Grain crops in Indonesia

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ABSTRACT

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VERSION HISTORY

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1. Introduction

The purpose of this article is to aid researchers such as linguists and anthropologists who are doing research in rural areas of Indonesia to correctly identify grain crops grown in the local area.

This paper grew out of my experience in the Uma area of Central Sulawesi and my travels as a consultant to other areas of Sulawesi. In my first year or so living in an Uma village, I learned the Umas had terms for four grain crops: rice, maize (commonly called corn in North America), and two other kinds of grain; but it was years before I was sure what those other two grains were called in English or Indonesian.

I am not an expert in this topic. I studied it in order to write this article. My audience is fellow-linguists and anthropologists doing research in Indonesia who, like me, are laymen in botany and agriculture. I have tried to make this paper as non-technical as possible, yet as technical as necessary to help you identify grain crops that you may come across in Indonesia. Some of you will think that the Latin names and technical terms I use are daunting or unnecessary; others will be disappointed that I haven't been more technical.

Here are some points to remember as you read this article.

- If in the area where you are doing research there are terms for grain crops other than rice and maize, and you aren't sure what these grain crops are, read the sections on Job's tears, millet and sorghum. Chances are you will find your answer there.

- You can use the Internet to find photos and illustrations of these grain crops to help you identify them.

- If you want to do a serious study about grain crops in Indonesia, you may want to look at the book *Plant Resources of Southeast Asia* (abbreviated *PROSEA*). Volume 10 is specifically dedicated to grain crops.

- If you are doing research in an area where maize or rice is an important crop, you may be interested in reading my accompanying article, "Maize and Rice Terminology."

1.1 What are grain crops?

Grain crops, also called cereal grains, are plants that are grown for their starchy, edible seeds. The three main uses of grains are:

1. as a basic food for humans;

2. as food for domesticated livestock;

3. as a raw material for industrial purposes (*PROSEA*, Vol. 10, p. 15).

Some grains are fermented to produce alcoholic beverages. This could be considered a fourth main use of grains, or could be included under 1. above.

In this paper I limit my topic to plants belonging to the grass family (Gramineae) that are grown for their starchy, edible seeds.

There are several kinds of plants that are outside the scope of this paper.

- plants of the grass family that are grown as crops but not grain crops, e.g., sugarcane.

- plants that do not belong to the grass family but that have edible seeds that are sometimes called grains, e.g., buckwheat and amaranth. To my knowledge these grain crops are not grown in Indonesia. Various kinds of amaranth are grown in Indonesia for their edible leaves, not seeds. The vegetable called *bayam* in BI is a kind of amaranth.

- plants that have starchy seeds that are not considered grains, e.g., various kinds of peas, peanuts, soybeans, acorns, and the seeds of pumpkin and watermelon.

- plants that have edible seeds that are used as spices or condiments, e.g., sesame seeds.

1.2 Principal and secondary grain crops in Indonesia

Rice and maize are the two principal grain crops in Indonesia and in all of Southeast Asia. All other grain crops are of minor importance compared to them. In certain areas, however, neither rice nor maize is an important crop. In the past there were areas in Indonesia where a grain crop other than rice or maize was the principal grain crop, but to my knowledge this is no longer true.

1.3 Ancient, introduced, and foreign grain crops in Indonesia

By ancient grain crops I mean grains that were grown by the Indonesian people before the age of European exploration and colonization began in the 16th century. These grains were either brought to Indonesia by early Austronesian settlers, or introduced to them

long before the period of European contact. There are four ancient grain crops in Indonesia: rice, millet, Job's tears, and sorghum.

Maize is an introduced grain crop, but has been in Indonesia for several centuries.

Wheat is a foreign grain in Indonesia. It is imported to Indonesia in large quantities and is well known as a food but virtually unknown as a crop in Indonesia, except in experimental agricultural research.

Other grains, such as oats, barley, rye, etc., are considered foreign in Indonesia. Oatmeal (Dutch: *havermout*) is available in urban Indonesia, and grains such as barley or rye are imported and used as ingredients in some commercially produced foods. But these grains are not grown as crops in Indonesia.

2. Job's tears

Job's tears is a grain crop named for its teardrop-shaped seeds. Other English names for this plant include David's tears, Saint Mary's tears, and Christ's tears.

