNGO⁸

An Underutilized Fruit with Great Economic Potential

by RITA T. DELA CRUZ

People tend to put premium on good looks. However, some of the most hard-featured looking fruits happened to be the most appetizing, if not the tastiest. For fruits, those that look good on the outside are usually given the first bite while those that are not are often overlooked. What's more an ugly-looking, even utterly repulsive, fruit that no one even heard of? Take paratungon for example.

Paratungon (*Salacca ramosiana* Mogeia) is a species of palm under the (family Arecaceae/Palmae). Its fruits grow in clusters at the base of the tree. The fruits are deep orange colored with prickly and scaly skin. They are about the size and shape of a ripe rambutan with a distinct tip at the base. The fruit can be peeled off by pinching the tip of the skin and pulling the peels away. The taste is usually sour but others say some varieties are sweet and acidic.

The fruit is reported to be an endemic species in the Philippines. It was first seen and recorded in the 1930s in the Sulu Islands and later was found growing in abundance in Palawan in the 1980s as recorded in the field by the renowned botanist, Dr. John Dransfield. The *salak* or snake fruit (*Salacca zalacca*), a popular

commodity grown in Indonesia, Malaysia and Brunei, is a related species.

Currently, this fruit is a nearly threatened species in Palawan according to a recent research project funded by the Bureau of Agricultural Research (BAR) under its National Technology Commercialization Program (NTCP). The project titled, "Identification and Collection of Indigenous Fruits in Palawan" is being implemented by the Department of Agriculture-Regional Field Unit 4B which covers Mindoro Occidental, Mindoro Oriental, Marinduque, Romblon (MIMAROPA) and Palawan, in collaboration with the Western Philippines University (WPU). The project aimed to sustainably conserve *in-situ* the diversity of indigenous tropical fruit species through approaches that involve various stakeholders and the promotion of public awareness and enhanced utilization of these plant genetic resources. The identified fruits are also being looked at for their commercial production and processing properties.

Paratungon is one of the 47 indigenous tropical fruit species that were identified for their economic potential as food source. Other indigenous crops with economic potentials are: *tabu* (a vine that bears white flesh fruits), *palau-biyok* (a yellow or orange colored fruit), and *luod* or wild durian (juicy and sweet fruit with a very strong odor).

Potential for Wine Making

Still under the BAR-DA IVB-WPU research initiative, paratungon was studied for its potential as a source for wine making and other by-products such as marmalades and champoy, among others.

According to Dr. Romeo R. Lerom of WPU, the results of the study showed that the wine produced from paratungon has a very distinct aroma and taste which makes the

“ Paratungon is one of the 47 indigenous tropical fruit species that were identified for their economic potential as food source. ”



paratungon fruit good for processing into wine. He added that, paratungon is a non-seasonal fruit available all year round making it a continuous source of wine material. However, Dr. Lerom mentioned that since the technology is relatively new, he recommended that further studies be conducted to standardize the quality of the wine and the other products developed from paratungon. Likewise, it was recommended that appropriate tests be conducted to establish the nutritional composition of products from paratungon.

Aside from these food products, other known uses of the plant are being explored, particularly the petioles and rachises (shaft) of the leaves as wall panel décor.

Salacca Fruits

In the Philippines, Salacca fruits are scarcely to be found, are hardly known, and remain underutilized. They are better known and appreciated in neighboring countries.

The genus, Salacca, has 20 species of palms which are abundantly growing in Indonesia. The skin of the Salacca fruits has a unique snakeskin-like texture, which is mostly rough to the touch. The Salacca plant is typically a short-stemmed palm and

its leaves have a spiny petiole. In most species they are pinnate with numerous leaflets, but some species, have undivided leaves.

From the 20 species of Salacca, the “salak” and the “dalubi” are found in the country. These two were described and briefly discussed in the book, “Important and Underutilized Edible Fruits of the Philippines,” which was authored by Dr. Roberto E. Coronel, former professor at the University of the Philippines Los Baños (UPLB).

Salak (*Salacca zalacca*), commonly referred to as the “snake fruit”, is native to Indonesia and was introduced in some tropical countries. In the Philippines, it was introduced during the early 1900s but is rarely found now. The fruits are globose in shape, yellow and clothed with spiny scales. The flesh is shiny, translucent, yellow white, with a slight acidic taste, soft and encloses three dark brown, hard seeds. The fruit is often eaten raw.

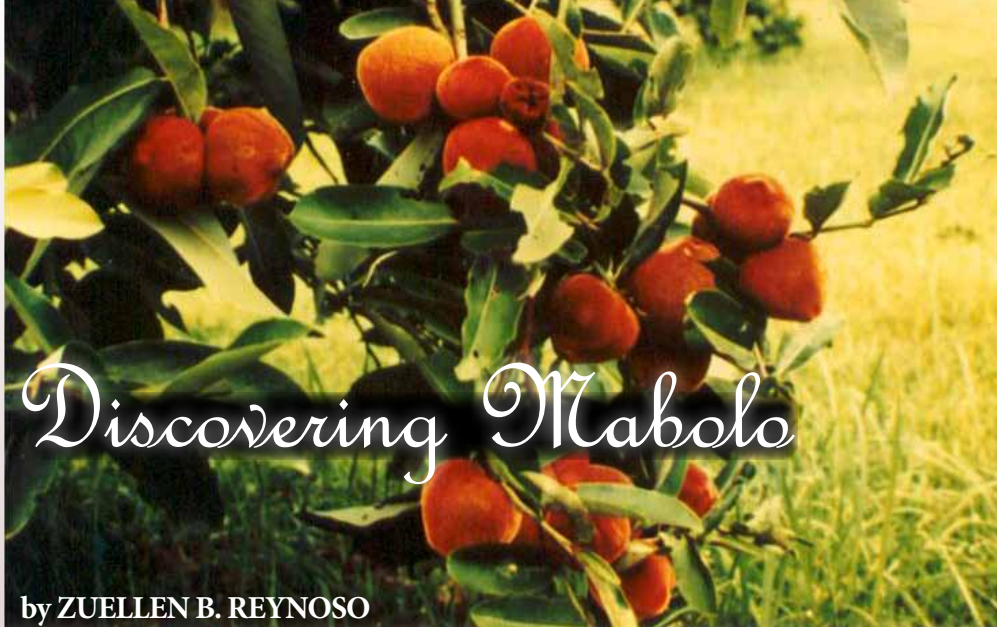
Another species, dalubi (*Salacca clemensia*) is said to be indigenous to the Philippines particularly in the low altitude areas of Mindanao. Fruits are in clusters, roundish and dark brown, and with scaly, shell-like peel in which are enclosed a rather scant, semi-

“ Wine produced from paratungon has a very distinct aroma and taste which makes the paratungon fruit good for processing into wine. Paratungon is a non-seasonal fruit available all year round making it a continuous source of wine material.”

translucent, subacid, juicy flesh with 1-3 large seeds. The fruits may be eaten raw. Little is known of this unutilized species.###

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Discovering Mabolo

by ZUELLEN B. REYNOSO

In a tropical country like ours, fruits that are unavailable to western nations, come abundantly and without much effort in our nutrient-enriched and sun-drenched soil. Fruits like the Philippine mango, pineapple, and papaya are just a few of the many highly valued fruits imported by other countries from the Philippines. Export demands continue to increase due to this; however, local demands fall quite short behind.

Thus, a call to patronize our own produce has been raised by Agriculture Secretary Proceso J. Alcala, “we should encourage and lead by example, and urge our young people to love Pinoy fruits.” There’s nothing wrong with appreciating imported fruits as long as we do the same for our own. Start today, start with mabolo.

Mabolo

The mabolo fruit (*Diospyros blancoi*) is also known as the Philippine persimmon, velvet apple or butter fruit (in Singapore). This fruit grows from the Kamagong tree which is native to the Philippines. Indigenous to forestlands in low or medium altitudes in the country, the Kamagong tree is mainly used for furniture and specialty wood products. While the tree is known around the world for its wood, its fruit, mabolo, deserves a bit more attention.

The Kamagong tree can reach up to 20 meters high, depending on variety. The velvety skin of mabolo buds comes in a shade of green, to brown and then to a dull magenta when ripened. The short hairs on the skin of the fist-sized fruit may cause irritation

in the mouth when eaten or to sensitive skin when in contact, but the flesh of the fruit is free from irritants. A couple of wedge-shaped seeds sit at the center of the whitish pulpy meat of the fruit in some varieties, although most are seedless. Mabolo emits a strong cheese-like scent that is somewhat unpleasant but lessens when peeled.

The Kamagong is considered a highly productive tree. Apart from the trunk and the mabolo fruit, the leaves and barks prove to be as useful. Among Philippine indigenous cultures, its leathery oblong leaves are used to treat skin irritation such as eczema, respiratory diseases like coughs and even fever. Both leaves and bark are also believed to be antidotes for snakebites in some tribes; unripe mabolo is also used as remedy for dysentery, diarrhea, hypertension and heart disorders. Mabolo contains vitamins and minerals, specifically calcium, iron, protein and vitamin B making it a healthful food.

