

## Fruits and Vegetables in Markets in Bintulu, Sarawak, Malaysia

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### Summary

Fruits and vegetables in home gardens and markets in Bintulu, Sarawak, Malaysia were surveyed. More than sixty kinds of tropical fruits were found in markets. Some of these fruits were collected from wild trees. The fruits most frequently found were *Nephelium mutabile* and *Lansium domesticum*. Forty-eight vegetables, mainly Chinese ones, were observed in markets. Most vegetables were the same species as ours and they were produced in home gardens in the suburbs of Bintulu. Some wild species such as *Artemisia vulgaris* and *Centella asiatica* were sold in markets as leaf vegetable. It is very important to conserve local crops as plant genetic resources.

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Key words : fruits and vegetables, market, plant genetic resources.

### Introduction

Many kinds of fruits and vegetables unfamiliar to us are recently being introduced to our country and enrich our diets. On the other hand, extensive losses of local crops and varieties, genetic erosion, have already occurred, although it is not too much to say that the importance of conservation of genetic resources are emphasized for future improvement of crops.

In local markets, crops produced in home gardens are sold and sometimes very rare local crops and varieties are found. Edible wild species which are locally used are observed frequently in such markets. These local crops, varieties and wild species are closely related to the mode of life in the district. It is very important to study the ecological and physiological characteristics of such local crops, varieties and wild species, and conserve them for future breeding materials.

The author visited Bintulu (113°07'E, 3°16'N), Sarawak, Malaysia in December, 1990 and made lists of fruits and vegetables found in markets. There were abundant tropical fruits and vegetables. Most fruits are unknown to us, although some of them are import-

ed. Vegetables were mostly Chinese ones and these are cultivated in Japan.

In this paper, many kinds of tropical fruits and vegetables in markets in Bintulu were introduced and the importance of the conservation of local crops as plant genetic resources was emphasized.

### Location, climate and peoples of Sarawak

Sarawak occupies 124,450km<sup>2</sup> of a large segment of the western side of Borneo, which lies within the tropical zone (Fig. 1) and the vast areas of this state are still covered with untouched tropical rain forest. It is warm throughout the year with temperature ranging from 22 to 32°C (the data in Kuching, the state capital of Sarawak). Seasonal fluctuation of temperature is very small (Fig. 2). Annual precipitation reaches more than 4,000mm and the rainy season falls during the months of December to February. Such warm temperature and high rainfall have played a large part in molding natural wild forest<sup>1)</sup>.

Sarawak has more than twenty peoples. The Ibans are the largest group in Sarawak and occupy 30 percent of the state's population. They are largely shifting cultivators and live in longhouses. The Chinese people is the second largest group (29%) and the Malays are the third (20%). The Bidayus occupy eight percent and the Melanaus do six percent.