Some scholars believe that the first Austronesian settlers to Indonesia brought Job's tears with them or found it growing wild in Indonesia. Other scholars believe that this grain crop was introduced to Indonesia after the Austronesian people had already settled there. In either case, farmers in Indonesia have grown Job's tears for thousands of years.

There are two types of Job's tears grown in Indonesia. The two are considered to be variants of the same species (*Coix lacryma-jobi*).

1. Edible Job's tears (*Coix lacryma-jobi* var. *ma-yuen*). Indonesian: *jelai* or *enjelai*, or *jagung jali*.

2. Inedible Job's tears (*Coix lacryma-jobi* L. var. *lacryma-jobi*). Indonesian: *jelai batu*, or *enjelai batu*.[1]

Both the plants and the seeds of these two varieties are similar in appearance.[2] The seeds of the edible variety have a shell or hull that can be removed by pounding in a mortar and pestle, similar to the way that rice is hulled. Inside there is an edible starchy kernel. This kernel is fatter or rounder than a kernel of rice; to me it looks similar to the grains of barley I have seen in some kinds of soup. Like rice, Job's tears is usually cooked by boiling in water.

The seeds of the inedible variety of Job's tears are much harder, and have no starchy kernel inside. Since these seeds have a tiny natural hole on both the top and bottom, they have long been used as decorative beads. A traditional kind of Muslim 'rosary' (Indonesian: *tasbih*) is made from these seeds. I have seen Job's tears seeds used as beads for necklaces and other decorative beadwork in various areas of Sulawesi.

Before maize was introduced to Indonesia, Job's tears was an important crop in some parts of Indonesia. Now it is of very minor importance, if not neglected altogether. In many rural areas the farmers remember it vaguely if at all, though there are farmers in some people groups who still plant it.[3]

The edible Job's tears plant grows to a height of 1 to 3 meters. Its stem is jointed and rather stiff, similar to the stalk of the maize plant but not as big. Its broad leaves are also similar to the leaves of the maize plant. The teardrop-shaped seeds are greenish when unripe and are off-white, gray or dark gray when mature. I have seen reddish seeds as well, but I don't know if these seeds were naturally reddish or if they were dyed.

The seeds of Job's tears do not grow on a cob (as maize), nor in a dense cluster of stems (as rice), nor in a well-defined head (as wheat); rather the grains grow individually, each grain on its own tiny stem. These stems, each with a seed, grow in loose clusters on the upper part of the plant.

Technically the seeds of Job's tears are not seeds, but tiny hollow shells in which the plant's flowers grow. The technical name of this is an involucre. The pollen-bearing part of the male flower and the pollen-gathering part of the female flower poke out from a tiny

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[1] In Toraja, inedible Job's tears is called *sirope*; in Pamona, it is called *kalide*.

[2] I can attest to this fact from personal experience. Early in my time living in an Uma village I learned about the grain that Umas call *dole*, which turned out to be edible Job's tears. But one day on a walk I picked some seeds from a Job's tears plant, and I tried to break them open with my teeth to munch on. This amused my Uma friends, but fortunately my teeth suffered no permanent damage. That's when I learned there were two varieties of this plant, and that the seeds of the inedible variety (Uma: *rope'*) are very hard indeed.

[3] Concerning edible Job's tears, the editors of *PROSEA* write: "At present it is cultivated as a minor cereal crop throughout the tropics and subtropics, especially in India, China, the Philippines, Thailand, Malaysia and the Mediterranean" (*PROSEA*, Vol. 10, p. 84).

hole in the upper tip of the shell. After fertilization, a starchy kernel grows inside the shell of the edible variety. Job's tears 'seeds' of both the edible and inedible varieties that I have seen measured 5–10 mm long and 4–6 mm across.

The Proto Austronesian (PAN) reconstruction *zelay or *qazelay 'grain species' may have referred to Job's tears. In some Indonesian languages, the present-day word derived from these protoforms refers to Job's tears, e.g., Uma *dole* 'edible Job's tears.' In other languages, the word derived from one of these protoforms formerly referred to Job's tears but now refers to maize, e.g., Mori *osole*; Kaili and Pamona *jole* 'maize.'

The Indonesian terms *jelai* and *enjelai* are reflexes of these protoforms, and refer to Job's tears. These terms are not well known, however, since Job's tears is no longer a common grain in Indonesia. Recently the term *jelai* has been used in Indonesian Bible translations to refer to barley and so has taken on a new meaning.[4]

Some scholars report that Job's tears is a more nutritious food than rice or maize (*PROSEA*, Vol. 10, p. 85). But because it produces less grain per hectare than rice or maize, and because its growing season is longer than that of rice or maize, it is considered a less desirable crop.

