

DOMESTICATION OF RICE: VARIETIES AND UTILITY

Vinda Manjramkar

Department of Zoology, VPM's B.N. Bhandodkar College of Science, Thane (W) 400601,
Affiliated to University of Mumbai, Maharashtra, India
vindamanjramkar@yahoo.com

INTRODUCTION

Man lived a nomadic life for many years, ate raw plants and the flesh of other animals. The idea of domestication of plants and animals would have aroused the evolution of the brain in man. The need to satisfy hunger without much exertion, there by then the switching on the lazy, selfish gene in humans must have been the contributing factor for the domestication of plants. The nomadic where the traders, hunter- gatherer, pastoral who finally settled on river banks (as of Indus valley civilization, rivers are cradles of civilization) (Bates *et al.*, 2017), the Neolithic human ancestors about 3,00,000 B.C eventually settled, transformed the culture from hunting, food gathering to farming and domesticating plants and animals. Thus, the era of domestication of plants and animals began with cultivation of rye, paddy (rice) and many more.

It is well set that domestication of plants beginning in the Middle East with grains of Rye localized phenomenon may be a step towards domestication. The Neolithic crop founders or domesticators. A crop wild relative (CWR) is a wild plant closely related to a domesticated plant, whose geographic origins can be traced to regions known as Vavilov Centers (named for the pioneering botanist Nikolai Vavilov). Genetic material from CWRs has been utilized by humans for thousands of years to improve the quality and yield of crops. 29% of wild relative plant species were completely missing from the world's genebanks, with a further 24% represented by fewer than 10 samples. Over 70% of all crop wild relative species worldwide were in urgent need of further collecting to improve their representation in genebanks.

CONTEXT

Rice is a very important dietary constituent not only in India or east Asian countries but all over the world. Rice is the seed of the grass species *Oryza glaberrima* (African rice) (Linares Olga, 2002) or *Oryza sativa* (Asian rice), as a cereal grain. All the continents have their own varieties of rice. It is a tropical to subtropical crop which requires high rains, water logging

in the field and high temperature. Rice is self-pollinating grass, pollen grains are very sensitive to high temperature.

Given the title of auspiciousity, traditionally every ritual of Hindus starts with grains of rice right from before birth to after death events, domestication of rice is unknown? Humans must have intentionally planted around some 8000 to 9000 years ago. They would have sorted out plants with desirable traits and thus the journey of rice began. Rice is one of the earliest cereals known to human civilization. Tracing the history of rice, wild varieties known as *Oryza rufipogon* and *O. nivara* (Phillips *et al.*, 2017) chromosome number $2n = 24$, both Asian wild grasses most closely related to *O. sativa*. Common Asian rice is a sinewy, weedy plant. *O. sativa* has $2n = 24$ chromosomes, and can be easily genetically modified.

There are a lot of rice varieties locally cultivated by tribals of the world, however tribals of Thane, Palghar districts cultivate rice varieties which are ready for harvest in 60 days. The first seeds are offered to deity goddess "Gauri Parvati" during Ganpati festival in the month of Bhadrapada, kheer (sweet dish) of new rice harvested is offered. Locally this rice is called "kali kudai." Also another variety called Rajghudya both can enhance lactation in breastfeeding mothers. "Wada kolam" is another variety locally harvested. Indian coastal region has a special variety of rice called "khar bhaat", rice grown near estuaries that can withstand salinity is harvested in 80 to 100 days, it has salty taste and is consumed with fish curries locally. This variety yield is low.

Each type of rice has its own taste, texture, and unique properties that work well with different cooking applications. The two subspecies of Asian rice, Indica and Japonica, can generally be distinguished by length and stickiness. Indica rice is long-grained and non-sticky, while Japonica is short-grained, thick and glutinous, together they have over 40,000 varieties. The long grain like basmati has a fragrance that is fluffy and light, cuisines like pulao, biryanis are prepared with this variety. This variety is used in west Asia, North India, and is also cultivated in this region. Less rice eating population areas, they prefer wheat over rice. India is the largest exporter in Basmati rice. The semi dwarf basmati varieties like Pusa Basmati can be cultivated in other parts of the country. Medium grain is less fluffy, a bit sticky on cooking. Short grain is sticky on cooking. The medium and short grain go well with curries of fish or vegetables, largely consumed in coastal India, and southeast Asia. Some medium varieties also have aromas like Indrayani from Pune district. Parboiled rice is short grain proceeded in milling used in south India. Brown Rice sheds its outer husk and retains its bran and germ layers that give it a characteristic tan color. Brown rice takes a little longer

to cook than white rice due to the nutrient-dense layers rich in vitamins and minerals. Forbidden rice rich in nutritional value, this rice is also known as black rice and has a mild nutty flavor. Slightly sticky on cooking, it is used in a variety of Chinese or Thai dishes. Wild Rice grains are harvested from the genus *Zizania* of grasses, high in protein, wild rice adds a colorfulness. Jasmine Rice, sometimes known as Thai fragrant rice, is a type of long grain rice with a long kernel, slightly sticky texture. Arborio rice is a medium grain rice that is wider in size and has a characteristic white dot at the center of the grain from town Arborio in the Po Valley of Italy, with high starch content, it has a slightly chewy and sticky consistency and develops a creamy texture when cooked.

