PAKO

(Diplazium esculentum)

INDIGENOUS VEGETABLES OF THE PHILIPPINES

No. 8 / 2018

PAKO

Diplazium esculentum (Retz.) Sw.

English names:
Fiddlehead fern, Vegetable fern

Philippine local names:
Paco/Pako (Tagalog, Bicolano, Visayan), Pak-paku, Apako (Ilocano), Pako-pako (Visayan)

KNOWING PAKO

"Pako" is the usual name used by most Filipinos for ferns. However, the same word and its variations are also used to refer to the most common edible fern, *Diplazium esculentum*. In this pamphlet, we will use the term Pako, first letter capitalized, for the edible fern *D. esculentum*.

At least ten (10) edible ferns have been identified in the Philippines, of which two – Pako and *apat-apat* (*Marsilea crenata*) are commonly eaten by Filipinos. Of the two, Pako is more popular.

Pako belongs to the species-rich fern genus *Diplazium*, with about 400 species widely distributed in the tropics. In shaded (as well as not-so-shaded) areas with little disturbance and lots of water – riversides, areas near waterways and the edges of forests – there is bound to be Pako; and more often than not, there are bound to be Pako-eaters and Pako-seekers around.

It is important not to confuse Pako for a similar-looking (but poisonous, locals say) fern that usually grows alongside Pako in the wild. Pako's leaves are arranged alternately opposite each other along the stalks, with serrated lobes that are lanceolate with pointed tips. The leaves, especially when young, are emerald green and appear to have a shiny wet look. Newly-emerged leaves are tightly coiled, looking like violin scrolls called "fiddles".

Like any other fern, the Pako plant has three major parts: the roots, specialized stems or rhizomes and the leaves or fronds. For those fortunate enough to see live ferns growing in their natural setting, a bed of ferns would actually be clusters of fronds shooting up randomly at intervals from rhizomes, which are themselves attached to roots underneath. The fronds that we cut to put in vases are the leaves. They emerge in clusters out of the tip of rhizomes that creep just below the soil surface. These rhizomes are erect and are attached underneath to wiry roots that branch and spread like a mat under the soil, supporting the bed of ferns above.

Edible Indigenous Philippine Ferns

Diplazium esculentum - Pako

Marsilea crenata - *kaya-kayapuan* (Tagalog), apat-apat (Visayan), *tukod-tukod* (Ilokano)

Acrostichum aureum - mangrove fern (English), *lagolo, lapole, pako-laot, paku-pakuan, ugab-ugab* (Tagalog)

Angiopteris palmiformis - giant fern (English), *pakong kalabaw* (Tagalog), *buway* (Hanunoó), *banatta* (Ifugao)

Asplenium nidus - bird's nest (English), *dapo, pakpak lawin, pasdak, pastak, pugad lawin* (Tagalog); *kaban-kaban* (Visayan), *agubak, pakub buladlad* (Hanunoó)

Ceratopteris thalictroides - water sprite (English), *pakong-sungay, pakong-roman, pakong-tubig, saguray* (Tagalog), *banawug sapat* (Hanunoó)

Pteridium aquilinum - bracken fern (English), *sigpang, agsam* (Visayan), *anam-am* (Bontoc), *sunkuk buladlad, tuyapak* (Hanunoó), *apatpat an tayawan, tayawan* (Ifugao)

Pteris ensiformis - sword brake, white-striped sword brake (English), *buntot-kapon, pakong-parang* (Tagalog), *takay-takayan* (Visayan), *apatpat baen di gadgadeng* (Ifugao)

Sphaeropteris glauca

Stenochlaena palustris - *agnaya, diliman, hagnaya* (Tagalog), *diliman, hagnaya* (Tagalog, Visayan), *diliman, giliman* (Pampangeno), *diliman* (Pangasinan)

Sources: Amoroso, VB, Mendez RA and AP Villalobos (2017); Madulid (2001); DA-BAR (2017).

THEY GROW IN NUMBERS, EVEN WITHOUT OUR HELP...

Just like any fern, Pako reproduces by spores. Ferns do not produce flowers or seeds. These spores come from the undersides of leaves of spore-producing plants (sporophyte). Spores are released at maturity and grow into a gametophyte plant (called prothallus). The prothallus produces the sperm and the egg. When there is shade and water, the egg is fertilized, completing the reproductive process.

Pako can also be reproduced clonally out of new sporophyte plants (called ramets) that develop from underground rhizomes. These plants live for several years, allowing them to become dominant in disturbed forests, riverbanks and farmlands.