Mabolo Possibilities in the Philippines

Kamagong is among the tree species abundant in the Philippines. Kamagong wood is one of the principal materials used in crafting furniture around the country and is even exported. One of the most expensive of wood materials, Kamagong wood darkens as it ages making it a

favorite for antique collectors. However, popular as this wood may be, it is not the case for its fruit, Mabolo.

Folkloric usage of Mabolo suggest that the juice of an unripened Mabolo is natural treatment for diarrhea and first aid treatment for wounds, while other parts such as bark, leaves, and roots are useful in treating respiratory diseases and skin ailments such as eczema.

Scientific research on the fruit dating as far back as the 1980s boasts not only of the nutritional and medicinal value of the fruit, but also of its biofuel potential. Numerous scientific research show that compared to commercial gasoline, biofuel from mabolo emits lower amounts of carbon monoxide and carbon dioxide. Proven as effective as alcohol fuel, this ethanolic extract is highly profitable as the tree is endemic to the country, and propagation is uncomplicated.

A major purpose of initiatives in agriculture and fisheries R&D is to advance the achievement of food self-sufficiency in the country. Underutilized fruits and vegetables endemic to the country offer immeasurable potential once propagation, postharvest techniques, and value adding are uncovered through R&D. Further exploring the possibilities of Mabolo not only provides another promising food source, but also adds another viable inexpensive source of biofuel. ###

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Appreciating GRANADA A Bombastic Fruit

by DARYL LOU A. BATTAD

Photo: Ferran Tumo Gort

Photo: Samhosh Thomas

Fertility life, good health—these are just some of the attributes that have been given to granada, a symbolic fruit that dates back to some 3000 years ago.

Considered an ancient and mystical fruit that has been existing since biblical times, pomegranate, or granada as we refer to it in the Philippines, is only one of the many plant species with under-exploited potentials especially in terms of its health benefits. Not known to most of us are its “explosive” medicinal and nutritive values of the so-called superfruit.

The word pomegranate is derived from the Latin words *pomus* meaning apple, and *granatus* meaning seeded. It is round on the bottom of which is a crown-like calyx. Its skin is thick and is usually reddish-yellow or purplish on some varieties. The pomegranate is a neat, rounded shrub or small tree that typically grows 12–16 feet in height. It prefers a semi-arid mild-temperate to subtropical climate and is naturally adapted to regions with cool winters and hot summers.

Native to some regions in Persia, now known as Iran, to the Himalayas in Northern India, the pomegranate has also been cultivated throughout the Mediterranean regions of Asia Minor, Africa, and Europe.

In the Philippines, granada is not given much attention and is denoted only as a minor crop, mostly planted in the backyards of few households. granada has not been regarded as a

viable commercial fruit because local agriculturists and fruit aficionados remain unaware of the many benefits of eating and growing pomegranates.

So What’s in the Bomb?

With the development of the mantra of “all natural” health, people have become extra conscious about health.

In the recent years, wide arrays of crops fruits and vegetables have been promoted as “superfruits”, “supercrops” and the like. Invariably, soon as one fruit or vegetable gains this status, others supersede it as the title holder. Such is the intensity of research and discovery.

For researchers and scientists, attention has focused on the attributes of these so-called “supercrops” to find out their relative merits.

What most do not know about pomegranates is that they are loaded with nutrition and are particularly abundant in vitamins A, B C, and E, and the elements, potassium, zinc, and calcium. The most potent characteristic of this superfruit is its antioxidant properties. Such nutrients unbelievably have free-radical scavenging effects, which can prevent degenerative diseases like cancer, heart diseases, and arthritis.

Now hyped as the new superfruit, pomegranates are rich in the nutrients and antioxidants that carry potentials benefiting the overall health by targeting the cellular and molecular structures of the body. Recent studies show that pomegranates may be effective in fighting cancer proliferation. Pomegranate-treated tumor cells are said to increase cell adhesion and decrease cell migration. This simply means that the disease is prevented from spreading to different parts of the body, reducing the risk of cancer.

In 2008, the Journal of Agriculture and Food Chemistry ranked pomegranate juice as the healthiest of all fruit juices. It is claimed to have higher antioxidant potency than red wine, grape, cranberry, and apple juices.

Here in our country, although pomegranates are not given much priority, some medical doctors are already prescribing pomegranate juice as food supplement to their patients, particularly as an aid in lowering cholesterol levels and other cardiac risk factors, and maintaining a healthy prostate in males.

An Opportunity Bomb

With all of the qualities and valued health benefits of the granada fruit, this commodity

surely deserves priority attention. In the Philippines, which has rich, vast soil and natural resources and the weather conditions fit for growing pomegranates, it can be a good move to start its commercial planting. Agronomists in India, one of the top pomegranate-producing countries, reveal that this fruit thrives where there is long dry season, only that it should be well supplied with water (drip or otherwise). With each tree giving out a possible yield of 30–50 kilos, and a price of around 60–80 rupees per kilo (the Indian rupee and Philippine peso have about the same value) depending on size, the pomegranate farmer can earn much from his trees.

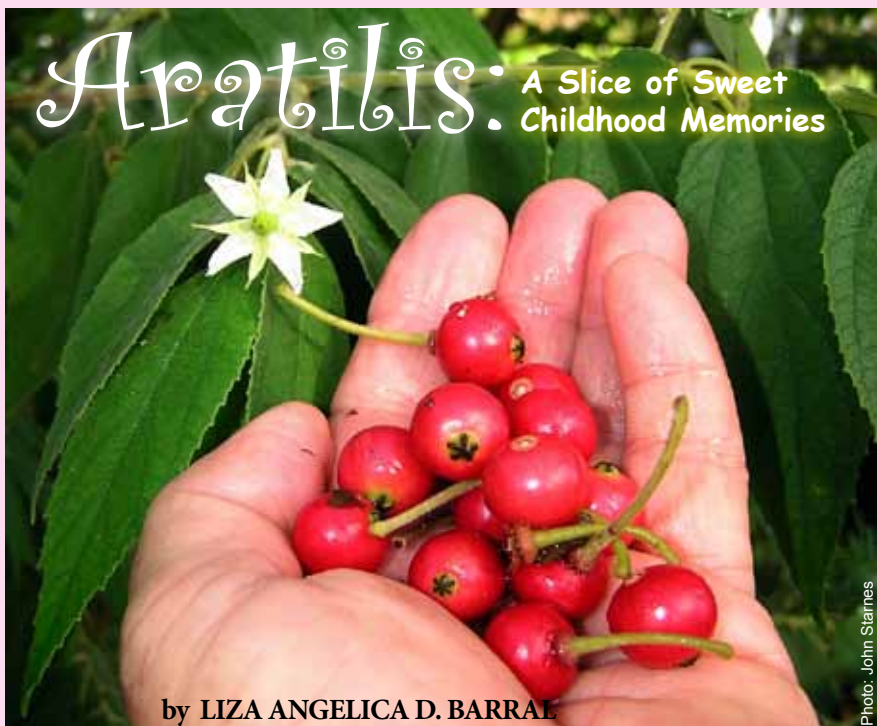
Although there already are pomegranate products available here in the country, pomegranate juice—the most prominent and common product—is more expensive than other fruit juices mostly because of the erratic supply of the raw materials, which are still imported from neighboring countries. This thus opens opportunities for local production.

A Call for Philippine R&D

In promoting “Pinoy Fruits”, the Department of Agriculture (DA) is raising awareness and interest of the public in the consumption of fruits especially the indigenous kind available in our native land. There are still hundreds of thousands of underutilized fruits that do not only serve as food for wildlife, but also stands to be beneficial to man with their food and medicinal potentials, associated commercial opportunities, and other benefits.

For too long, crops categorized as underutilized have been ignored by policymakers and largely excluded from agricultural R&D agenda. While there are research efforts for the local fruit industry in general, there is a felt lack of support for the cultivation, management, harvesting and postharvest handling of underutilized fruit crops. Comprehensive studies on their marketability are needed to spur interest in these crops. Likewise, the nutritional status has to be established and recognized by concerned public and private health entities. And, finally, there must be existing policies and legal frameworks in place regulating the use of the underutilized fruits—in this case, granada our fruit of interest.

Now, who doesn’t want the granada fruit to explode in Philippine soils? ###



Maybe the young generation is not familiar with aratilis since it is rarely seen in the urban areas nowadays. Unlike before, it was growing like mushrooms in underdeveloped areas of the metropolis. But try to ask your elder brothers or sisters or even your parents, you will get to know not only about aratilis but also their happy times when they were still young.

When asked about the aratilis tree, their common answers would be about the sweet and delicious fruits that they usually pick directly from the tree. Some children would even climb the tree or throw rocks or branches to bring the fruits down. During playtime, kids usually eat it raw. No wonder it was considered as a ready -to-

eat food and not only by actively growing children but also by birds and fruit bats.

For the benefit of today’s generation, let us get to know more about the tree which stands witness to our elders’ sweet childhood memories.