There is always a co-evolution of pest and host, thus even the rice no exception for this, major diseases of Rice (*Oryza sativa*), are by bacteria, fungus, insects, land crab, they cut the plant from base with chelicerae (these crabs are specifically threat to paddy fields in some districts of Maharashtra) can destroy whole field in just one night.

There are lots of local rice varieties from ancient times also having medicinal values in the area where it is cultivated, like fermented rice water with kojic acid used to treat hair and skin. Fermented rice paste is applied on the face as a face pack.

Rice wine is traditionally consumed in east Asia, India, preparation techniques may differ. It is naturally loaded with a variety of probiotics, conferring health benefits on the host. Rice wine typically has an alcohol, which may vary from varieties to technique used in fermentation on average it can range between 18-25 percent ABV. Rice beer is used as adjunct in certain medicinal preparations. Sake rice beer from Japan is well known. The Tangkhul tribe in the east of Manipur is well known for its varieties of beer. 'Xaaj Pani' of the Ahoms (royal family) from Arunachal Pradesh. Handia (Also handi or hadiya) is a rice beer originating from the Indian subcontinent, popular in the Indian states of Bihar, Jharkhand, Odisha, Madhya Pradesh, Chhattisgarh and West Bengal.

Lot of Indian dishes have rice as an ingredient. The kheer wherein the rice is coarsely powdered with sugar, milk, dry fruits, is a sweet dish served on occasions of festivals or after death ceremonies (dry fruits not added). Feerni is Mughal version consumed in a cold and slightly solid form. Porridge is prepared from roasted rice with little carom seeds as baby food or to sick person incorporated with mashed vegetables. Anarsa is an Indian pastry (net like, crispy), made in Diwali made from fermented rice jaggery and poppy seed, fried in

ghee. Rice breads, rice cakes, momos, over hundreds of dishes can be prepared with rice as the basic ingredient.

Rice is important food, it is also undeniably integral to Indian religious ceremonies and our social framework. Present in most prayer rituals, oblation to God and devotees alike, more or less every regional food culture in India counts rice as important. The annual calendar of festivals has many celebrations based on the harvest cycle of rice. There are folklores and songs sung during sowing and harvesting. Every religious ceremony starts with tilak (vermilion and rice applied on forehead) with akshat (rice grains). Breaking of any Hindu fast is done by the first morsel of rice (bhaat called as dal bhatt). Buddhist venerate rice as Siddhartha (Lord Buddha) was saved after feeding on Kheer immediately after his enlightenment. In Java and Bali the goddess of rice is called “Dewi sri”. In India rice is incarnated with goddess Lakshmi (Asia Folklore, 2015), Japanese folk incarnate it with sun god. In Christianity, rice signifies spiritual prosperity, attainment of knowledge, purity and long life. In Islam Zakatul Fitrah donation rice or any other grain, dates, during the holy month of Ramadan.

Also, after death rituals the raw rice finds place in the mouth of the corpse before cremation while the plain cooked rice is used in funeral rites and pitru paksha. Ceremonies to appease restless spirits and ancestors. The cooked rice should be eaten by crows.

New varieties of Rice

The GM rice is called Golden Rice Technology. A japonica variety of rice was engineered with three genes necessary for the rice grain to produce and store beta-carotene which included two genes from the daffodil plant and a third from a bacterium. Researchers used a plant microbe to ferry in the genes into the plant cells. There were a lot of controversies and protests for golden rice production.

A group of Indian scientists has developed a new salt-tolerant transgenic rice plant by over-expressing a gene from a wild rice called *Porteresia coarctata* into the commonly used IR 64 indica rice variety. *Porteresia coarctata* is a native of India, Sri Lanka, Bangladesh and Myanmar and is grown mainly in saline estuaries.

Saudi Arabia is growing a rice variety which is the most expensive in the world. The “*Hassawi Red Rice*” (Al-Mssallem *et al.*, 2011) grows in hot areas as high as 48° Celsius and needs more water compared to other varieties. The water supplied by irrigation. The rice has rich nutritional value.

CONCLUSION

Rice brings all human beings together on common ground. Rice is undeniably historic and religious. It is a comparatively simple process to cook rice, the only requirement is boiling water. Woman folk can do other household tasks while rice is cooking, it also requires only one utensil with a lid (optional). Handful rice can feed many hungry stomachs. It is wonder cereal a gift from nature

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