

82. 「サトイモ」と「クワズイモ」の食の伝統と遺伝的多様性

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概要

(1-2) Our aim was to explore the food traditions and genetic diversity of taro (*Colocasia esculenta*) and giant taro (*Alocasia* spp.) through field surveys, literature review, and DNA testing in Bangladesh, Vietnam, and Japan. We also extended the survey to South Korea. (3) In Bangladesh, we observed a popular local taro variety with unusually low acidity: cv Lati Raj. Stolons appear to be the main product, though the corms are also eaten. Lati Raj is well-adapted to rising water levels during the wet season, and genetic analysis showed that it is likely derived from the wild populations common in the Bangladesh floodplain. In Vietnam we learned about use of wild *Alocasia odora* as a medicine and edible leaf vegetable, despite the very strong acidity of this species. Taro cultivars in southern Korea resemble those found in northern Japan; dispersal between these regions may have been bidirectional. (4) We have identified lectin diversity as a promising explanation for variable acidity in aroids, and a possible target for selection during aroid domestication, but proving this lectin theory will require new approaches. (5) The grant greatly facilitated all our efforts in fieldwork, literature study, and genetic analysis, and was necessary to bring key questions for taro domestication into focus.

背景および目的

Previous research indicated that the evolutionary origins of cultivated taro (*Colocasia esculenta*) lie in the mainland of Southeast Asia, and that domesticated varieties may have arisen separately in Himalayan mountains and in adjacent lowland floodplains, such as those found in Bangladesh (Matthews et al. 2024). Acidity was a likely key target for selection during aroid domestication, so it is important to study acrid wild aroids that are still used today as food, medicine or fodder. Recently it has been suggested that medicinal uses of plants may have been more important than food uses in early human evolution, when physical activities and uncooked foods made injury and illness likely. For all these reasons, we studied wild and cultivated forms of taro and *Alocasia* (*A. odora*, *A. cucullata* and *A. macrorrhizos*) in the field and in research collections, and investigated local cooking methods. Our target study areas were Bangladesh, Vietnam, Japan, and South Korea.

方法

In all areas visited, extensive field notes and photographic records were made, and leaf samples were preserved using silica gel as a desiccant. After fieldwork, genetic tests were carried out using standard methods, and light microscopy was used to directly observe special cells responsible for acrid toxicity of aroids. We also analysed published genetic data for aroids, including lectin genes (see Discussion below).

In Bangladesh, we met the leaders of local NGOs who in turn introduced us to local communities where both taro and *A. macrorrhizos* are cultivated. From interviews and direct observation we learned about the plants, acidity levels, cooking

methods, and other uses. At the Bangladesh Agricultural Research Institute (BARI), Gazipur, we saw field trials with taro and *A. macrorrhizos*. In Vietnam, staff at the Plant Resources Center (PRC), Hanoi, assisted our study of a collection with (i) taro cultivars, (ii) *A. odora*, an important medicinal plant and occasional source of edible leaves, and (iii) *A. cucullata*, a cultivated medicinal and ornamental plant with symbolic significance in Buddhist culture. With PRC, we visited a local community where *A. odora* is actively utilised as a medicinal plant and food. A field survey of cultivated taro in Tsushima island, Japan, was followed by a short visit to South Korea. From Daejeon, we travelled to Gokseong, a major taro growing district located at a similar latitude to Tsushima island.

結果および考察

Results. In Bangladesh, we **(i)** confirmed that local taro cultivars belong to the same chloroplast genetic lineage as tropical wetland taros found in Asia and the Pacific (CI), **(ii)** found only the CI lineage in further tests of wild taros in the north, **(iii)** observed a popular, low-acridity taro cultivar (Lati Raj, Stolon King, Fig. 1) that can be eaten raw by domestic animals (cow, duck, goose) (such low acridity is rare in taro), **(iv)** confirmed identification of *A. macrorrhizos* as a starchy stem crop in village gardens and the BARI collection (Fig. 2), **(v)** learned that *A. macrorrhizos* petioles in Bangladesh can be fermented together with small dried fish to produce a food condiment - a preparation previously only reported in Assam, India, **(vi)** learned that fish are often combined with taro in local dishes, that the stolons of wild and cultivated taros are commonly eaten, and that sour fruit or other sour ingredients are commonly used to adjust flavour and reduce acridity of taro dishes, **(vii)** observed that wild taros commonly flower, fruit and produce seeds during the wet season, and are present everywhere in open habitats (river banks, roadsides, canal banks, vacant land, etc.).



Fig. 1. Harvesting stolons of Lati Raj (Bangladesh, P. J. Matthews, 2025).



Fig. 2. Stem of *Alocasia macrorrhizos* diced and fried with spices, and served as a snack (Bangladesh, P. J. Matthews, 2025)

At the Plant Resources Center, Hanoi, we surveyed phenotypic and genetic diversity in taro cultivars from upland regions of northern Vietnam. We found both CI and CII cultivated taro lineages, reflecting the diverse origins of cultivated taros in eastern Asia generally, in countries that span temperate to subtropical latitudes. Taro cultivar diversity and culinary uses may be especially rich in Vietnam because the diverse topography and wide latitudinal range, as in Japan (Fig. 3). In the colder peninsula of southern Korea, the dominant commercial varieties of taro are temperate, dryland CII types (Jordão, Choi, Matthews et al., 2026, in press).