Muntingia calabura, commonly known as aratilis or aratiles in the Philippines, has other local names such as *datiles* in Bicolano and *manzanitas* and *cereza* in Ilocano. Other international names of aratilis include Jamaican Cherry, Panama Berry, and Strawberry Tree in English; *bolania*, *yamanza*, and *memizo* in Spanish; *kersen* in Indonesian; and *trungca* in Vietnamese.

Aratilis is a small tree measuring five meters to, at

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One surprising study on aratilis is on its anti-cancer properties with the finding of new cytotoxic flavonoids in *Muntingia calabura* roots.”

most, 10 meters high with spreading branches. That is why fruits are easily reached by children. Leaves are light green, oblong ovate to broadly oblong lanceolate measuring 8–13 cm long and with toothed margins. White flowers are long-pedicelled, about two centimeters in diameter and solitary or in pairs. Fruits are globose, about one centimeter in diameter, smooth, light red, sweet, and with numerous tiny seeds. The tree originated in Tropical America and it was introduced during the Spanish Era in the Philippines where it was widely distributed and became thoroughly adapted.

Various uses have been found for aratilis in other parts of the world including Southeast Asia. In India, the aratilis tree is grown in urban gardens and parking lots since it is a fast growing tree and it attracts fruit-eating birds such as woodpecker. In Mexico, the aratilis fruits are usually sold in markets. In Brazil, it is planted along riverbanks to attract fish with its fruits and, as a result, the fishermen have better chances of catching the fishes. In Indonesia, where the fruits are commonly eaten raw, aratilis is not sold at all in the markets because of the abundance of the fruits specially during the fruiting season.

Aratilis fruit has 82 percent edible portion which contains (per 100 g) 75.0 water, 100 kcal energy, 2.0 g protein, 0.6 g fat, 21.6 g carbohydrates, 2.4 g crude fiber, 104 mg calcium, 52 mg phosphorus, 0.3 mg iron, 0.03 mg thiamine, 0.04 mg riboflavin, 0.5 mg niacin, and 150 mg ascorbic acid.

Common Uses and Health Benefits

Parts of the aratilis tree can be utilized for other purposes. Leaves can be boiled to make a tea while its bark can be used to make ropes and fiber for bark skirts. Fruits can be processed into jams and juice. Its timber can also be used for light carpentry and as firewood. Even the flowers can be utilized as an antiseptic and to treat abdominal cramps.

Studies were conducted in order to identify the beneficial effects of *Muntingia calabura*. One is the in-vitro anti-bacterial activity of aratilis extracts. Results show that it possesses a potential anti-bacterial

property that is comparable to the standard antibiotics being used. Another study claimed that aratilis leaves possess antinociceptive (reducing sensitivity to pain), anti-inflammatory and antipyretic properties, justifying the Peruvian folkloric medicinal use.

One surprising study on aratilis is on its anti-cancer properties with the finding of new cytotoxic flavonoids in *Muntingia calabura* roots. Twelve new flavonoids were isolated and most of the isolates have demonstrated cytotoxic activity with some exhibiting selective activities when evaluated with a number of human cancer cell lines.

Environmental Benefits

One of the distinct characteristics of the aratilis tree is its ability to grow in poor soil and to tolerate acidic and alkaline conditions as well as drought making it a good “pioneer” plant. In addition, aratilis is also a fast-growing fruit tree and is very prolific. Once the berries ripen and harvested the tree flowers again to be pollinated anew by birds and insects such as bees and butterflies and these make for a lot of seeds to be spread by man and animals as the next generation of aratilis trees. Aratilis trees can shed much leaf and branch litter and therefore they can be used for reforestation projects in underdeveloped areas as these contribute to the improvement of the soil resulting to better adaptation by other trees.###

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Our country is home to many indigenous crops. However, the potentials of some of these crops still remain unexplored. A United Nations projection reveals that in 2050, world population is expected to reach nine billion. Achieving food security, especially among the developing countries, is a constant challenge which needs to be dealt with. To help contribute in addressing this issue, we need to make the most out of what is considered to be underutilized.

A Fruit with a Future

The International Centre for Underutilised Crops reports *Pouteria*, a genus of tropical fruit trees, as one of the fruits with good prospects in the future. Among the 188 known species under this genus, three have been identified as having commercial importance and potential. One of them is *Pouteria campechiana*.

Believed to have originated from West Indies in tropical America, it was introduced to many tropical countries, including the Philippines during the 1900s. Locally known as canistel, it goes by its more popular name tiesa. Its texture is likened to the yolk of a hard-boiled egg, giving it its other common name – eggfruit. Though cultivated in many home gardens, it is still one of the fruits in our country which go unnoticed. It was identified in the book of Dr. Roberto E. Coronel as one of the “Important and Underutilized

Edible Fruits of the Philippines”.

The medium-sized evergreen tiesa tree grows up to 7–12 meters tall with trunk width reaching up to one meter. It has long, slender, green and glossy leaves which are clustered at the end of the branches. It has fragrant white flowers which are bunched on leaf axils. Usually smooth and glossy, its fruits are nearly round to oblong in shape with a nipped tip and measures 9–12 centimeters in length. Though it has a semi-woody yellow skin on the outside, a soft, sweet, yellow to orange flesh can be found on the inside of the ripe fruit, containing about 1–4 large and shiny dark brown seeds.

Most trees in the country are grown from seedlings. Just recently, a seedling selection by Dr. Coronel has been registered as a tiesa variety named “Saludo”.

In the Philippines, tiesa adapts well from sea level to medium altitudes in areas with a short to long rainy season. Propagation may be done through seeds with 50-day germination, or through cleft grafting. Fruits are best harvested from August to January when the fruits are fully matured and ripened. In general, plant establishment to plant maturity takes about 1–3 years. Most of the time, the tree is vigorous and healthy as it has no known serious pests and diseases.

Benefits and Potentials

Whether it is for industrial, medicinal, or nutritional value – tiesa has a lot of useful products which can be developed from the fruit to the tree itself. Tiesa trees do not only make a good shade provider and shelter. Its abundant white, gummy latex is collected and marketed for making chewing gums while the hard and fairly heavy timber is suitable for furniture and construction purposes.

More of its potentials can be harnessed. It was reported to be a highly suitable species for reforestation. Additionally, the trees can also be incorporated in agroforestry systems such as homestead gardens, orchards, or as shade trees in coffee plantations where it can contribute to crop diversification, soil improvement and in preventing soil erosion.

Aside from the tree itself, other parts are valued for their medicinal properties. In Mexico for instance, the astringent effects produced from a decoction of its bark are taken to reduce fever. Alternatively, it is used and applied to treat skin diseases in Cuba. Its seeds are also found useful as remedy for ulcers while the seed oils are believed to prevent hair loss.

When peeled, the edible



a TASTE- of the *Exotic* MARANG

by LEILA DENISSE E. PADILLA

Mindanao is famous for the precious fruit, durian, known for the paradoxical appeal of its luscious taste and texture underneath an utterly undesirable scent. Many Filipinos swear to the unique culinary experience that durian can give while others are simply repulsed by its overpowering smell.

For those who dislike the taste and smell of durian, a slightly similar-looking fruit, called marang, that also thrives in Mindanao has a sweeter tang and more appealing scent that can also bring a distinctive experience to the taste.

What to Know About Marang

This indigenous fruit is not only compared to durian but also to breadfruit and jackfruit, which bear similar physical appearance as marang (*Artocarpus odoratissima*). Marang is slightly bigger than breadfruit or rimas which also belongs to the same genus, *Artocarpus*, and is softer and smaller than jackfruit or langka.

Its shape is round to oblong

with a thick rind covered with supple and broad spines when young which become stiff and frail as the fruit matures. Growing up to 15–20 cm long and 13 cm broad, marang can weigh up to one kilogram or more on the average.

Meanwhile, the marang tree is an evergreen that grows up to 25 meters tall with 40 cm trunk girth. The leaves are elliptic to obovate, which are largely alike to that of the breadfruit but are less lobed. It grows up to 16–50 cm long and 11–28 cm broad.

But the most important part is what's inside the thick skin. After cutting, twisting and pulling the half of the rind as how marang is traditionally opened, an abundant core full of white fleshy arils will surely invite anyone to pick and taste. The core resembles that of the jackfruit and the arils (covering of the seed) are the size of a grape with a seed that is 15 mm long.

Marang is widely grown in the Philippines and Borneo and was introduced in Brazil, Australia,

fruit is usually eaten raw. Some add salt, pepper, lime, or mayonnaise to give it a little extra flavor. It is mostly used in the preparation of favorite desserts such as sherbet, ice cream, milkshake, pancake, cupcake, and jam.

One can have a taste of its rich fruity flavor while enjoying the health benefits it can give. An analysis for nutritional properties has shown that tiesa is an excellent source of carotene (provitamin A) which is needed for healthy eyesight. It also has fair levels of carbohydrates, niacin, ascorbic acid, iron, protein, calcium, phosphorus, thiamin, and riboflavin.