Before the introduction of maize, edible Job's tears was a common secondary grain crop in parts of Indonesia. It was planted in dry fields similar to the way maize is planted now. In contrast, the inedible variety of Job's tears is usually planted in marshy ground, such as on the edges of rice paddies.

3. Millet

Millet is a generic name that is used to refer to several grain crops. One source I read said that grain crops called millet belong to five different genera: *Penissetum*, *Eleusine*, *Setaria*, *Panicum* and *Paspalum*. If this is so then the term millet covers numerous species of grain crops. Most grain crops that are called millet have small seeds. The grains of millet are generally round and smaller than grains of rice. Most kinds of millet grow well in dry climates. In America the most common use of millet is probably as birdseed.

Millet has been used as both human and livestock food since ancient times. Millet was known in ancient Israel (cf. Ezekiel 4:9). It is still a common grain crop in parts of Africa and Asia.

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[4] The Indonesian Bible translations *Terjemahan Baru* and *Bahasa Indonesia Sehari-hari* use the term *jelai* to refer to barley. While it is true that the starchy kernels of Job's tears somewhat resemble those of barley in size and shape, this translation is technically inaccurate since Job's tears is not the same as barley. But there is a cultural basis for this translation. In ancient Israel barley was a secondary crop, considered inferior to wheat. In the same way in Indonesia Job's tears was traditionally a secondary crop, considered inferior to rice. In any event, the decision was made to use the term *jelai* for barley in these Indonesian translations of the Bible. And since the original meaning of *jelai* has faded from the memory of most Indonesians, among many Indonesian Christians the term *jelai* is now known as a term for a kind of grain grown in Biblical times in Palestine.

Millet used to be an important grain crop in some areas of Indonesia. Early Indian explorers and merchants reported that Java was “rich in millet and gold” (Wilkinson 1959, p. 452). In parts of Halmahera there used to be elaborate customs and ceremonies associated with the growing, harvesting and cooking of millet.

Farmers in Indonesia have grown millet for a long time. According to archaeologists, millet varieties which have had a long history in Indonesia are foxtail millet and banyard millet. Other millets such as finger millet and proso millet have been introduced into Indonesia in more recent times.

3.1 Foxtail millet

Foxtail millet, *Setaria italica* (L.) P.Beauv., also called Italian millet and Chinese millet, is named for the dense hairy clusters of grain that look like a fox’s tail. Indonesians are more likely to describe foxtail millet as “like a cat’s tail.” The hairy appearance of the clusters of grain is due to the bristles that grow on the end of each grain. Foxtail millet reportedly grows to a height of 1.2 to 2 meters, and the head of grain is between 5 and 30 centimeters long.

Bellwood 1997 believes that foxtail millet was cultivated by the earliest Austronesian populations in Taiwan and the Philippines, and that foxtail millet remained a significant crop as Austronesians moved into Sulawesi and eastern Indonesia, although it declined in importance in the western part of Indonesia.

Zorc reconstructs the protoform PHF *zawah 'millet, *Setaria italica*,' i.e., foxtail millet.[5] Some scholars believe that *zawah is not a true protoform but the result of borrowing from early contact with India; they cite the Pali word *jawa*, or Sanskrit word *yawa*, as the probable source. In India this term meant 'millet' or 'barley.' It is possible that Indian traders introduced some kinds of millet to Java centuries before European contact. One possible origin of the name of the island Java is from this Indian term for millet.[6] Also, the Malay or Javanese terms *jawawut* 'millet' and *jawaras* 'sorghum,' could be derived from this term for millet that came from India.

The millet I have seen in various parts of Central Sulawesi is probably foxtail millet. Before the arrival of maize, it was an important secondary crop after rice. Now, however, few farmers plant it. Farmers from various areas in Central Sulawesi have reported that each grain of millet has multiple layers of hull, making the pounding and winnowing process for millet a tedious one.[7]

3.2 Barnyard millets

In the western part of the Indonesian archipelago, it appears that barnyard millets, genus *Echinochloa*, were cultivated more so than the fine-grained foxtail millet (Bellwood 1997, p. 245). Today, however, even in western Indonesia barnyard millet has declined in importance to where it has the status of a weed rather than a grain crop. This should not be surprising, because the same thing has happened in other parts of the world. For example an encyclopedia article describes common barnyard millet this way: "Formerly in parts of Europe and in the Mediterranean area occasionally cultivated as a millet; in recent times it is only a troublesome weed."[8]

At least three *Echinochloa* species are found in Indonesia. A cover term in English for these species is 'barnyard grasses.' When they are cultivated they can instead be called 'barnyard millets.' A general Indonesian term is *padi burung*.