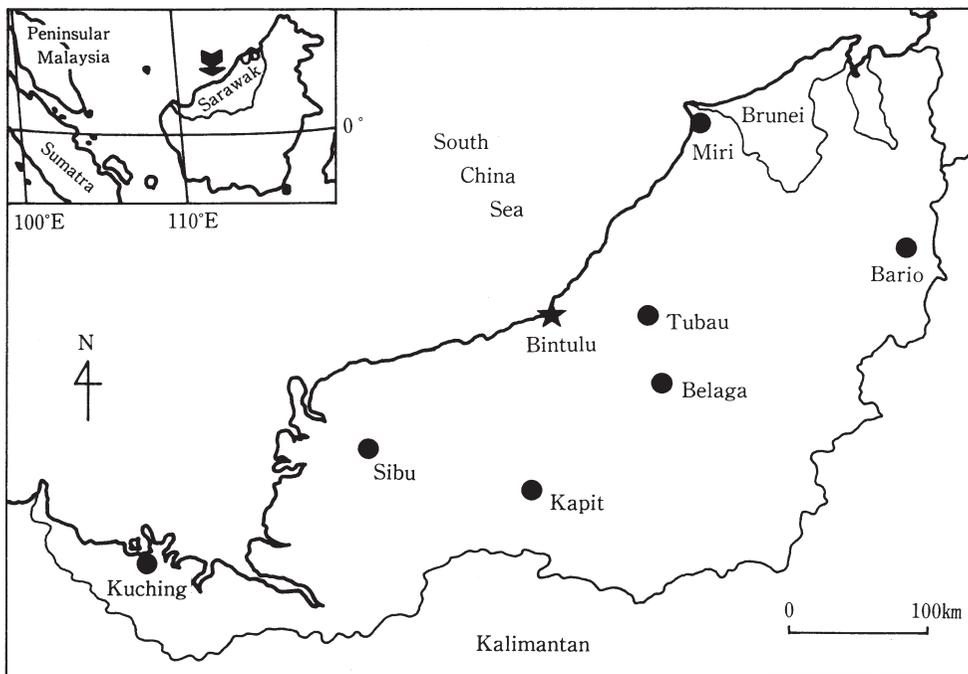


Fig. 1. Location of Bintulu, Sarawak.

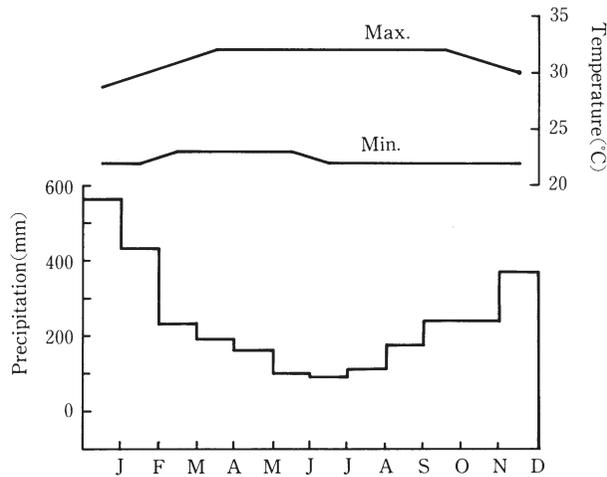


Fig. 2. Seasonal changes in temperature and precipitation in Kuching, Sarawak.

Other major groups are Kenyahs, Kayans and Kedayans<sup>2)</sup>.

Bintulu is located in the lowland coastal plain of the Kemena River, 350km northeast of Kuching and faces the South China Sea on the west (Fig. 1).

### Home garden

Each family has home garden adjacent to their house (Fig. 3). People cultivate rice, vegetables and fruits. Most of these crops are consumed at home and the surplus is sold in markets. In a home garden, for example, amaranth (*Amaranthus gangeticus* L.), balsam pear (*Momordica charantia* L.), cassava (*Manihot esculenta* Crantz.), cucumber (*Cucumis sativus* L.), okura (*Abelmoschus esculentus* (L.) Moench), peanut (*Arachis hypogaea* L.), sweet potato (*Ipomoea batatas* (L.) Lam.) and taro (*Colocasia esculenta* (L.) Schott) which were observed very frequently in markets were cultivated. These vegetables planted in home garden were different from ours in size and shape, but it is not clear that these vegetables were farmer's home seed-raising or not.

Banana (*Musa* sp.), Indian mango (*Mangifera indica* L.) and papaya (*Carica papaya* L.) trees were found in home gardens and in most cases, at the margin of forest nearby the home garden, fruit trees, such as jackfruit (*Artocarpus heterophyllus* Lam.) and pulasan (*Nephelium mutabile* Bl.) were planted.

They live self-sufficient lives and are practicing sustainable agriculture.



Fig. 3. Farmer's house and home garden in the suburbs of Bintulu. Bananas, Indian mangos and papayas were planted in a home garden.



Fig. 4. Fruits in the market in Bintulu. Pineapple, pulasan, pummelo, rambutan and jackfruit were found.

### Fruits and vegetables in markets in Bintulu

The market in Bintulu is situated in the southwestern part of this city. The market was open in the morning. There were more than one hundred sellers in the market. Farmers, mostly women, came from the suburbs of Bintulu and occupied about  $2 \times 1\text{m}$  space for each other and exhibited ten to twelve kinds of fruits and vegetables produced in their own home gardens on the both side of road with chattering each other (Fig. 4). Various fishes and chicken were also found in the markets. Many citizens, mostly women, dropped in at the market.