Ferns have inhabited the earth for the last 300 million years. Knowing how they reproduce, grow and thrive is important not only to know when to harvest but also to conserve and protect its natural habitat. They do grow in numbers without our help ...

...and they will not be lost with our help. A group of women in South Cotabato who proudly declared their and their children's continued preference for indigenous vegetables has a sad tale to tell:

"Sa una, diha jud sa mga tubigan, sa mga sapa, ang daghan nga mga gulay-gulay. Mungadto lang mi ug manguha kay daghan man. Karon, wala na. Naay gamay makuhaan, didto nalang duol sa usa ka gamay nga sapa nga limpyo pa. Ang usa ka sapa, ni-uga na sa pag-quarry og bas, ug and kinadak-an hugaw na sa paglabog og hugaw sa piggery sa panahon nga kusog ang ulan kay bawal man unta. Naa pod gulay-gulay makuha duol sa lasang-lasang sa among bukid pero gamay na lang pod kay naa'y plantation sa buwak ug mga kalubihan." (We used to collect indigenous vegetables near our rivers where they used to grow abundantly. Now, only one small waterway remains healthy where we can still gather some indigenous vegetables. Another small river started to dry up because of sand quarrying. The biggest one is being used to illegally dump waste from a piggery during a heavy rain. We also gather indigenous vegetables in our forested hills, but much of the area has been reduced when a flower plantation was established and some areas converted into coconut groves.)

With the vigilance of these women, the village local government has intensified its efforts in monitoring illegal dumping of wastes from piggeries.

The village is right in the middle of urbanization, with the highway running through it. Human settlement, new roads, commercial buildings, fruit and flower plantations and piggeries took over much of the village. *"Semento na tanan; wala na'y matamnan"* (Everywhere is concrete; there's nowhere to plant). Perhaps, these mothers' love for the indigenous vegetables that used to abound in the village and nourished their families over generations is one of the few forces that has kept these vegetables from completely disappearing or from being completely forgotten. Their families still love *laswa, dinengdeng, paksiw na alugbati, ginataang langka* and of course, Pako salad.

In addition, the expansion of commercial agriculture to the uplands (e.g., corn in South Cotabato, high value vegetable crops in many upland areas) along with the use of herbicides and pesticides, is destroying Paco's water and forest habitats.

WHERE TO FIND AND GATHER PAKO

Harvesting Pako is fun since this would mean a leisurely walk along river banks or climbing a hill or going to the lake. Thus, the perfect time to harvest Pako is during sunny days when the rivers and streams are clear and the plants are clean and dry.

When harvesting, collect only from a healthy group of plants. Select the semi-mature fronds that are at the stage when half of the frond, which is bright green in color, is unfurling or half of the frond has already unfurled. Cut the leaves by the stalk at about 20-30 cm above the base, taking care not to damage the rhizome so that the plant can regenerate. At least one or two fronds must be left intact, to ensure the plant survives.

Wrap the harvest in banana leaves or leaf sheaths, rinse with stream water and keep them in a cool dry container to maintain their freshness until the next day.

Along tourist routes going south of Manila, it is common to find Pako stalls and peddlers. In Calamba City, Laguna, a bundle of Pako (about 5 cm in diameter) sells for P20.00. This is almost twice the price farther south along the highway of Atimonan, Quezon province where Pako is also a local vegetable pride. In South Cotabato, a bundle of Pako (about 10 cm in diameter) is sold for P5.00 to market retailers who will make two bundles out of one and sell each new bundle for P5.00 as well.

THAT'S WHAT FERNS ARE FOR

A lady in South Cotabato was incredulous. "In the '60s, Pako was only for floral arrangements. A decade later, we were already eating them, and even selling to neighbors, traders and vegetable markets", she said.

Ferns, indeed, are closely associated with flowers in vases and bouquets. Pako, on the other hand, is one fern that has firmly claimed its place among indigenous vegetables of the Philippines.

Consistent with the report that no pteridophytes (ferns) are cultivated as crop plants, Pako is mainly gathered rather than cultivated almost everywhere in the Philippines. However, some women in Capiz described how they moved the Pako closer to home by collecting planting materials (plantlets) and transplanting them in their backyards - in plots! Recently, research and development work at the Central Mindanao University (CMU) in Bukidnon led to the publication of a fern recipe book with information on antioxidants and protein content. They also identified methods for its propagation and cultivation in a pteridogarden (pteridophyte garden), as well as ways of handling Pako as a vegetable. Future work will be geared towards development of cost-efficient methods for commercial farming, product development, technology commercialization and packaging. Incidentally, the ten edible ferns in the Philippines identified also by the CMU group are considered medicinal ferns as well.