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[5] Zorc and Ross 1995, p. 1149. PHF stands for Proto Hesperonian-Formosan, a term used to refer to a reconstruction based on data from languages found in Formosa and the region of Western Malayo-Polynesia, which includes the Philippines and most of the Austronesian languages of Indonesia. In addition to Zorc's reconstruction, Blust has reconstructed the following protoforms (Blut and Trussel 2010):

PAN *beCeŋ 'millet species, probably foxtail millet';
PAN *baCaj 'millet species';
PMP *batad 'millet variety'.

[6] Under Wilkinson's entry for 'Jawa,' he says "Java is described by early Indian writers as rich in millet and gold; it may have got its name from the millet" (Wilkinson 1959, p. 452). In my opinion, however, this explanation could be nothing more than folk etymology.

[7] Uma farmers told me that the grain they call *wilo'* has seven layers of hull; I heard the same report from Behoa people about the grain they call *bailo'*. Adriani's 1928 Bare'e-Dutch dictionary reports that the Bare'e (Pamona) grain *wailo*, which he identifies as foxtail millet, has "nine layers of skin." The numbers seven and nine are probably not technically accurate but express local beliefs about the tedious process of hulling millet.

[8] *Mansfield's Encyclopedia of Agricultural and Horticultural Crops*, 2001, s.v. "Echinochloa crusgalli."

- *Echinochloa crus-galli* (L.) P.Beauv. ‘common barnyard millet, cockspur grass’
- *Echinochloa colona* (L.) Link ‘jungle rice, small barnyard grass, shama millet’
- *Echinochloa frumentacea* (Roxb.) Link ‘Indian barnyard millet, Japanese barnyard millet, Japanese millet, sanwa millet’[9]

In Javanese, *E. crus-galli* is known as *jawan* or *jagowan*. This plant grows to 1.5 meters tall. The heads are erect or slightly leaning, with multiple, straight, dense spikes alternately branching off the sides of a central axis (see picture above). C. A. Backer, a Dutch botanist who studied the flora of Java, noted that this plant was widely distributed across Java. Based on this, plus certain evidence from place names (toponyms), he felt it must have been this plant when it was formerly cultivated, not foxtail millet, that made the island of Java famous as a source of millet (Heyne 1922, p. 173).

E. colona ‘small barnyard grass’ is said to look like a smaller and simpler version of *E. crus-galli*. The name ‘jungle rice’ comes from the fact that it mimics rice during its growth stage, and if left in rice fields it will even outcompete rice for nutrients. *E. colona* is a wild grass that grows to about 1 meter tall. It is not a grain crop *per se*. However at some point in prehistory—exactly when or where remains unknown—people began to cultivate *E. colona*. Its cultivated form with fuller heads is classified by botanists as *E. frumentacea*.[10] Today this millet continues to be grown as a grain crop in India, Pakistan and Nepal. A map in Ishige 1980 (see below) indicates that it was also grown in Indonesia as far east as Sumbawa and Sulawesi.

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[9] Wikipedia gives ‘Indian barnyard millet’ as the common English name, and uses ‘Japanese barnyard millet’ for a different species.

[10] Some botanists refer to both the wild and cultivated varieties as *E. colona*.