Another market was open in the evening to night. In this market, clothes and foods such as satay, sugar cane juice and many kinds of sweets and fruits were sold instead of vegetables, fishes and chicken in the market of the morning. Sellers were mostly men and many citizens, men, women and children, enjoyed walking, eating and shopping.

Fruits in markets are shown in Table 1. There were more than sixty kinds of tropical fruits. Most of them are very rare in Japan, although some of them are imported. The fruits most commonly found in the market were duku (*Lansium domesticum* Jacq.) and pulasan (*Nephelium mutabile* Bl.). Duku is round in shape of 4 to 5cm diameter and its flesh is white. It tastes a little sour. Pulasan is very similar to rambutan (*N. lappaceum* L.) but smaller than that. The flesh is white translucent and tastes very sweet. This species is native to this region and occurs both wild and in cultivation. The author found this fruit trees frequently on the edge of forest adjacent to home gardens. It seems to have many strains which are different in size, color and taste. *Mangifera*, *Musa* and *Citrus* fruits were also abundant. Some of *Mangifera* were cultivated, while others were wild. Among them, Indian mango (*M. indica* L.) was the commonest. This fruit showed very

Table 1. Fruits in markets in Bintulu.

Botanical name	Malay
Anacardiaceae	
<i>Bouea macrophylla</i> Griff.	Kundang
<i>B. microphylla</i> Griff.	Perus
<i>Mangifera caesia</i> Jack	Binjai
<i>M. foetida</i> Lour.	Bacang
<i>M. indica</i> L.	Mangga
<i>M. odorata</i> Griff.	Kuini
<i>Spondias cytherea</i> Sonn.	Kedondong
Annonaceae	
<i>Annona muricata</i> L.	Durian blanda
<i>A. reticulata</i> L.	Nona kapri
<i>A. squamosa</i> L.	Buah nona
Bombacaceae	
<i>Durio kutejensis</i> (Hassk.) Becc.	Durian borneo
<i>D. oxleyanus</i> Griff.	Durian beludu
<i>D. zibethinus</i> Murr.	Durian
Bromeliaceae	
<i>Ananas comosus</i> (L.) Merr.	Nanas
Caricaceae	
<i>Carica papaya</i> L.	Betik
Ebenaceae	
<i>Diospyros discolor</i> Willd.	Buah mentega
Euphorbiaceae	
<i>Baccaurea motleyana</i> Muell. -Arg.	Rambai
<i>Cicca acida</i> (L.) Merr.	Cermai
<i>Emblica officinalis</i> Gaertn.	Melaka
Guttiferae	
<i>Garcinia mangostana</i> L.	Manggis
Malvaceae	
<i>Hibiscus sabdariffa</i> L.	Asam susur
Meliaceae	
<i>Lansium domesticum</i> Jacq.	Duku, Langsat
<i>Sandoricum koetjape</i> (Burm. f.) Merr.	Sentul
Moraceae	
<i>Artocarpus communis</i> Forst.	Sukun
<i>A. elasticus</i> Reinw.	Terap
<i>A. heterophyllus</i> Lam.	Nangka
<i>A. integra</i> (Thunb.) Merr.	Cempedak
Musaceae	
<i>Musa</i> × <i>paradisiaca</i> L.	Pisang
Myristicaceae	
<i>Myristica fragrans</i> Hoult.	Buah pala

Table 1. Fruits in markets in Bintulu (continued).