SOME TRADITIONAL PREPARATIONS

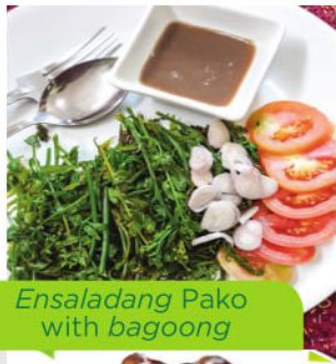
The ways that Pako is prepared are much the same across the country: as fresh salad greens, as a vegetable soup, as steamed vegetable, or as a leafy vegetable in stews. Surprisingly, Pako is also among the leafy options for the iconic *dinengdeng* in the north and its variant in Iloilo, the *laswa*.

Steamed Pako. In Samar and Sorsogon, people put Pako and other vegetables like *kangkong, okra* or *alugbati* on top of rice in a steamer when it is almost done (*sinapaw sa luto/kanin*).

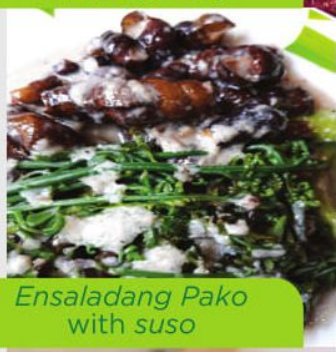
Traditional salad (*Ensaladang Pako*). Blanch Pako leaves and immediately rinse in tap/cold water to keep them green. Drain to remove the excess water and serve with any homemade vinaigrette: chili-*mansi* (chili + *calamansi*), *toyo*-chili-*mansi* (soy sauce + chili-*mansi*), seasoned vinegar (*sinamak*), *bagoong* (fermented fish), *alamang* (shrimp paste), *patis* (thin fermented fish sauce) or *burong isda/kuyog* (fermented fish).

***Ginisang Pako* (Tagalog, Bicolano) or *Apan-apan* (Ilonggo).** After heating cooking oil in the preheated cooking pan, sauté the garlic followed by onions. Then, add sliced tomatoes and the principal favoring ingredients (*sahog*) – usually, shrimps, pork or just *bagoong* or canned sardines. Pako leaves are added last before simmering everything for 2 to 3 minutes.

Ginataang Pako. Pre-heat the cooking pan. Add coconut milk and the spices and seasonings: *tanglad/salay* (lemongrass), ginger, onions, garlic, chili (*pasitis*) and *sahog*. When everything is cooked, add the Pako leaves and coconut cream. Avoid stirring and do not cover the cooking pan. Simmer in low fire until cooked. Pako can be mixed with other vegetables in preparations with coconut milk like *ginataang labong* (bamboo shoots), *ginataang kalabasa* (squash), *ginataang sitaw* (string beans) and *ginataang munggo* (mungbean).



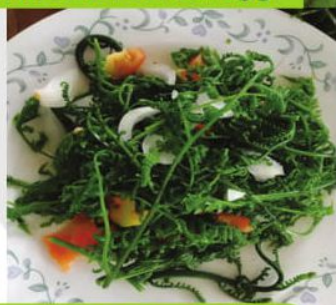
Ensaladang Pako with *bagoong*



Ensaladang Pako with *suso*

Ginataang tambo with *Pako*

Pako salad salted egg



Plain Pako salad

PAKO (*Diplazium esculentum*)

The CMU study also found that the Pako is a good source of protein and is similar to ascorbic acid in radical scavenging activity.

DID YOU KNOW?

THAT 100 GRAMS OF BOILED PAKO LEAVES PROVIDE:

Water	***g***	*91.60*
Energy	***kcal***	*33.00*
Protein	***g***	*1.90*
Fat	***g***	*0.40*
Carbohydrate	***g***	*5.50*
Dietary Fiber	***g***	*0.60*
Calcium	***mg***	*26.00*
Phosphorus	***mg***	*34.00*
Iron	***mg***	*1.00*
ß-carotene	***µg***	*530.00*
Total Vitamin A (RE)	***µg***	*50.00*
Ribloflavin	***mg***	*0.03*
Niacin	***mg***	*0.80*
Ascorbic Acid	***mg***	*2.00*

Source: Food and Nutrition Research Institute (FNRI). The Philippine Food Composition Tables 1997. Page 40. Department of Science and Technology

ADDITIONAL REFERENCES

Amoroso VB, RA Mendez and AP Villalobos. 2017. Bringing back the lost value of Philippine edible ferns: their antioxidant, proteins and utilization. Int. J. Adv. Res. 5(4):757-770

Buot IE. 2007. Vulnerable pteridophytes in the forest landscape of Quezon Province, Southern Luzon, Philippines. http://agris.fao.org/agris-search/search.do?recordID=PH2009000978. Accessed May 29, 2016.