Aside from those mentioned, tiesa is also found to be a fruit containing high antioxidant properties. In a study titled, "Functional components, alkaloid and saponin contents and antioxidant activity of Philippine grown fruits", tiesa showed relatively high amounts of total

phenols and antioxidants. These are nutritionally beneficial compounds that naturally occur in fruits and vegetables that act as the body's shield and armor against illnesses and diseases, thus strengthening the body's immune system and keeping us healthy and strong.

Meanwhile, a BAR-funded project titled "Antioxidant Potential and Components of Philippine Vegetables and Fruits" evaluated tiesa and other fourteen fruits and vegetables grown in the country for the natural antioxidant properties they possess. Based on the results of this study, it is interesting to note that high antioxidant activities are present in the non-edible portion of tiesa, specifically on its seeds.

Even if this fruit crop has not been included as one of the species with development potential for economic utilization at the present time, its high nutritional value may spur interest and encourage wider growth and development in the future. Intensive

promotion on its food value, as well as research on how to further exploit the fruit, are needed to realize the crop's full potentials. ###

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and other tropical countries. "Marang is one of the popular fruits growing in Mindanao especially in North Cotabato, Davao, Agusan provinces, etc. Actually there is no identified marang plantation since marang is just a volunteer crop yet there are large areas [where] marang trees are abundantly growing," stated Dr. Emma Sales of the University of Southern Mindanao (USM) in its project titled, "Optimization of Postharvest Technologies and Exploitation of other Attributes of Marang". This project is supported by the Bureau of Agricultural Research (BAR).

Marang can grow in many types of soils, from loose type to heavy type, but it will grow best in loamy soil with 5.5–8 pH level. After four to five years, marang will begin to bear fruits.

Healthier with Marang

Marang is gaining popularity, not only for its delectable taste and texture, but also for its dietary value. Popularly consumed fresh as table dessert in Mindanao, marang is filled with beneficial nutrients.

It contains ash, ascorbic acid, beta-carotene, calcium, carbohydrates, crude fiber, fat, iron, niacin, phosphorus, protein, retinol, riboflavin, thiamine, and vitamin A. The seeds are also edible, which can be eaten after being boiled or roasted.

However, once opened, marang must be consumed right away because it spoils easily unlike other exotic fruits. It rapidly oxidizes which causes the arils to brown while its flavor starts to become bland. This is the reason why marang is not that popular in other regions of the country apart from Mindanao. Even though it has the potential to become widely known, its short shelf life and high perishability hamper its marketability.

According to Mr. Zacarias Sarian, Agriculture Editor of Manila Bulletin and an exotic fruit farmer, "Marang is a very delicious fruit that is traditionally grown in Mindanao... The trouble is that marang has poor shipping quality. Ripe fruits easily deteriorate so that those that are available in Manila, if there are, were harvested prematurely. It has been shown that the marang will also bear fruit in Luzon. In fact, one caller from

“**Marang is filled with beneficial nutrients. It contains ash, ascorbic acid, beta-carotene, calcium, carbohydrates, crude fiber, fat, iron, niacin, phosphorus, protein, retinol, riboflavin, thiamine and Vitamin A.**”

UP Diliman contacted us one day telling us that they have a very fruitful tree that needed pruning. She was asking how to do that. We also know of a fellow in Brgy. Aduas in Teresa, Rizal who used to have a number of fruiting marang trees. In other words, more people should plant this fruit tree in Luzon to meet the requirements in Manila." This statement was found in an article "Marang in Season" written by Mr. Sarian and posted in the website, Agri ZACcess Ideas.



Optimizing Postharvest and Marketing Strategies

The University of Southern Mindanao - Agricultural Research Center (USMARC) sought to optimize postharvest techniques that will prolong the shelf life of marang, and to develop processed food products from marang.

This was conducted through the project, "Pilot Testing of Postharvest Technologies and Product Diversification of Marang," funded by BAR and the Department of Agriculture-High Value Crops Development Program (HVCDP). This project was

implemented by Dr. Sales along with a group of USM researchers.

The project turned out postharvest techniques such as right maturity stage harvesting, appropriate utilization of tools, proper packaging methods, and ripening techniques can improve shelf-life and storability and can minimize losses.

Eleven food products from marang arils and seeds were also developed through the project. From the arils, a total of nine products were created that include vinegar, vacuum-fried marang, ice cream, jelly, conserve, jam, juice, concentrate, and blanched pulp. From the seeds, coffee and nut butter were developed.

A Future with Marang

The Philippines is known to be agriculturally rich and diverse with bountiful flora and fauna recognized by the world. Mango, coconut, durian, and many more have been fascinating foreign consumers and so it is not impossible that one day, marang will become one of the premium quality exports of the country.

With the orchestrated efforts of different sectors and institutions like USM, BAR, DA, and more, it is hoped that Filipinos, not only from Mindanao but also from Luzon and Visayas, will have a taste of marang and will be encouraged to venture in marang production and processing in order to create and meet the demand and to gain competitive advantage in the global market. Optimistically, marang will become underutilized no more.###

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The STARFRUIT

For All
Seasons



by ANNE CAMILLE B. BRION

Balimbing is a popular expression among Filipinos meaning turncoat or double-faced. This term is commonly used when talking of someone who cannot be trusted. In the field of politics, it is often associated with betrayal where a person would take the side of the candidate from which he or she can obtain maximum benefits.

Getting to Know the Fruit Crop

Balimbing is the local name of *Averrhoa carambola* which belongs to the *Oxalidaceae* family. The Food and Agriculture Organization (FAO) of the United Nations reports that the fruit crop is known to have originated in Ceylon and in the Moluccas, but has been grown mostly in Asia because of the advantageous tropical climate suitable to the growing of the plant. Having reached a number of countries, this gave rise to the fruit's different names. In English, it is known as starfruit, carambola, and five corners. The Indonesians and Malay call it *belimbing manis*, while it is referred to as *ma fueang* among the Thais and *khe* among the Vietnamese.

Balimbing is an edible fruit which, though known to many, has not been fully utilized despite its good economic potentials. In fact, it has been included in the book of Dr. Roberto E. Coronel titled "Important and Underutilized Edible Fruits of the Philippines". In the book, balimbing is

described as a small tree reaching up to 6-9 meters in height. It is characterized by its dark-green colored leaflets and reddish purple flowers clustered in leaf axils. The fruit turns greenish yellow to yellow when ripe and has a sweet to sour taste. It has an oblong to ellipsoidal shape with a translucent, soft, and waxy skin. About 6-9 centimeters long, it presents itself as a five-cornered fruit with its five prominent longitudinal, angular wings. When cut across, it resembles a star hence the name starfruit.

Plant management involves the propagation of balimbing from seeds, which may take 20-25 days to germinate, and growing it preferably in a rich loam soil. Meanwhile, it takes about 4-6 years for a seedling tree to fully blossom and bear fruits. If grafted, it may only take 2-3 years. Varieties such as Fwantung, Arkin, Kembangan, and B11 are among the superior cultivars selected for growing in the country.

Though growers can expect fruiting all year round, recommended harvesting time is from May to August when the heaviest crop comes in. There are no known serious diseases for the plant, but oriental fruitfly is considered as its most mortal enemy. Wrapping and bagging the

fruits are done to address this issue.

Maximizing the Uses of the Underutilized

Whether ripe or unripe, this wondrous crop is used in many different aspects. Filipinos mainly use balimbing for its culinary and food value. Usually eaten fresh and raw, this fruit may also be sliced and served in salads and dishes. It can also be processed and made into jam, jelly, or preserve or even as a simple carambola juice. Consumption may provide the body some of the essential vitamins and minerals it needs including calcium, iron, thiamin, riboflavin, niacin, and ascorbic acid.

Additionally, its wood can be used for firewood, timber and construction purposes. Due to the potassium oxalate it contains when unripe, balimbing may also substitute for dyes. Its juice extract can remove stains in cloth or polish metal as well. It also becomes an ornamental plant in gardens and parks because of the complementing colors of its leaves, flowers, and fruits.

In traditional medicine, the fruit has been utilized for its therapeutic potentials to ease and treat many illnesses and diseases.

In India, a ripe fruit is used to staunch hemorrhages while the dried ones are taken to provide relief for fever and eye afflictions. The oxalic acid it contains makes it a useful laxative. Apart from its fruit, other parts of the plant are also found to be of medicinal value such as the leaves to lighten headache.

It is also administered to treat skin impurities. In some Southeast Asian countries for example, its flowers are rubbed on the skin affected with dermatitis, while its inner bark is used together with other materials to soothe prickly heat.

Investigative studies are also being done in other countries to further explore the potentials of this crop. In Bangladesh, a study was conducted to explore the crop's antibacterial activities while another study in India sought to determine the possibility of the fruit as a raw material for wine production.

With the saying "too much of anything is bad", too much consumption of this fruit may upset a balanced diet, or worse pose threats to human health. There are documented cases in some parts of the world where the consumption of the fruit by individuals suffering from kidney-related illnesses resulted to discomforts such as nausea and vomiting, among others. Hence, extra precautions are needed if consuming the fruit as its oxalic acid may prove harmful. Further studies are needed to establish its nutritional limits.