Botanical name	Malay
Myrtaceae	
<i>Psidium cattleianum</i> Sab.	Jambu china
<i>P. guajava</i> L.	Jambu batu
<i>Syzygium aqueum</i> (Burm. f.) Alston	Jambu air
<i>S. jambos</i> (L.) Alston	Jambu mawar
<i>S. malaccensis</i> (L.) Merr. et Perry	Jambu merah
<i>S. samarangense</i> (Bl.) Merr. et Perry	Jambu semarang
Oxalidaceae	
<i>Averrhoa bilimbi</i> L.	Blimbing asam
<i>A. carambola</i> L.	Blimbing manis
Palmae	
<i>Areca catechu</i> L.	Pinang
<i>Borassus flabellifer</i> L.	Lontar
<i>Cocos nucifera</i> L.	Kelapa
<i>Salacca edulis</i> Reinw.	Salak
Passifloraceae	
<i>Passiflora edulis</i> Sims	Buah susu
<i>P. quadrangularis</i> L.	Timun belanda
Punicaceae	
<i>Punica granatum</i> L.	Delima
Rutaceae	
<i>Citrus aurantifolia</i> (Ch.) Sw.	Limau nipis
<i>C. aurantium</i> L.	Limau manis
<i>C. grandis</i> Osb.	Limau betawi
<i>C. hystrix</i> D. C.	Limau purut
<i>C. limon</i> (L.) Burm.	Limau
<i>C. medica</i> L.	Limau susu
<i>C. medica</i> var. <i>sarcodactylis</i> (Nooten) Sw.	Limau jari
<i>C. reticulata</i> Bl.	Limau jepun
<i>C. sinensis</i> (L.) Osb.	Limau manis
<i>Clausena lansium</i> (Lour.) Skeels.	Wampi
<i>Fortunella polyandra</i> Tanaka	Limau pagar
Sapindaceae	
<i>Euphoria malaiense</i> (Griff.) Steud.	Mata kucing
<i>Litchi chinensis</i> Sonn.	Kelengkeng
<i>Nephelium lappaceum</i> L.	Rambutan
<i>N. mutabile</i> Bl.	Pulasan
Sapotaceae	
<i>Achras zapota</i> L.	Ciku
<i>Manilkara kauki</i> (L.) Dubard	Sawai

Table 2. Vegetables in markets in Bintulu.

Botanical name	Malay
<b>Fruit vegetables</b>	
Cucurbitaceae	
<i>Benincasa hispida</i> (Thunb.) Cogn.	Kundur
<i>Citrullus lanatus</i> (Thunb.) Matsum. et Nakai	Tembikai
<i>Cucumis melo</i> L.	Blewek
<i>C. sativus</i> L.	Timun
<i>Cucurbita moschata</i> (Duch. ex Lam.) Duch. ex Poir.	Labu
<i>Lagenaria siceraria</i> (Mol.) Standl.	Labu ayer puteh
<i>Luffa acutangula</i> (L.) Roxb.	Petola sagi
<i>L. cylindrica</i> (L.) Roem.	Petola manis
<i>Momordica charantia</i> L.	Peria
<i>Sechium edule</i> (Jacq.) Swartz	Labu siam
Cruciferae	
<i>Brassica oleracea</i> L. var. <i>botrytis</i> L.	Telur kol
Leguminosae	
<i>Glycine max</i> (L.) Merr.	Kachang bulu rimau
<i>Phaseolus vulgaris</i> L.	Kachang bunchis
<i>Pisum sativum</i> L.	Kachang
<i>Psophocarpus tetragonolobus</i> (L.) DC.	Kachang botor
<i>Vigna radiata</i> (L.) R. Wilczek	Kachang hijau
<i>V. unguiculata</i> (L.) Walp.	
subsp. <i>sesquipedalis</i> (L.) Verde	Kachang tauge
Malvaceae	
<i>Abelmoschus esculentus</i> (L.) Moench	Kachang bendi
Solanaceae	
<i>Capsicum annum</i> L.	Chabai, Lada
<i>Lycopersicon esculentum</i> Mill.	Tomate
<i>Solanum melongena</i> L.	Terong
<b>Leaf vegetables</b>	
Amaranthaceae	
<i>Amaranthus gangeticus</i> L.	Bayam kadong
Basellaceae	
<i>Basella rubra</i> L.	Remayong
Compositae	
<i>Artemisia vulgaris</i> L.	Rumput roman
<i>Lactuca indica</i> L.	Sawi rana
<i>L. sativa</i> L.	Daun salade
Convolvulaceae	
<i>Ipomoea aquatica</i> Forsk.	Kangkong

Table 2. Vegetables in markets in Bintulu (continued).

