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SHORT COMMUNICATION

Dioscorea alata: an ingredient of Mahaprasad

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Mahaprasad is the specific food items that is offered to the Lord Jagannath in the holy temple of Puri in Odisha, India. 56 types of food items are offered to the Lord Jagannath in a day. The holy food is cooked in the earthen pots in firewood only. A typical type of rituals of offering is followed in this temple where the food is offered to Lord Jagannath first and then to Goddess Bimala. The Prasad is fed without any reservation or discrimination. Mahaprasad is of two types: Sankudi mahaprasad and Sukhila mahaprasad. Sankudi consists of mainly the rice (main meal) cooked in different ways whereas Sukhila mainly consists of dry sweet meals. The foods are cooked in a pure way and with great devotion. Spices like cardamom and cloves are added only after the offerings are made to the Lord.

Ingredients of Mahaprasad

The 56 items of the mahaprasad include rice cooked in different ways, different varieties of dal and side dishes, different sweets with or without

milk, cakes pancakes and patties. The ingredients of rice preparation include water, ghee, sugar, curd, ginger, lemon, salt and lentils. Rice is prepared in nine different ways with different combinations of the above ingredients. The ingredients of sweets preparation include maida, wheat, sugar, ghee, salt, ginger and beans. 11 different types of sweets are prepared with the said ingredients in different combinations. The ingredients for 12 different varieties of cakes pancakes and patties include rice, urad dal, coconut, jaggery, ghee, sugar, rice flour, cheese, wheat, curd, and bean. 8 different milk preparations are made out of milk, sugar, rice, wheat, cheese, ghee, cream. Different dal and side dishes include different varieties of lentils and vegetables like eggplant, bean, spinach, tubers like *Dioscorea alata*, mustard seed, coconut milk, coconut, mango, apple, grapes, yogurt, cucumber, radish, fried flowers of *Azadirachta indica* tree (Information collected from Temple).

Dalma: It is a variety of dal serve in the Jagannath temple cooked with vegetables and tuber *D. alata* as an important ingredient without garlic and onion. The uniqueness of this dish apart from its taste and aroma is that it remains unspoiled for days. This unusual character can be related to the study and reports of its main ingredient, *i.e.*, *Dioscorea alata*.

Dioscorea

Dioscorea species, popularly known as Yam worldwide is a prime staple food substitute for the majority of rural and local people of the country. *Dioscorea* is a genus of over 600 species native to tropical and warm temperate regions out of which only 10 species are cultivated throughout the world (Kumar et al 2012).. 26 species of *Dioscorea* are reported from India out of which 13 species are reported from Odisha. The nutritive and antioxidant content the species not only enrich the diet of the local rural and local people but also make them ethnomedicinally important (Mustafa et al 2018). They are also known to cure several ailments including skin infections and as birth. Tubers as well as the vegetative parts are used as single or multiple formulations. Though not all some species of *Dioscorea* are reported to be toxic which causes different health issues in consuming. Those involves kidney injury, indigestion from improperly cooked tubers. Detoxification of the tubers involves placing them in running water for a few days, soaking in salt water, boiling for several hours and then squeezing out the juice, or roasting to detoxify them (Kumar et al 2012).

Botany of *Dioscorea*

The word “Yam” is applied to members of the genus *Dioscorea* belonging to the family *Dioscoreaceae* in the order *Dioscoreales* (Alexander & Coursey 1969). Wild species are either annuals or semi-perennials or perennials. Cultivated species are annuals. Generally, the