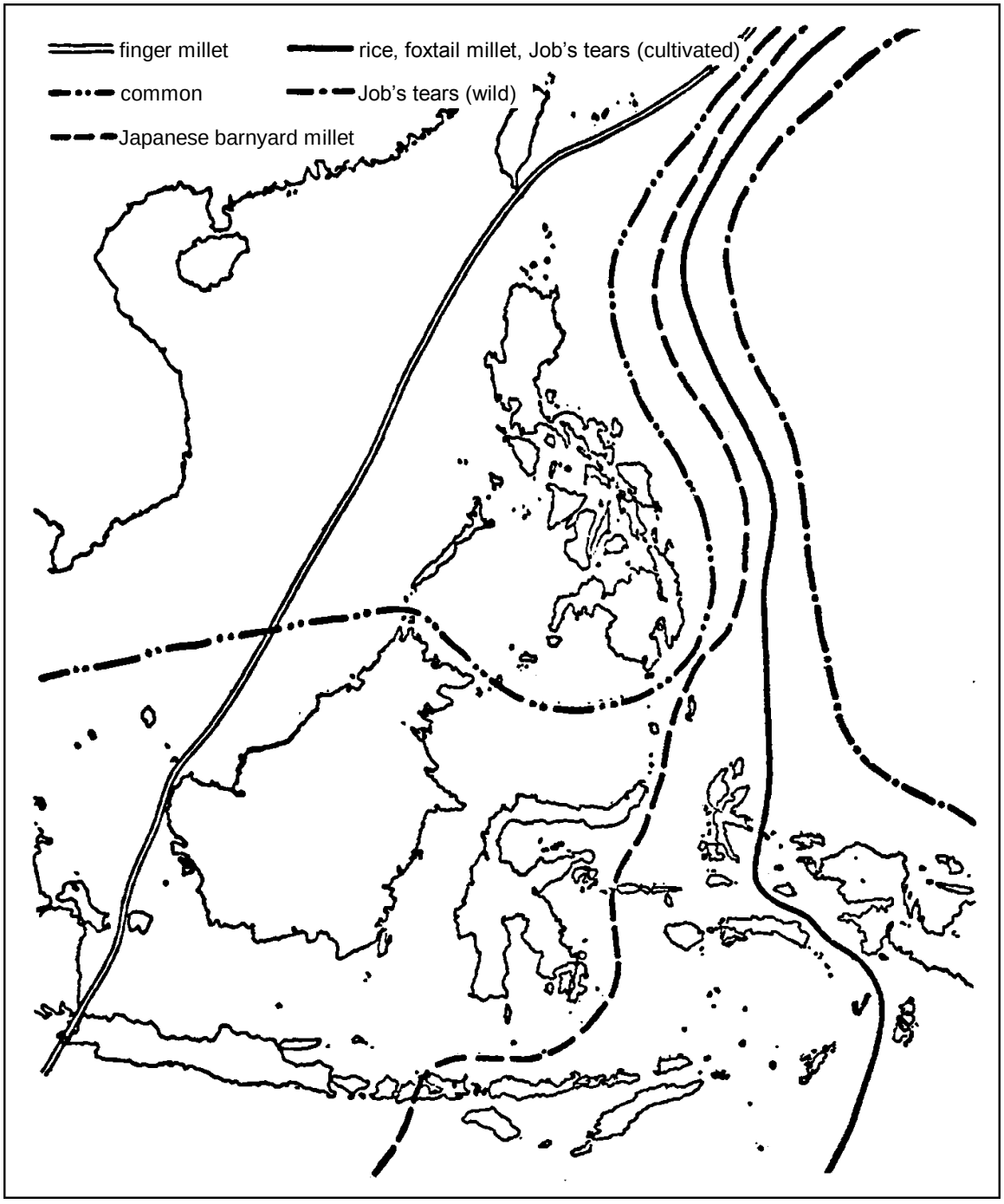
3.3 Other millets

Other millets that have been cultivated in Indonesia include finger millet, proso millet and little millet.

Finger millet (*Eleusine coracana* (L.) Gaertner cv. group Finger Millet), also called ragi and poor man's millet, originated in the highlands of east Africa. The name finger millet comes from the heads of grain, which typically have from three to six compact spikes that spread out like fingers on a hand (see picture below left). Finger millet was introduced to India perhaps around 1000 BC. Africa and India remain the principle regions where finger millet is cultivated. It is also grown on a small scale in parts of Southeast Asia. In Indonesia it was introduced to Sumatra and possibly also Java. The Batak name for finger millet is *jaba*; in Javanese it is called *suket lulangan*.

Proso millet (*Panicum miliaceum* L. cv. group Proso Millet), also called common millet, hog millet, broomcorn or broom millet, grows to a height of about 1 meter. The stems are cylindrical and hollow between the nodes, and can be used to make brooms. The stems and leaves have tiny hairs. The root system is shallow. In most varieties the grains do not grow in dense heads, but on loose drooping cluster of stems (a panicle) similar to the way rice grows (see picture of proso millet above right). The seeds are oval. According to *PROSEA* (Vol. 10, p. 115), proso millet was known in China 5000 years ago, and in Europe 3000 years ago. However, it was not cultivated in Indonesia until 1919, when the first trial plantings were carried out (with success) on the island of Flores (Heyne 1922, p. 182).