There are indeed true potentials awaiting this fruit with myriad uses. What today is an unnoticed fruit may become a promising commodity in the future. Extensive research and development efforts not only for balimbing but also for other underutilized crops in the country should be pushed as their enhanced use can contribute towards achieving food security and improving the well-being of the people. ###

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a Treat of GU YA BA NO



Photo: A. Muricata

by DIANA ROSE A. DE LEON

If you were asked to list your favorite fruits, what would be in your list? Most probably, all of you will jot down the popular ones such as mangoes, bananas, apples, oranges, pineapple, etc. There is nothing wrong if these are your favorites as they are delicious and nutritious, and at the same time are the ones commonly available and accessible in the market.

Here is another question. Did you write down guyabano as one of your favorite fruits? If yes, it means you are among those people who have discovered the delight of eating guyabano.

Knowing Your Guyabano

Soursop (*Annona muricata* Linn.), more popularly known as guyabano, is commonly grown as a backyard fruit tree in the Philippines. It has great economic and commercial potentials but remains underutilized.

Guyabano is not endemic to the country and its roots can be traced all the way to Central America. It is also cultivated in Africa and has found its way to the soils of Southeast Asia in such

countries as Indonesia, Malaysia, and the Philippines.

Usually, seeds are used to propagate guyabano but propagation can also be done asexually by marcotting, grafting, and budding. It can grow in any type of soil but to get good fruit bearing, loose, fairly rich, deep loam and well-drained soil is best recommended. The tree bears fruits in three to five years time after planting. The tree flowers all year round and peaks from May to June. Its fruit ripens in November and December.

To those who have never seen a guyabano fruit, it is best described as green and heart-shaped with leathery-like and soft spiky skin. It has an edible creamy white, meaty and juicy flesh/pulp with a taste that is sweet yet sour. It has multiple, inedible, black seeds.

When picking a guyabano from the tree, one should only harvest mature guyabano. It is in its maturity when the skin color is shiny green or yellowish green and the spikes are set far apart. Fruits that are picked prematurely will ripen but has poor eating



quality. Fully mature fruits ripen in three to five days after harvest. Extra care is needed in handling the fruit as it gets easily injured because of its tender skin. It is advised to refrigerate the ripe fruit for only two to three days.

Like any other fruit tree, guyabano needs proper care of as it is prone to attacks by a number of pests such as root grubs, mealy bugs, carpenter moth larvae, scale insects, oriental fruit fly, and nest building ants and it can catch diseases such as root rots, pink disease, and anthracnose.

It can be intercropped with banana, coffee, cacao, blackpepper, and citrus. It may also be intercropped to bigger fruit trees such as avocado, starapple, durian, mango, jackfruit, rambutan, santol, and coconut trees.

A Multi-Purpose Fruit Tree

The fruit is rich in fructose, the vitamins C, B1, and B2, potassium, magnesium, thiamin, copper, niacin, folate, iron, riboflavin, and dietary fiber making it a healthful food. The guyabano fruit is popularly processed into candies, jam, jelly, preserves, tarts, shakes, ice cream, and sherbets and other beverages.

Many believe that guyabano is truly a wonder crop as, aside from its edible fruit, all its parts including the bark, leaves, roots, and even its seeds have natural healing properties.

The pulverized seeds find use as a skin astringent and a concoction made from it is a good vermifuge and anthelmintic against parasites, head lice, and worms. It is also used as an all natural pesticide against caterpillars, army worms, and leafhoppers on plants.

The leaves are used as a sudorific (inducing perspiration). It has tranquilizing and sedative properties. It is also used as a treatment for pain

and inflammation cause by arthritis and rheumatism. It is used to treat eczema and other skin diseases, and can help to bring down fever. The sap of young leaves can be applied directly on pimples. The crushed fresh leaves are also applied on skin eruptions for faster healing and prevent scarring. Drinking tea out of boiled leaves may help induce sleep.

The bark, roots and leaves, on the other hand, are used to treat diabetes, and also has tranquilizing and sedative properties for relief from colic and convulsions. It acts as an antispasmodic and is beneficial to those who are hypotensive.

In a study done by the Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI), it was found out that the green and unripe guyabano has more flavonoids than its yellow and ripe form. Flavonoids may help in preventing cancer, allergies, infections, and viruses. Studies also show that guyabano outdid Metformin, the most commonly used drug maintenance of diabetics, in lowering blood glucose levels. Because of these, DOST-ITDI is now promoting guyabano as a natural dietary supplement and on the process of developing guyabano capsules and tea bags for commercialization.

But one interesting thing that makes guyabano stand out among the other fruits is the claim that it can cure cancer. Plenty of people through testimonials posted online have said that guyabano healed their cancer.

In a study published in the *Journal of Medicinal Chemistry*, extracted acetogenins in guyabano were found to be more potent than adriamycin - a drug used in chemotherapy treatment- and thus, guyabano may indeed have chemotherapeutic potential.

Also, based on laboratory tests, it was found out that, unlike chemotherapy which also targets healthy cells, the compound present in the guyabano extract only affects and kills malignant

cells. It does not have the usual side effects of chemotherapy treatment such as extreme nausea, weight loss, and hair loss.

However, the studies and tests to prove the cancer-healing properties of guyabano were done in vitro (artificial environment) and as yet there are no published clinical trials on humans to support these claims and, therefore, there is not enough evidence for the guyabano to be recommended to the public as a cancer cure.

Despite the good things said about guyabano, one should take necessary precautions before eating it or using its parts for making concoctions. The bark is said to possess alkaloids called anonaine and anoniine which are high in hydrocyanic acid. Hydrocyanic acid is a colorless substance that is considered poisonous. It is not advised for people who have motor control difficulty or are suspected of having Parkinson's disease.

The guyabano seeds are toxic and all should be removed before eating or processing it. The seeds also contain 45 percent of yellow non-drying oil which is an irritant poison that can cause severe eye inflammation.

Overall, guyabano is a fruit that is safe to eat. It is undeniably a crop that deserves attention. With proper support, guyabano may be the next "it" crop of the country. ###

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by ZUELLEN B. REYNOSO

Enter the Dragon Fruit

The deep pink almost bright red skin of the dragon fruit may be a tad bit off-putting for many. From afar, the green parts of its skin may seem like thorns—surely the dragon fruit could easily be misconstrued as poisonous and inedible. However, studies from all around the globe have shown that the dragon fruit is more than an ornamental flower of a cactus. This beautiful mysterious fruit offers a wide range of health and economic benefits once explored.

Growing in tropical areas in Asia and Latin America, the dragon fruit (*Genus: Hylocereus*) is also known as pitaya or pitahaya in many countries. Other names include red pitaya, dragon pearl fruit, green dragon, dragon crystal, and strawberry pear. This fruit grows from a cactus plant that either grows from the ground or climbs onto trees, which could reach up to 20-foot long when full grown. The fragrant flower of the dragon plant only blooms at night, and wilts during the morning—hence, the name Night blooming Cereus, Belle of the Night, Queen of the Night, and Moonflower. Apart from these exceptional characteristics, the fruit itself offers even more promise.

The dragon plant matures within a year and starts to bear fruit with an average of 5–6 cycles of harvest each year. The football-shaped dragon fruit weighs an average of 150–600 grams with its outer skin either red or yellow in color depending on its variety. The flesh of the dragon fruit is white with tiny black edible seeds, with a texture much like that of a kiwi—soft, juicy, and a bit grainy, with a sweet-citrusy taste.

Apart from the culinary uses of this night blooming cactus, it also offers countless medicinal properties. One serving provides 15 percent of the daily requirement for vitamin C, 10 percent for potassium, 8 percent for iron, and 1 percent for calcium. Research have shown that consuming dragon fruit could prevent certain cancers, jumpstart weight loss, control blood glucose level for diabetes, thwart memory loss, and facilitates faster healing process of wounds and other lesions.

Dragon Fruit in the Philippines

Pitaya growers continue to increase throughout the country,

from the provinces of Cavite, Ilocos, Bicol, all the way to Davao, and even a couple of commercial planting farms in Pangasinan, Nueva Ecija and Quezon. Its' reputation of profitability continue to spread, and more farmers are committed to the production of dragon fruit. Selling expensively in the local market, roughly Php 150–180 per kilo and even higher abroad, dragon fruit is tagged by the Department of Agriculture – Bureau of Agricultural Research (DA-BAR) as a money crop. With little investment capital and maintenance for growing pitaya and producing dragon fruit, DA-BAR pushes on to discovering planting techniques to increase the productivity of the pitaya cactus.

In the Philippines, two main varieties are grown and the most common is the one with the white flesh, *Hylocereus undatus*, followed by a darker red-fleshed dragon fruit, *Hylocereus costaricensis* (some authors refer to it as *Hylocereus polyrhizus*). The former grows bigger but is less sweet than the latter. There is

another less familiar dragon fruit called the yellow pitahaya or yellow pitaya, *Hylocereus megalanthus* (some authors also call it *Selenicereus megalanthus*) which has a yellow-skinned thorny fruit with white flesh and is not as common in commerce as the other varieties. It is said to be the sweetest.