Fig. 3. On Tsushima island, Japan, narrow coastal valleys with alluvial soil are ideal for growing taro, but heavy protection from wild boar is required (P. J. Matthews, 2025).

The survey of *Alocasia* spp. in the PRC collection, Hanoi, showed that at least two species have been collected, namely *A. odora* and *A. cucullata*. Our genetic tests indicate that *A. cucullata* is primarily a domesticated form of *A. odora*. The main practical use for *A. odora* is medicinal. The starchy corm is peeled, sliced, heated and dried (Fig. 4), can be stored indefinitely, and is used to prepare a decoction in hot water that is then consumed as a kind of tea, without any irritation, despite the presence of calcium oxalate raphides after processing.

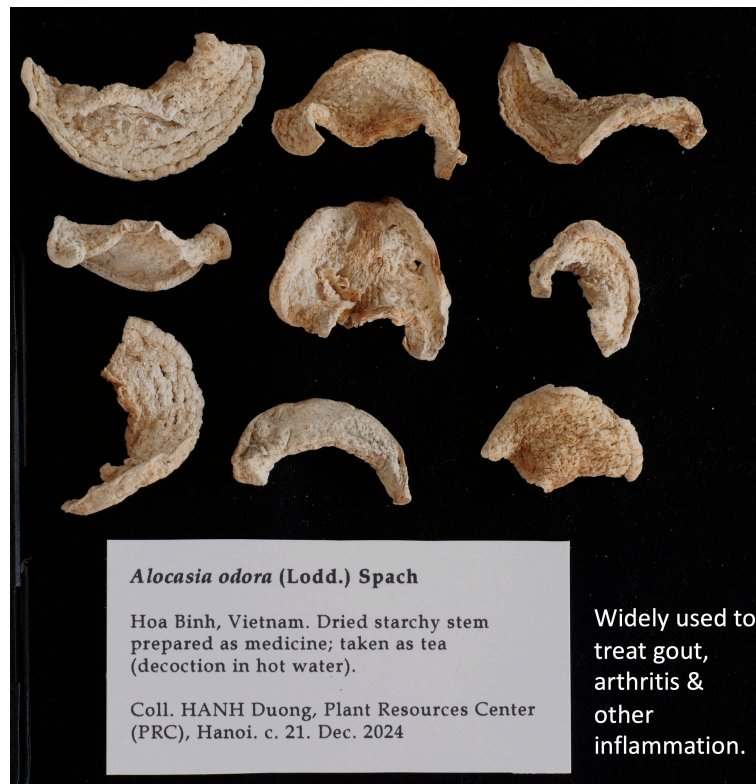


Fig. 4. Sliced stem of kuwazu-imo (*Alocasia odora*), prepared for medicinal use (P. J. Matthews, 2025).

Discussion. Published reports show that more wild aroid species and genera are used for medicine than for food. The preparation and use of toxic wild aroids as sources of medicine may provide clues for how aroids with less toxicity were eventually found and developed into food plants. Chinese and Japanese research groups have suggested that acidity in medicinal aroids is produced by a class of proteins called lectins. Our analysis of published taro lectin sequence data shows that acidity-linked lectins form a multigene family, which in turn may explain why acidity is highly variable in taro, with different levels of expression or effect in different plant parts. We are not yet able to prove a role of lectins in the domestication of edible aroids and the cooking methods used, but we can offer the lectin acidity hypothesis as a testable theory to partly explain the great variation in cooking methods we have observed from mainland Southeast Asia to Japan.

Presentations

Bangladesh Agricultural University, Mymensingh, 4th Nov. 2024: "Searching for taro, finding the world."

MAPS, Tokyo 1.-2. Feb. 2025: "Food from the bowels of the Earth: taro, fish and other ingredients in Bangladesh"

Academica Sinica, Taipei, 24th May, 2025: "*Alocasia* and *Colocasia* in Asia and the Pacific: cultivar diversity, domestication & wild relatives."

PRC, Hanoi, 3rd July, 2025: "Medicine, good fortune, food, & fodder: *Alocasia* & other toxic aroids"

Exhibition: "Catchment & Kitchen – Aroids of the River-Forest-Garden", 18th–24th August, 2025. Takasegawa Machiya Gallery, Kyoto-shi.

(完)

発表論文

- 1) Jordão, VMM, S-J Kim, H-J Byun, B-Y Seol, AS Tamboli, I Ahmed, I-S Choi and PJ Matthews (2026) Plastid phylogenomics reveals diversity and phylogenetic relationships of cultivated taro (*Colocasia esculenta*) in Korea. Korean Journal of Plant Taxonomy (in press).

引用文献

- 1) Matthews, PJ, MA Hossain, D Sookchaloem, VD Nguyen, SY Wong, J Joling, E Schranz, FT Bakker, E Tabuchi, I Ahmed and A Hay (2024). Chloroplast capture and range extension after hybridization in taro (*Colocasia esculenta*). Ecology & Evolution 14: e70082.