Little millet (*Panicum sumatrense* Roth ex Roemer & Schultes), also called Indian millet, reportedly grows wild in Indonesia, the Philippines and other parts of Asia (*PROSEA*, Vol. 10, p. 153). It usually grows to less than 1 meter in height. Pictures of little millet on the Internet show that the grains grow on drooping clusters of stems (a panicle) similar to the way rice grows. Little millet seeds are smaller than those of proso millet. I have found several references to the fact that it is grown as a grain crop in Indonesia, but little other information.



Eastern limits of cereal crops in the islands of Southeast Asia. Foxtail millet = *Setaria italica*; Japanese barnyard millet = *Echinochloa frumentacea*; finger millet = *Eleusine coracana*, of Indian origin; common millet = *Panicum miliaceum*, of Chinese origin; Job's tears = *Coix lacryma-jobi*. From Ishige 1980, used by permission.

The *Kamus Besar* cites two terms for millet: *jawawut* and *sekoi*, and it cites these two terms as synonyms.[11] In Wilkinson 1959 I found three terms for millet:

- *jawawut* 'millet,'
- *sekoi* 'millet (*Panicum italicum*)' [an older classification for foxtail millet],
- *boton* 'a name for millet.'

It would be neat to assign one of these terms to foxtail millet, another to barnyard millet, maybe a third to finger millet or little millet. Perhaps some Indonesian authority has done so, but I know of no such authority. So in my Uma dictionary I have glossed the Uma term for millet with both of the Indonesian terms *jawawut* and *sekoi*. The term *boton* found in Wilkinson's Malay-English dictionary does not appear to be used in Indonesia.

4. Sorghum

Sorghum is a grain crop believed to be native to Africa. Most species of sorghum belong to the genus *Sorghum*.[12] There are over a hundred varieties of sorghum. *PROSEA* reports that it is the fifth most important grain crop in the world, after wheat, maize, rice and barley, and that it is "an important staple food, particularly in semi-arid tropical regions of Africa and Asia, and an important feed grain and fodder crop in the Americas and Australia" (*PROSEA*, Vol. 10, pp. 130-131).

Varieties of sorghum are normally divided into four groups:

- **grain sorghums**: crops grown for the grain, which is used primarily as animal feed in industrial countries but for human food in some places;
- **grass sorghums**: crops grown for the plant itself, which is fed to animals;
- **sweet sorghums**: crops grown to produce sugar and syrup, as well as for forage, hay and silage (i.e., animal food);[13]
- **broomcorn**: sorghum crops grown for the fibers in the stems, which are used to make brooms and brushes.

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[11] *Kamus Besar* lists *jawawut* and *sekoi* as synonyms, saying that both refer to the plant *Panicum viride*. This scientific name is probably erroneous—I have noticed numerous errors in the scientific names cited for plants in the *Kamus Besar*.

[12] Two common species are *Sorghum bicolor* and *Sorghum vulgare*. The latter is sometimes classed by the older name *Andropogon sorghum*.

[13] Sweet sorghum can be consumed similarly to sugarcane: the thin canes are peeled, the pith chewed up and sucked, and the leftovers spit out. Consequently if local people don't know the Indonesian word for 'sorghum' they may identify this plant instead as *gelagah* 'wild sugar cane.' The term *gelagah* however properly refers to a different speices, *Saccharum spontaneum* L.

Sorghum grown for grain is sometimes called milo. Other names used for sorghum include: durra, feterita, Egyptian millet, guinea corn, jowar, kaffircorn, and shallu.

Cultivated varieties of grain sorghum can grow to a height anywhere from 0.6 to 4 meters. All varieties of sorghum have extensive branching root systems. Most varieties can withstand dry conditions and grow well in hot climates. Sorghum plants have a fairly thick stalk and broad leaves, similar to the stalk and leaves of maize. Sorghum grains do not grow in a cob (like maize), or in a well-defined head (like wheat), or individually (like Job's tears), but grow in branched bushy clusters at the top of the plant (a panicle). This is similar to the way rice grows, but the grain cluster of sorghum is larger than that of rice. Depending on the variety of sorghum, these grain clusters can be dense or sparse.[14] The grains can be white, brown, reddish, or almost black. I have only seen sorghum on one occasion in Indonesia; it had grains about the size of BBs or peppercorns.