Cultivating pitaya cactus is quite basic, either by stem cutting or through seeds. As it is a cactus, growing it could be challenging but not impossible. The crop needs only little hydration, but attention must be put for defenses against pests and diseases to maximize its productivity. Its season of flowering runs from May to December and the dragon fruits are harvested 30–50 days after flowering.

Apart from pitaya cactus farms, dragon fruits are also grown in backyard gardens of both rural and urban dwellers in the Philippines. Originally thought of only as ornamental plants, dragon fruits is making itself known to homemakers. Eaten fresh and raw, dragon fruit is now also made into jams, mixed in cocktails, or combined with other ingredients to make salads.

Promoting Dragon Fruit

Research and development (R&D) initiatives to fully uncover the

possibilities presented by dragon fruit were undertaken in 2003 by DA-BAR through its Agribusiness Development Project (ADP). In collaboration with the Southern Mindanao Integrated Agricultural Research Center (SMIARC) in Davao City, the initiative was able to: 1) enhance and share the production technology of dragon fruit, 2) propagate seedlings for distribution to other interested growers, and 3) establish the value of the produce. To this date, the techno-demo farm in Davao City continues to draw-in interested growers and producers for techniques and planting materials they need to begin their dragon fruit garden or farm.

In Burgos, Ilocos Norte, stands the biggest dragon fruit producer, the REFMAD Farms owned by Edita Aguinaldo Dacuycuy. Motivated by the search for alternative medicine and in partnership with Mariano Marcos State University and the Department of Science and Technology, she continues on in promoting the use and production of dragon fruit. Apart from this, the farm also incorporates the use

of organic farming in its dragon fruit production where they utilize animal manure as fertilizer and integrated pest management to manage pest and diseases.

One agenda of R&D is ensuring that the natural resources in the Philippines are used and maximized to its full potential such as the unexplored fruits common in our country. The culinary, medicinal, and economic possibilities of these Filipino fruits are endless and are waiting to be discovered. It is up to us to continue unearthing these agricultural wonders for a food self-sufficient Philippines. ###

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Putting **SANTOL**
Up a Higher Notch:
11 Reasons to Love
the *Lolly*
Fruit



by DARYL LOU A. BATTAD

Pinoys are known to be lovers of sweet-sour mouth-watering fruits—the ones that put the taste glands into a frenzy. Santol, true to its delightful sweet and sour taste, has been and still is the favorite fruit of people of all ages, especially in the rural areas. Produced in great abundance—as santol trees can be found almost anywhere—santol is regarded as “for everyone’s taking”. Yet this rather popular fruit has always taken the backseat to other more established fruits like banana and mango.

Santol is a tropical fruit native to the regions of Indochina. Along with other Southeast Asian countries, it was introduced and naturalized in the Philippines hundreds of years ago. Most people refer to it as santol, wild mangosteen, or in most English countries, as the lolly fruit because you literally have to suck the seeds to get its essence. Aside from the fact that it is commonly tagged as a shade tree in our country, santol provides other uses and benefits that we don’t consider of high importance.

There are numerous reasons why we should start putting santol into the limelight, and not merely look at it as underutilized, traditional, or simply just a promising fruit.

1. Low farming maintenance.

As it is known to most of us, the santol tree is found throughout the country. It can be planted under a wide range of soil types and flourishes in both dry and humid areas of Philippine

lowlands. Santol can be grown in the backyards of our homes, and it is guaranteed to mature even with a minimum of management. It is only for commercial planting and fruit grade that a santol tree must be planted such that distance to other trees is considered and given its proper nourishment to hasten its growth. For maximum yield, it requires fertilization twice a year. It is easily reproduced by various means - seeds, air-layering, inarching, or by budding onto -rootstocks. Harvesting is usually done with the bare hands or by using a long stick with a forked end. Generally, the cultivation of santol is not as demanding as other fruit-bearing tropical trees can be.

2. Santol is a very productive tree.

Normally, seed trees produce fruits 5–7 years after planting. Described as a hardy tree of vigorous and rapid growth, a santol tree thrives well even where the dry season is prolonged. Truly productive, a full grown tree can be relied on to produce around 18,000–24,000 fruits every year. In fact, huge quantities rot on the ground annually because of such copiousness.

3. Packed with good nutrition.

Like most other tropical fruit, santol contains vitamins and minerals that boost our body’s immunity. It is rich in vitamins

B and C, which, respectively, promotes proper cell metabolism, and strengthens and protects the immune system against cardiovascular diseases. It also contains fair amounts of carbohydrates, iron, fiber, and phosphorus. Chewing santol also contributes to healthier teeth as it stimulates the production of saliva and lowers the levels of bacteria, thus reducing tooth decay.

4. Has anti-allergy properties.

Imagine the convenience of having an anti-allergy food right in the comfort of our own backyards? The pulp of the santol fruit is rich in bryonolic and sandorinic acids which are known to have anti-allergy properties. These acids are produced through cultures of santol plant cells. With further studies and development of clinical processes and protocols, santol can be established as a remedy for certain allergies.

5. An all-natural souring agent.

Sinigang is one Filipino dish that we all love. Nowadays, santol has become a favorite souring ingredient. It surely gives a healthy, luscious, salivating sour taste perfect for sinigang dishes!

6. Jams and jellies, anyone?

Santol fruit (with seeds removed) and rind is perfect for making candies, jams, jellies. Santol also makes a good preserve. Here in the Philippines, the fruits are peeled

by removing the seeds and boiling the rind with sugar, preserved in syrup, and processed into marmalades for export. According to some Filipino entrepreneurs, such products are a favorite in Europe and the United States.

7. A ringworm counter agent.

The bitter bark of the santol tree which contains a slightly toxic alkaloid and a steroidal sapogenin, has a good reputation for the treatment of ringworm, a common fungal infection of the skin. The bark is powdered and applied to the affected skin. This might be considered traditional especially in Philippine rural cultures but it has scientific backing. Steroidal sapogenins from santol, can be chemically synthesized into cortisones, a known substance for the treatment of skin diseases.

8. Bottoms-up!

Ever heard of Santol wine? With this fruit, nothing is wasted. Overripe santol fruits can be fermented with rice to make an alcoholic drink. It's healthy, and easy to do.

9. Would a wood...?

According to J.F. Morton, author of the book, "Fruits of Warm Climates," the wood of the santol tree can also be used for construction. It is fairly hard, moderately heavy, close-grained and polishes well. However it is not always of good quality. It is not durable when moist and is subject to borers. But since it is plentiful, easy to work with, and very popular that, as Morton stated, if carefully seasoned the wood can be employed for house posts, interior construction, light framing, barrels, cabinet work, boats, carts, household utensils, carvings, and

accents. The bark is also used in tanning fishing lines.

10. Folkloric-but-tried-and-tested medicinal uses.

Interestingly, the aromatic, astringent root serves as a tonic for women after childbirth. The roots may be boiled and made into a tea to help ease diarrhea and dysentery. It may also be mixed with vinegar and water to relieve other intestinal problems. Leaf decoction is used to bathe patients with fever, causing sweating thus reducing fever.

11. ...And Just by Being the Santol Fruit that it is...

Apart from all of the many things we get from santol, Filipinos will always include this in their fruit basket. Santol can be a snack by itself because the fruit can be eaten as it is. Dipped in salt or vinegar, this mouth-watering fruit will always be among the well-loved fruits in the Philippines, thus assuring a big, constant market.

Realizing the many uses and benefits from a certain produce is the first step in regarding it as an important crop or fruit. Consequently, researchers, agriculturists, scientists, policymakers, and extensionists will pay attention to such a crop and will begin to build ways to harness its potentials, create strategies, and establish policies in the sustained development. This can be the case not only of santol, but all the other crops that receive little or no attention at all.

It is comforting to know that in the field of agriculture,

concerned agencies—especially the Department of Agriculture—are initiating efforts to reach out to the masses, first and foremost, reacquainting them on our abundant but mostly ignored local food resources. Promoting Pinoy fruits can be a big leap benefitting the fruit industry which can contribute to assuring food security and improved incomes for the Filipino farmer.

There is still so much to improve in santol: from cultivation, production and by-product development, harvesting and postharvesting, marketing, to policy recommendations. With continued efforts and coordination among concerned agencies, the development of the underutilized fruits can contribute significantly to the attainment of the Department's vision on Philippine food security. ###

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Photo: www.whologwhy.com



Photo: www.sapsamfood.com

Rambutan: The Exotic Fruit of Southeast Asia



by LIZA ANGELICA D. BARRAL



Photo: Wizan



Maybe the majority of us Filipinos have seen this red hairy fruit. Indeed, the fruit's name is derived from the Malay word "rambut" meaning hairy. It is usually eaten raw and has a distinct taste and texture. Although rambutan is categorized as an underutilized fruit, it is considered as one of the promising commercial crops.