female plants are less in number than the male plants. Most *Dioscorea* species have simple, cordate, or acuminate leaves borne on long petiole, but in some species, they are lobed or palmate with pointed tips. They are climbers and climb by twining. The direction of twining of the vine (*i.e.*, anti-clock wise or clock wise) is a characteristic peculiar to the particular sections within the genus *Dioscorea*. The wings present in some species, such as *D. alata* L. support the twining habit. The flowers are basically dioecious, with male and female flowers borne separately or on separate plants. The male or female flowers are borne on axillary spikes in the leaf axils. The male flowers are sessile, glabrous, and spherical and are borne axially or terminally. These flowers consist of calyx of three sepals and corolla of three petals, arranged regularly and almost similar in size and appearance, with three or six stamens (Onwueme 1978). Fruits are mostly capsules. The seed in each capsule is small and has wings that vary in shape in different species (Onwueme 1978). The seeds are flat and light, and the wings help in wind dispersion. Some species, such as *D. alata* L., *D. bulbifera* L., *D. pentaphylla* L., *D. pubera* Blume, have bulbils in the axils. Bulbils are specifically adapted for vegetative propagation (Coursey 1967). They are very smaller than the underground tubers. Short day length generally accelerates formation of bulbils. *Dioscorea* possess shallow fibrous root systems, normally un-branched and concentrated within the top layer of the soil, and very few actually penetrate up to 1 m depth (Onwueme 1978). The tuber is the storage organ, which forms a new tuber and shrivels away simultaneously when the re-growth is induced. When the organ lacks the typical characteristics of a modified stem structure, the tuber has no preformed buds or terminal bud at the distal end (Hahn et al.1987).

Dioscorea alata

Dioscorea alata (Figure 1) like air potato produces large aerial tubers which grows attached to the stem. They are found growing in shady areas or moist forest but do not tolerate frost. They normally grow for about 10 months after which goes back to dormant stage for 3-4 months, aerial stems being dried up during dormancy. They are grown throughout the tropics for its edible tubers. When cultivated, an annual rainfall of 1000-1500 mm is required. *D. alata* are aggressive and fast growing vines that twines on trees, shrubs. They are grown twinning on other plants in order to capture sunlight. This species has the capability to outcompete and displaced native vegetation but are considered to be sensitive to aluminium toxicity in the soil (Kumar & Jena 2017).

Origin of *D. alata*

As reported by Coursey in 1967, *D. alata* was introduced to America by the Portuguese in the 1500s. Introduction to Florida was reported by Small and Ward in 1933 and 1968 respectively. It was earlier rare and scattered in Central Florida as it was introduced for ornament and escaping from cultivation. Natural population increased in number in north Florida with some stands forming blankets of shingled leaves to cover even the mature trees. It was then reported as disrupting natural-area plant communities particularly in coastal hammocks in south Florida by Broward, Dade and Lee counties in 1996.

Botany of *D. alata*

Vigorously twinning herbaceous vine, from massive underground tuber. Stems to 10m (30 ft) or more in length, freely branching above: internodes square in cross section, with corners compressed into “wings”, these often red-purple tinged. Aerial tubers formed in leaf axils, elongate to 10cm (4 in) x 3cm (1.2in), with rough, bumpy surfaces. Leaves

long petioled, opposite (often with 1 leaf persistent); blades to 20cm (8 in) or more long, narrowly heart shaped, with basal lobes often angular. Flowers small, occasional, male and female arising from leaf axils on separate plants (*i.e.*, a dioecious species), male flowers in panicles to 30 cm (1 ft) long, female flowers in smaller spikes. Fruits a 3- parted capsule; seeds winged (Kumar & Jena 2017).

Uses

It is an important ingredient of a variety of dal known as Dalma serve in the Prasad of Jagannath temple. It is also consumed as boiled or baked. It is used in variety of desserts as well as flavoring agent. This is a valuable starch that can also be consumed by diabetics or health conscious individuals due to its low absorption rates (Mustafa et al 2018). They have a potential to prevent chronic diseases due to the low content of sodium and high content of potassium, manganese, calcium and dietary fibre (Table 1). This could also be a potential food supplement for mineral and fibre. Apart from its valuable uses as nutrients in food, they are known to contain several secondary metabolites which are responsible to act as a defense mechanism for several diseases and ailments. In fact they form an important folk medicine and it has been used as moderate laxative and vermifuge. It has also been used for treatment of fever, gonorrhoea, leprosy, tumors and hemorrhoids (Kumar & Jena 2017).

Table1: Medicinal uses of *Dioscorea alata*

Parts used	Uses	References
Tuber	Tuber powder used to cure piles	Jadhav et al.(2011)
Tuber	Eaten raw twice a day to reduce weakness	Kamble et al.(2010)
Tuber	Juice of tuber is	Samanta and

	used to kill stomach worm	Bishwas (2009)
Tuber	Paste is applied on cancerous wounds	Dutta (2015)
Tuber and leaves	Used as a cooling agents	Kumar et al. (2017)

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Figure 1: *Dioscorea alata* in wild