Farmers in Java and some other parts of Indonesia have reportedly grown sorghum for hundreds of years. One Indonesian government web site said "Sorghum has long been known by the Indonesian farmers especially in the region of Java, West Nusa Tenggara (NTB) and East Nusa Tenggara (NTT)."[15] The Malay terms *jawaras* and *cantel* are used for sorghum, but are not found in all dictionaries.[16] Sorghum was probably brought to

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[14] You can see pictures of sorghum by searching for 'sorghum' using an Internet search engine, e.g., click on "Images" in Google.

[15] This is a quote from the website of the Indonesian government's Badan Tenaga Nuklir Nasional (National Nuclear Energy Agency), in an article about research to develop new breeds of sorghum. (http://www.batan.go.id/p3tir/berita/pertanian/sorgum/sorgum_eng.htm)

[16] Wilkinson's Malay dictionary has no entries for either *jawaras* or *cantel* (which Wilkinson would have spelled *chantel*). Echols and Shadily's Indonesian-English dictionary has no entry for either of these terms. The *Kamus Besar* has no entry for *jawaras*. It does have an entry *cante* (without the final 'l'—probably a typographical error), which it defines as 'sorgum.' And it has an entry for *sorgum*, which it defines as 'gandum'–perhaps a generic or non-technical use of the term *gandum* to refer to grain.

western Indonesia from India centuries ago, probably before European contact, and spread eastwards from there. Sorghum is still grown in parts of Indonesia, but I have found no information that suggests it has ever been an important crop anywhere in Indonesia.

5. Wheat

Wheat is an Old World crop of the genus *Triticum*. It was grown in parts of Europe, the Middle East, Egypt and southwest Asia since before history was recorded. Some authorities consider wheat to be the most highly produced grain crop in the world, but others put maize ahead of wheat. Wheat is primarily grown in temperate climates, and many varieties grow well only where there is a cold winter season.

There are many varieties of wheat, but in general the wheat plant looks similar to the rice plant. It has a hollow stem, long narrow leaves, and grows to a height of 60–120 centimeters, depending on the variety. Unlike rice, however, wheat grains grow in tight, well-defined heads. I think the technical term is a spike. Each grain has a groove or crease on one side. Each grain is surrounded by a hull, and in most species of wheat several hairs grow from the outer tip of this hull. In some varieties of wheat the hairs are short bristles; in other varieties they are rather long and form a ‘beard’ around the head of grain.

According to *PROSEA*, wheat first came to Southeast Asia when the Spanish brought it to the Philippines in the 1660s. Very little wheat is grown in Indonesia or any Southeast Asian country, except for small areas here and there, mostly for research purposes

(*PROSEA*, Vol. 10, p. 137).[17] But Indonesia as well as other Southeast Asian countries import huge amounts of wheat. Noodles, bread and other foods made from wheat flour are no longer the luxury foods they once were but have become commonplace in the diets of many Indonesians.

The Indonesian word *terigu* 'wheat flour' is of Portuguese origin (cf. Portuguese and Spanish *trigo* 'wheat'). The term *gandum* refers to wheat as a grain. Wilkinson 1959 reports that the Malay term *gandum* is of Persian origin. Cognate terms are found in some languages of India, which suggests that this term may have come to Indonesia from trade with India. The term *gandum* has been in Indonesia for centuries, even though wheat itself was not grown in Indonesia.

Echols and Shadily 1963 give two meanings for *gandum*: 1) wheat, and 2) grain. By this I deduce that some Indonesians use the term *gandum* as a generic term, perhaps to refer to a grain they know little about or that they do not know a more precise name for in Indonesian.

In some minority language areas of Indonesia, speakers of the local language have reported that there is a term in their language for *gandum*. I am aware of several such places in Sulawesi. In some cases it is simply a loan word from the Indonesian *gandum* (cf. Da'a *gando*; Pendau *gandung*). In other cases the local language has a term for a kind of grain that the people used to grow in former times but that has now become neglected and almost unknown, and they equate that local term with the Indonesian term *gandum*.[18]

It is highly unlikely that farmers in minority languages in Indonesia ever grew wheat in the past or grow it now. If they know of a grain that used to be grown in their area, and they equate their term for that grain with the Indonesian *gandum*, it is more likely that the grain in question is Job's tears, a type of millet, or a type of sorghum. Whatever the traditional grain crop was, it became neglected to the point that few people remember it, and the local term for it has now become linked with the Indonesian term *gandum*.