Nephelium lappaceum L., commonly known as rambutan in the Philippines, it comes from family *Sapindaceae*. The fruit is also called *ramboutan* or *ramboutanier* in French, *ramboetan* in Dutch, *ramboostan* in India, *shaotzu* in Chinese, and *chomchom* or *vaithieu* in Vietnamese. The underutilized fruit is native to Malaysia and it was introduced to many tropical countries including the Philippines during prehistoric times.

The tree is medium to large-sized, about 15-25 meters high. Leaves are even pinnate with 2-4 pairs of leaflets. Leaflets are 10-20 centimeters long, elliptic to obovate, thin but leathery and dark green. Numerous small, greenish white flowers are in panicles on shoot tips. Rambutan fruits are globose to ovoid, 4-5 centimeters long, yellow or red when ripe and with fleshy spines. Rambutan's aril is nearly white, translucent, subacid, juicy, and with an oblong or ovoid seed. Rambutan grows well from sea level to medium altitudes in places with a long rainy season. Rambutan can be propagated through seed, (which takes about 10-15 days to germinate)

marcotting, inarching, cleft grafting and patch budding. Major pests are fruit borer and oriental fruitfly while the major disease is foot rot.

In the Philippines, flowering occurs from late March to early May while the fruiting season is from August to October. Fruits are harvested when fully ripe on the tree. In order to maintain the quality and freshness, rambutan fruits must be transported to local markets within three days of picking. The yield of rambutan may vary from year to year. Individual trees eight years old or older can produce as much as 440 lbs or 200 kilograms in the first season, and 132 lbs or 60 kilograms on the next season. In the Philippines, the average production per tree of 21 selections was reported to be 264 lbs or 120 kilograms over a four year period, while the general average is only 106 lbs or 48 kilograms.

Rambutan fruit has 36 percent edible portion which contains (per 100 grams) 77.6 grams water, 87 kcal energy, 1.2 grams protein, 0.9 grams fat, 18.6 grams carbohydrates, 1.1 grams dietary fiber, 32 mg calcium, 16 mg phosphorous, 0.4 mg iron, 0.02 mg thiamine, 0.10 mg riboflavin, 0.5 mg niacin and 91 mg ascorbic acid.

Rambutan's Different Faces
Various rambutan

cultivars were introduced from our neighboring countries like Malaysia and Indonesia, but only a few cultivars were eventually adopted in the Philippines. These are Maharlika, Seematjan and Seenjonja varieties.

Mature Seematjan is reddish pink, egg shaped and weighs 35-48 grams. Peels and spines are red, soft and long with yellowish pink tips. The edible portion of the fruit is half the weight of the whole fruit, which is thick, juicy and very sweet. The edible portion easily separates from the seed. However, much of the seed covering adheres to the edible portion.

Mature Seejonja on the other hand is bright red and smaller than Seematjan. It weighs 16-20 grams and the regularly arranged spines are short and soft. The edible portion is less than half the whole fruit by weight. The edible portion is relative thinner, juicier, sweeter and adheres tightly to the seed.

The most popular variety is Maharlika, is round and weighs 19-28 grams with short and widely spaced spines. The outer portion is reddish pink and the spines are red and yellowish pink tips like Seematjan. Its edible portion is half as thick, juicy, sweet, easily separates from the seed and most of the seeds adheres to the flesh.

Special Uses and Benefits

Have you ever thought that every part of the rambutan tree has medicinal uses as well?

Rambutan fruit preferably unripe, can be used as astringent and can help relieve diarrhea and dysentery. Its' seeds are effective in reducing body fat and making the skin healthier by eating it raw, mashed or mixed with other foods. The leaves promotes good hair growth by applying its water extracts to the damp scalp while the leaves are also used as bandage on the temples to soothe headaches. The roots can also be used as a decoction to treat fever.

The edible part of rambutan has a high amount of phosphorus which helps filter out waste from the kidneys and is also responsible for growth, maintenance and repair of tissues and cells. The functions of calcium and phosphorus work hand in hand to strengthen bones and teeth. The edible portion can also be preserved in syrup or jam. Even the shoots of young rambutan can be utilized as one of the ingredients in dyeing silk.

R&D Prospects for Rambutan

There have been continuing efforts in monitoring and improving the production and marketing of rambutan in the Philippines. As early as 1990s, the Agribusiness Systems Assistance Program (ASAP) reviewed the Philippine situation of rambutan. According to the team of experts, more R&D projects should be conducted specifically on its production and marketing aspects in order to tap the local and export markets. In addition, a continuous search of areas that are suitable for the long-term production of rambutan was recommended.

Planting of additional trees in areas which can produce rambutan outside of the traditional season should also be explored. In a rambutan plantation in Davao, for instance, growers can produce fruits during February and March. This breakthrough could probably be our country's opportunity of exporting rambutan during our competitor's off-season. In order to effectively penetrate the international market, research must also focus on the objective of increasing rambutan's production and

value-adding, and maximizing refrigerated shipment, coupled with aggressive promotion.

The value-adding aspect of rambutan was ventured in by Mr. Jaime Goyena from the University of the Philippines Los Baños (UPLB Batch 1958) and Associate Member of U.P. Kappa Sigma-Conservation Development Society Alumni Association. As an agriculturist, Mr Goyena was able to breed rambutan (R-5 cultivar) through natural selection and because of this, he garnered the 'Pinakamatamis na Rambutan' award given by the Department of Agriculture in the late 1990s. The R-5 cultivar also proved to be the best raw material for wine making. Another passion of Mr. Goyena's has moved him to test the potential of rambutan and the result is very encouraging and indeed rewarding. In 2006, the Goyena's Rambutan Wine was a recipient of a special award for one of the best tasting wines given by the Center for International Trade Exposition and Mission (CITEM) of the Department of Trade and Industry (DTI).

Funded under the National Technology Commercialization Program (NTCP) of Department of Agriculture-Bureau of Agricultural Research (DA-BAR), Mr. Jaime Goyena is now implementing a project titled "Increasing Farm Productivity and Income through Product Diversification: Pilot Scale Commercialization of Wine Products from Indigenous Fruits." The project specifically aims to 1) test the efficacy and cost effectiveness of a winery system to produce quality tropical fruit wine products on a commercial scale; 2) produce on semi-commercial scale, quality wine products from indigenous, underutilized fruit species namely lipote, abiu, bignay, doromon, Indian mango and rambutan using optimized protocols on wine production; and 3) promote cooperative enterprise development and marketing through capability building activities.

Technical Consultant and member of the project team, Dr. Edralina Serrano, chooses rambutan as one of the underutilized fruits in producing wine products due to the fruit's one-week shelf life. "To reduce losses as a result of its perishable nature, the fruit has to be converted (product diversification or value-adding) into a form that adds value to rambutan. Thus, the production of wine from rambutan as a value-adding strategy," Dr. Serrano added.

The project team has purchased and installed the equipment needed for wine making. Capability building activities through training of workers and potential entrepreneurs were also conducted. The project also started to process fruit wines in March 2012.

Other fruits in this project, *abiu* and jackfruit, are under fermentation while pineapple, *lipote*, *bignay* and rambutan will be next in line for processing. Hopefully this project will help to increase interest in wine production.

Through R&D efforts, rambutan can prove to be exceptional compared to other more famous fruits. Attaining greater familiarity for rambutan and products made from it may still be a few steps away, but there is confidence that, with its vast potential, this fruit can reach greater heights with its red and spiky crowning glory! ###

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Participatory Action Research (CPAR) and the National Technology Commercialization Program (NTCP).

With an improved package of technology (POT), productivity of the old trees and pomological characteristics were enhanced by using the as indicated by increases in the yield of trees, fruit size and weight.

The results of one project indicated that the availability of good quality and affordable planting materials of lanzones at established nurseries is a viable business venture for the industry in CALABARZON. The potential expansion areas are the neighboring regions which have similar agroclimatic conditions.

Another follow-up project studied the existing post-harvest practices of farmers to determine considering an extensive cost and benefit analysis as well as technologies to extend the shelf-life of lanzones and marketing strategies. ###

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The Philippines is one of the countries blessed with an abundance of fruits and vegetables. One of the favorites is lanzones (*Lansium domesticum*), dubbed as the 'highly seasonal and highly priced fruit in the Philippines'.

Locally-grown varieties of lanzones are *paete*, *duku*, and *jolo*. An outstanding variety from Thailand is also grown but is said to be erroneously called *longkong*. The *paete* variety is grown in certain areas in Luzon such as Southern Tagalog, and in Mindanao in places such as Misamis Oriental and Camiguin Island as it thrives only in a narrow range of conditions.

One distinct characteristic of the *paete* variety is that its skin or peel has no latex compared to the others. An almost seedless variety, its fruit is sweet and tasty. On the other hand, the tree of the *duku* is shorter than other varieties. It has a wider crown and hairless leaves and its fruits have a considerably delectable flavor.

Vitamin and Mineral Content

Lanzones is rich in vitamins A, B1 and B2, and minerals.