Catapang ML, PD Reyes and MP Medecillo. 2012. Factors influencing species diversity of ferns in Mt. Makulot, Cuenca, Southern Luzon, Philippines. 2nd International Conference on Environment and Industrial Innovation, IPCBEE 35, 98-102. http://www.ipcbee.com/vol35/020-ICEII2012-E30003.pdf. Accessed May 17, 2016

Copeland ED. 1942. Edible ferns. American Fern Journal Vol 32:4 Oct-Dec 1942. p. 121-126

Delos Angeles, M and I Buot. 2012. Orders and families of Philippine pteridophytes. Journal of Nature Studies. 11 (1&2): 19-33

Tongco JW, RAP Villaber, RM Aguda and RA Razal. 2014. Nutritional and phytochemical screening, and total phenolic and flavonoid content of *Diplazium esculentum* (Retz.) Sw. from Philippines. Journal of Chemical and Pharmaceutical Research, 2014, 6(8):238-242

https://www.sciencelearn.org.nz/image_maps/57-fern-life-cycle

https://www.sciencelearn.org.nz/resources/1103-what-is-a-fern

https://www.nyu.edu/classes/bkg/web/fernandez.pdf

http://nearbynature.fwni.org/backgrounds/ferns-and-fiddleheads-background/

http://cagayandeoro.da.gov.ph/wp-content/uploads/2013/04/PAKo.pdf

http://businessdiary.com.ph/9938/bringing-back-lost-value-ferns/ Accessed 17 June 2018

Personal communication

Ryan Juan
Brgy. Santo Nino, Maddela, Quirino
Date: 26 January 2018

Leo Enrico Beltran
DA RFO V, Pili, Camarines Sur
21 February 2018

Prescilla Advincola
Sitio Ilaya, Brgy. Molet, Jamindan, Capiz
10 April 2018

Elsie dela Cruz
Brgy. Lucero, Jamindan, Capiz
11 April 2018

Focus group discussions

Barangay Poblacion, Municipality of Tupi, South Cotabato
Barangay Tablu, Municipality of Tampakan, South Cotabato
Barangay Molet and Barangay Lucero,
Municipality of Jamindan, Capiz
Barangay San Jose, Municipality of Tapaz, Capiz
Barangay Anaao and Barangay Alilem Daya (Poblacion),
Municipality of Alilem, Ilocos Sur
Barangay Dinwede East, Municipality of Cervantes
Ilocos Sur
Barangay Camandingan and Barangay Sumader,
Batac City, Ilocos Norte

Production Team

University of the Philippines Los Baños (UPLB) :

Authors: Leah E. Endonela, Nestor C. Altoveros, Hidelisa dR. de Chavez, Teresita H. Borromeo, Catherine Hazel M. Aguilar and Lorna E. Sister

Design/Layout and Editing: Lorna E. Sister and Dencel L. Aquino (consultant)

Technical Advisers: Nestor C. Altoveros and Teresita H. Borromeo

Support staff: Kimberly Dawn V. Bontanon, Karla Louise P. Ceguerra, Norvie J. dela Cruz, Zoilo Roy R. Perez and Edna A. Mercado

This series on **Indigenous Vegetables of the Philippines** is a publication of the project "Documentation of Indigenous Vegetables in the Philippines", funded and coordinated by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development of the Department of Science and Technology (DOST-PCAARRD) and implemented by the Institute of Crop Science (ICropS), College of Agriculture and Food Science, University of the Philippines Los Baños (UPLB) in 2018-2019. One hundred (100) villages across twenty-five (25) provinces provided primary information on traditional names, uses, occurrence and distribution. These provinces include: Abra, Albay, Batangas, Bohol, Bukidnon, Camarines Sur, Capiz, Davao del Sur, Ilocos Norte, Ilocos Sur, Iloilo, Isabela, La Union, Leyte, Nueva Ecija, Nueva Vizcaya, Palawan, Pangasinan, Quezon, Rizal, Samar, South Cotabato, Surigao del Sur, Tawi-tawi and Zamboanga del Norte.

These small pamphlets are intended to spark renewed interest in the conservation, use, production and promotion of Philippine indigenous vegetables that have always been part of Filipino food culture and are key to household food and nutrition security.