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[17] An Indonesian organization called Bogasari has an experimental program to grow wheat in Indonesia. In 2003 they had plans to grow as much as 200 hectares of wheat in various provinces. In one summary statement they say: "This project has proved wrong the myth that wheat cannot grow in Indonesia. In fact, in the place of 400 meters above the sea level, the temperature and weather are conducive for wheat planting." (data from: http://www.bogasariflour.com/news_list.cfm?newseng=50).

I infer from this that the Bogasari researchers were aware of a common belief that wheat does not grow well in Indonesia, and that they were not aware of any place in Indonesia where wheat was already planted as a crop.

[18] The Ledo people of Central Sulawesi say that they had a grain they used to grow but seldom grow any more called *gando*. The Duri people of South Sulawesi equate the Duri term *gose'* with the Indonesian term *gandum*. The Behoa people of Central Sulawesi equate the term *rire* with the Indonesian term *gandum*.

6. Maize

Maize (*Zea mays*), more commonly called corn in North American English, is a grain crop that originated in the New World. It was unknown in Indonesia and the rest of the Old World until Europeans began to explore the Americas in the 16th century. Maize was probably introduced to some parts of Indonesia as early as the 16th century and in the next three centuries it spread by trade through much of Indonesia.

In pre-contact Indonesia, rice was the principal grain crop in much of Indonesia; millet and Job's tears were important secondary grain crops in rice-growing areas, and perhaps even the main grain crop in areas where rice was not grown. When maize was introduced to Indonesia, rice remained the principal grain wherever it was already such, but maize replaced the other grain crops and became the second-most important grain crop.

I assume that most readers have a general acquaintance with both the maize plant and maize as a grain, so I will give only a brief description. There are numerous varieties of maize; they differ in the size of the plant, the size of the cob, the shape and color of the grains, etc. In general, the maize plant has sturdy, jointed stalks and broad leaves. It usually grows to a height of about 2 meters but some varieties grow taller. The male flowers, called tassels, develop at the tip of the plant; and the female flowers grow in clusters on a joint of the stalk, and eventually develop into a cob on which the kernels or grains of maize grow.

Since maize is not native to Indonesia, one cannot technically consider any term for maize in a local language in Indonesia to be 'native.' But in many language groups of Indonesia maize has been around for two centuries if not three; in such areas maize terminology is well-entrenched, and local people have little or no knowledge of the time when their ancestors didn't have maize. See my article "Vocabulary Associated with Maize and Rice" for more information about maize.

7. Rice

Rice (*Oryza sativa*) is a grain crop that has been grown in Asia since before recorded history.[19] The rice plant has long, pointed leaves and a round, jointed stem that is hollow between the joints. The oblong, edible seeds do not grow in a well-defined head like wheat but grow on a loose cluster of tiny stems that branch out from the tip of the plant (a panicle). In most varieties, when the grain becomes mature the weight of the grains causes the tip of the plant to bend. The grain and the plant begin to turn yellowish as the grain ripens and the plant dries. Most rice in Indonesia grows to a height of 60 to 180 centimeters.

There are hundreds of varieties of rice. Rice can grow in cool or tropical climates, in dry fields or wet fields, depending on the variety.

In some parts of Indonesia rice is the major crop and the major food source. In these areas elaborate ceremonies, taboos, beliefs and practices revolve around every phase of rice farming and cooking, and there is elaborate vocabulary associated with rice and all its attendant culture. In other areas of Indonesia, the people grow little or no rice. In broad terms rice is the principal crop in western Indonesia and much of central Indonesia, but in much of eastern Indonesia it is a less important crop or not grown at all. See my article "Vocabulary Associated with Maize and Rice" for more information about rice.

[19] Some authorities say that there is more than one species of rice, but in all the sources I checked, *Oryza sativa* is the species given for all varieties of rice grown in Asia. Some sources report that another species of rice, *Oryza glaberrima*, was domesticated in Africa. Wild rice that grows in North America is not of the genus *Oryza*.

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