Botanical name	Malay
<b>Leaf vegetables</b>	
Cruciferae	
<i>Brassica campestris</i> L. var. <i>amplexicaulis</i>	Sawi puteh
<i>B. juncea</i> (L.) Czern. et Coss.	Sawi
<i>B. oleracea</i> L. var. <i>capitata</i> L.	Kool
<i>Nasturtium officinale</i> R. Br.	Selada ayer
Liliaceae	
<i>Allium fistulosum</i> L.	Bawang hijau
<i>A. tuberosum</i> Rottl. ex Spreng.	Kuchai
Umbelliferae	
<i>Apium graveolens</i> L. var. <i>dulce</i> (Mill.) Pers.	Selderi
<i>Centella asiatica</i> (L.) Urban	Pegaga
<i>Coriandrum sativum</i> L.	Ketumbar
<b>Root vegetables</b>	
Araceae	
<i>Colocasia esculenta</i> (L.) Schott	Keladi
Convolvulaceae	
<i>Ipomoea batatas</i> (L.) Lam.	Ubi keledak
Cruciferae	
<i>Raphanus sativus</i> L.	Lobak
Cyperaceae	
<i>Eleocharis dulcis</i> Trin.	
var. <i>tuberosa</i> (Roxb.) T. Koyama	Chikai
Gramineae	
<i>Dendrocalamus asper</i> (Schult.) Backer	Buloh betong
<i>Zizania latifolia</i> (Griseb.) Stapf.	Rebong ayer
Leguminosae	
<i>Pachyrhizus erosus</i> (L.) Urban	Bengkuang
Liliaceae	
<i>Allium cepa</i> L.	Bawang
<i>A. sativum</i> L.	Bawang puteh
Nymphaeaceae	
<i>Nelumbo nucifera</i> Gaertn.	Seroja
Solanaceae	
<i>Solanum tuberosum</i> L.	Ubi benggala
Zingiberaceae	
<i>Zingiber officinale</i> Rosc.	Haliya



Fig. 5. Vegetables in the market in Bintulu.

Radish, coriander, winged bean, cucumber, okura, yambean and tomato were found.

wide variation in size, shape and color. *Musa* fruits varied in size, shape, color, flavor and texture, and some of them had seeds. They were classified into two groups : Those which are eaten raw, and those which are cooked before eating. Most *Citrus* fruits may be introduced or imported.

Enriching our diets, various tropical fruits are to be introduced to Japan in the future. It is very important to conserve local fruit species and their wild relatives.

Vegetables in markets are shown in Fig. 5 and Table 2. There found forty-eight vegetables in markets. Among them, twenty-one were fruit vegetables, fifteen were leaf ones and twelve were root ones. Taxonomically, Cucurbitaceae vegetables were the most, and Leguminosae and Cruciferae were the next. Chinese vegetables were very common. These vegetables were introduced by the Chinese settlers. Cucumber (*Cucumis sativus* L.) and eggplant (*Solanum melongena* L.) were found frequently as ours in Japan, but the shape, size and color were very different from ours. *Artemisia vulgaris* L. and *Centella asiatica* (L.) Urban appeared very commonly in markets. Both are wild species and *A. vulgaris* is cooked with goat meat in Ryukyu Islands of Japan. Several wild *Zingiber* species were observed and used as spices.

In this area, many kinds of fruits and vegetables, both wild and cultivated species, were used. In the past, we had various kinds of fruits and vegetables, but now only a few varieties are found in markets. With the increase of requirements for enriching diets, various wild species may be used as vegetables and spices, and be in cultivation in the future. We must conserve local crops, varieties and wild species as valuable genetic resources.

## References

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## マレーシア，サラワク州ビンツルの 市場の果物と野菜

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### 要 約

マレーシア，サラワク州ビンツルの市場における果物と野菜及び同市郊外のホームガーデンを調査した。

市場では野生種を含めた60種以上の果物が認められた。最も頻繁に見いだされた果物は *Nephelium mutabile* 及び *Lansium domesticum* であった。野菜に関しては48種が認められ、大部分は中国野菜で、日本で栽培されている野菜と同種のものもあった。これらはビンツル郊外のホームガーデンで栽培されているものであった。また、ヨモギやツボクサのような野生種が野菜として市場で販売されていた。

地方品種や野生種を植物遺伝資源として保存する重要性が認められた。

キーワード：市場，果物と野菜，植物遺伝資源。