Vitamin A is a fat-soluble vitamin group that includes retinol or and several pro-vitamin A carotenoids. It is responsible for a person's healthy skin, teeth, soft and skeletal tissue and mucous membranes. Likewise, lanzones contains carotene, a powerful antioxidant beneficial in protecting cells from free radicals, associated with many medical disorders.

Vitamin B1 or thiamine helps to break down sugars in the body. Supporting body growth and red blood cell production, riboflavin or Vitamin B2 helps the body release energy from

carbohydrates.

Production and Festivities

Lanzones, is popularly grown in Southern Tagalog (Laguna, Batangas, and Quezon), Camiguin, Sulu, Davao del Norte, and Zamboanga del Norte. April to June is the flowering season in Southern Tagalog while August–December marks the harvesting season in Mindanao.

To promote lanzones production in the country, local festivities have been set-up as part of the yearly cultural events in the regions or provinces where lanzones is grown. September is dubbed as the Pae-Taka-Lanzones festival in Paete, Laguna while every October, Mambajao in Camiguin celebrates its Lanzones Festival.

Putting a Twist to Eating Lanzones

Aside from eating it as a plain fruit, some people tried a twist by utilizing it as an ingredient in one recipe. Discovered in Laguna, *isdang niluto sa lanzones* or fish cooked in lanzones is a great tasting recipe which has a healthy amount of vitamins when consumed in sufficient amounts. For some people who are not fond of eating the small yellow round fruit especially getting rid of the *dagta* in their hands, this recipe provides a welcome change.

R&D on Lanzones

The Bureau of Agricultural Research (BAR) has supported three (3) projects on lanzones under its Community-based



Why Not Avocado?

by PATRICK RAYMUND A. LESACA

To this author, this pear-shaped fruit which is also rich in vitamins and minerals is a champion crop.

Avocado (*Persea americana*) is a tree native to Central Mexico and is a commercially valuable and cultivated crop in tropical and Mediterranean-type climates throughout the world. It has a green-skinned and fleshy fruit which ripens after harvesting. Avocado trees are partially self-pollinating but are often propagated asexually through grafting to maintain a predictable quality and quantity of the fruit.

Avocados are frequently used for milkshakes and are occasionally added to ice cream and other desserts. In the Philippines and in other countries like Brazil, Vietnam, and Indonesia, avocado is served as a drink or, more popularly, as avocado shake. Ripe avocado may be eaten fresh by scooping the flesh from the skin or one can simply add sugar, milk or water to suit one's taste.

The Origin of Avocado

Avocado originated in the state of Puebla, Mexico. The undomesticated variety is known as a criollo, which has a small fruit with dark black skin and contains a large seed.

The first written record in English of the use of the word 'avocado' was by Hans Sloane in a 1696 index of Jamaican plants. The plant was introduced to Indonesia in 1750, Brazil in 1809, the Levant in 1908, and South Africa and Australia in the late 19th century. In some South American countries like Argentina, Bolivia, Chile, Peru, and Uruguay, the fruit is known by its Quechua name, *palta*. In other Spanish-speaking countries it is known by the Mexican name and in Portuguese it is *abacate*. The fruit is sometimes called an avocado pear or alligator pear (due to its shape and the rough green skin of

some cultivars).

Avocado was introduced from Mexico to California in the 19th century and has become a successful cash crop. It is known as *aguacate* in Spanish use and as *abokado* in the Philippines.

According to a comprehensive research study made by Dr. Rachel C. Sotto of the University of the Philippines Los Baños (UPLB), several plant species were introduced into the country at the end of the nineteenth century. These came from different parts of the world and included fruits, vegetables and medicinal plants. Some proved to be valuable and easily adapted to Philippine conditions while others were less promising and did not gain wide acceptance among the populace. One of the introductions which proved to be suitable to Philippine soil and climatic conditions was the avocado.

It was introduced to the Philippines in 1890 by the Spaniards through seeds coming from Mexico. However, it was only from 1902 to 1907 that avocado was introduced successfully in larger scale to the Philippines by the Americans. Through the then Bureau of Agriculture (now the Bureau of Plant and Industry), planting materials were received from Hawaii, Costa Rica and the United States.

In 1913, the Bureau of Agriculture, together with the College of Agriculture of UPLB, started the countrywide distribution avocado trees. Today, avocados are found growing all over the country, most of which are cultivated in backyards.

Facts and nutritional values

The most common types

are: Bacon, Fuerte, Gwen, Hass, Pinkerton, Reed, and Zutano. The Hass avocado is today's most common variety. All Hass avocado trees are descended from a single "mother tree" which was raised by a mail carrier named Rudolph Hass, of La Habra Heights in California. Hass patented the productive tree in 1935. The "mother tree", of uncertain subspecies, died of root rot and was cut down in September 2002. Hass trees have medium-sized (150–250 g), ovate fruit with a black, pebbled skin. The flesh has a nutty, rich flavor with 19 percent oil.

The fruit is primarily pear-shaped, but some varieties are also almost round. They weigh from one ounce to up to 4 pounds each. Avocaditos are a cocktail-sized version of the avocado that is the size of a small gherkin, weighing only about an ounce.

In the Philippines, two distinct types of avocado exist, namely the green-fruited and the purple-fruited types. In other countries and notably in the USA, the green-fruited varieties are preferred. In the Philippines, however, the purple-fruited varieties are preferred by the consumers. (Bureau of Agricultural Statistics, Department of Agriculture).

About 75 percent of an avocado's calories come from fat, most of which is monounsaturated fat. On a 100g basis, avocados have 35 percent more potassium (485 mg) than bananas (358 mg). They are rich in B vitamins, as well as vitamin E and vitamin K. Avocados have a high fiber content of 75 percent insoluble and 25 percent soluble fiber.

Avocado is often said to be the most nutritious fruit in the world. The fruit provides more than 25 essential nutrients such as protein, iron, copper, phosphorus and magnesium, just to name a few.

Nutritionists claim avocado contain amounts of Vitamin C (necessary for the production of collagen needed for the growth of new cells and tissues, prevents viruses from penetrating cell membranes, and also a powerful anti-oxidant), thiamine (converts carbohydrates to glucose to fuel the brain and nervous system), and riboflavin (helps the body to release energy from proteins, carbohydrates and fat).

In an article prepared by Dr. Ed Bauman, director of Bauman College he noted that “avocados aid in blood and tissue regeneration, stabilize blood sugar, and are excellent for heart disorders... They’re loaded with fiber (11 to 17 grams per fruit) and are a good source of lutein, an antioxidant linked to eye and skin health.”

Overall, avocado is considered a complete food: it has vitamins, minerals, antioxidants, calories and fiber, no cholesterol, and is sodium free. As such, avocado is ideal for growing up children, adults and even for babies, especially when blended with other fruits. For athletes, avocado is a nutritious energy booster to rev up the body’s strength.

Promising Crop

As articulated by Dr. Sotto in her report, avocado has a bright potential for development in the country.

Avocado has a long fruiting season. In the Philippines, the peak of the fruiting season is from May to September, although some trees in certain localities fruit from January to March. By planting varieties which bear fruits at different times of the year, it may be possible to have a year-round supply of avocado fruits.

Avocado is one of the most nutritious and versatile fruits in the world. It is the ideal fruit for the diabetic and the anemic. The leaves and the seeds have several medicinal uses.

Perceived Constraints and Challenges

Since the avocado is still not considered a major fruit in the

land and is grown mostly as a backyard plant, only a limited amount of planting material is being produced today in a few government institutions and private nurseries. Compounding this is that planting materials may only come in the form of grafted plants or seedlings for rootstock use as an assurance of continuing the good characteristics of parent plants. UPLB particularly the National Seed Foundation and the Department of Horticulture, produce only a few hundred grafted plants of locally-available varieties at any one time.

Avocado has not yet attained the popularity or the status being enjoyed by other high-value fruit crops like mango, banana, and pineapple in terms of consumption, production, management, cultural practices and marketing. In addition, many are still not fully aware of the varied uses and excellent nutritional value of the fruit. If we are able to educate ourselves on the varied uses of the fruit and acquire the taste for the fruit—then avocado would be very promising crop for the domestic and export market.

With its long list of advantages, the future of avocado in the country may be worthwhile pursuing. ###

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Binukaw or batuan (*Garcinia binucao*) is a rounded fruit about four centimeter or more in diameter with flesh that turns yellowish when mature. It has a firm outer covering and contains acidic pulp with several seeds. Batuan is widely distributed throughout Luzon and Visayan Islands. The people from the Visayas prefer using batuan as souring agent in their local dishes over the sampalok or tamarind. It is also used for the same purpose in the Bicol region, particularly in Masbate. Existing products that are commercially available include candies, pickles, and purees. Currently, DA-Biotechnology has subjected batuan to DNA barcoding as part of resource identification, conservation and protection.



Bureau of Agricultural Research
RDMIC Bldg., Visayas Ave., cor. Elliptical Rd.,
Diliman, Quezon City 1104
