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Study of Rice, its Botanical Description and medicinal Values

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Introduction : Oryza Sativa, it is believed, is associated with wet, humid climate, though it is not a tropical plant. It is probably a descendent of wild grass that was most likely cultivated in the foothills of the far Eastern Himalayas. Another school of thought believes that the rice plant may have originated in southern India, then spread to the north of the country and then onwards to China. It then arrived in Korea, the Philippines (about 2000 B. C.) and then Japan and Indonesia (about 1000 B. C.). When Alexander the Great invaded India in 327 B. C., it is believed that he took rice back to Greece. Arab travelers took it to Egypt, Morocco and Spain and that is how it travelled all across Europe. Portugal and Netherlands took rice to their colonies in West Africa and then it travelled to America through the 'Columbian Exchange' of natural resources. But as is traditionally known, rice is a slow starter and this is also true to the fact that it took close to two centuries after the voyages of Columbus for rice to take root in the Americas. Thereafter the journey of rice continues with the Moors taking it to Spain in 700 A. D. and then the Spanish brought rice to South America at the beginning of 17th century.

The journey of rice around the world has been slow, but once it took root it stayed and became a major agriculture and economic product for the people. In the Indian subcontinent more than a quarter of the cultivated land is given to rice (2011-12). It is a very essential part of the daily meal in the southern and eastern parts of India. In the northern and central parts of the subcontinent, where wheat is frequently eaten, rice holds its own and is cooked daily as well as on festivals and special occasions.

History of Rice in India:

India is an important centre of rice cultivation. The rice is cultivated on the largest areas in

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India. Historians believe that while the indica variety of rice was first domesticated in the area covering the foothills of the Eastern Himalayas (i.e. north-eastern India), stretching through Burma, Thailand, Laos, Vietnam and Southern China, the japonica variety was domesticated from wild rice in southern China which was introduced to India. Perennial wild rice still grow in Assam and Nepal. It seems to have appeared around 1400 BC in southern India after its domestication in the northern plains. It then spread to all the fertile alluvial plains watered by rivers. Some says that the word rice is derived from the Tamil word arisi.

- Rice is first mentioned in the Yajur Veda (c. 1500-800 BC) and then is frequently referred to in Sanskrit texts. In India there is a saying that grains of rice should be like two brothers, close but not stuck together. Rice is often directly associated with prosperity and fertility; hence there is the custom of throwing rice at newlyweds. In India, rice is always the first food offered to the babies when they start eating solids or to husband by his new bride, to ensure they will have children.
- Paddy grains found during excavation at Hastinapur (India) around 1000-750 B.C. considered as an oldest sample in the world.
- Southwest Himalayas has various types and varieties and indicated probable centre of origin.

- De Condolle (1886) and Watt (1862) mentioned south India is the centre of rice origin.

- Vavillov suggested that India and Myanmar should be regarded as the centre of origin of cultivated rice.
- According to D. Chatterjee (1948), there are altogether 24 species of genus Oryza of which 21 are wild and two viz., Oryza sativa and Oryza glaberrima are cultivated. Oryza sativa is grown in all rice growing areas, but Oryza glaberrima is confined to the West Africa only. Thus it indicates that there might have been two centres of origin of our cultivated rice; South-eastern Asia (India, Myanmar and Thailand) and West Africa.

Importance of Rice:

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Rice has shaped the culture, diets and economic of thousand of millions of peoples. For more than half of the humanity " rice is life". Considering its importance position, the United Nation designated year 2004 as the "International Year of rice. Importance of rice are as follows:

a. Rice is an important staple food crop for more than 60 per cent of the world people. In 2008, more than 430 million metric tons of rice were consumed worldwide, according to the USDA.
b. Ready to eat products eg. popped and puffed rice, instant or rice flakes, canned rice and fermented products are produced
c. Rice straw is used as cattle feed, used for thatching roof and in cottage industry for preparation of hats, mats, ropes, sound absorbing , straw board and used as litter material.
d. Rice husk is used as animal feed, for paper making and as fuel source.
e. Rice bran is used in cattle and poultry feed, defatted bran, which is rich in protein, can be used in the preparation of biscuits and as cattle feed.
f. Rice bran oil is used in soap industry. Refined oil can be used as a cooling medium like cotton seed oil / corn oil. Rice bran wax, a byproduct of rice bran oil is used in industries.

Botanical Description:

The rice plant is a member of Poaceae (old Gramineae) family. The common cultivated rice plant is an annual which usually grows to a height of a half meter or two meters but there are certain varieties that grow much taller (6-9 metres). Some deep water rice varieties grow with the gradual rise of the flood water level. Rice plant can be divided into main two parts namely root system and shoot system:

Root system:

When a rice grain germinates in a well drained, upland soil the sheath (coleorhizae) emerges. If it germinates in submerged low lands, coleoptile emerges ahead of the coleorhizae. The primary, embryonic roots (radicle) comes out through the coleorhiza shortly after it appears. This is

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followed by two or more secondary roots, all of which develop lateral roots. The embryonic roots later die and are replaced by secondary adventitious roots produced from the underground nodes of the culm.

Shoot System:

Collectively applies to all plant part visible above the ground level. It is mainly composed of culms, leaves and inflorescence (panicle).

Culm:

The culm or stem is made up of a series of nodes and internodes. The rice culms are usually hollows except at the nodes. Each node bears a leaf and a bud. Under favorable conditions buds near ground level grow into tillers. The primary tillers give rise to secondary tillers which give rise to tertiary tillers.

Leaves:

The leaves of rice are sessile in nature. They are borne at an angle, on the culm in two ranks along the stem, one at each node. The leaf blade is attached to the node by the leaf sheath. The rice leaf is similar to that of wheat, but is usually distinguished from it by the length of the ligule. In the rice, ligule is very prominent, usually more than one centimeter. The leaf number is more on a primary tiller than on the secondry and tertiary tillers.

Panicle:

The rice inflorescence known as panicle is a group of spikelets borne on the uppermost node of the culm. The primary panicle branch is divided into secondary and sometimes tertiary branches. These bear the spikelet.

Spikelet:

The individual spikelet consists of two outer glumes. All the parts found above the outer glumes are collectively called floret. It consists of a hard covering the two sections of which are known as lemma and palea (the glumes) and the complete flower is between them. The lemma and palea together are known as the “hull”. The rice flower contains six functioning stamens

(male organ) and a pistil (female organ). At the base of the flower are two transparent structures known as 'lodicules'. Rice is a self pollinated crop. When rice flower becomes ready to bloom, the lodicules become turgid and push the lemma and palea apart, thus allowing the stamens to emerge outside the open floret. Rupturing of the anthers then leads to the shedding of pollen grains. After the pollen grains are shed on stigma the lemma and palea close.

Grain (Caryopsis):

Rice grain develops after pollination and fertilization are completed. The grain is tightly enclosed by the lemma and palea. The dehulled rice grain is known as brown rice as brownish pericarp covers it. The pericarp is the outermost layer which envelopes the caryopsis and is removed when rice is milled and polished. The embryo lies at the ventral side of the spikelet next to the lemma. Adjacent to the embryo is a dot like structure the hilum. The embryo contains the plumule and radicle. The plumule is enclosed by a sheath known as coleoptile and the radicle by the coleorhizae.

Medicinal Value:

The immense diversity of rice germplasm is a rich source for many rice based products and is also used for treating many health related maladies such as indigestion, diabetes, arthritis, paralysis, epilepsy and give strength to pregnant and lactating mothers. Ancient Ayurvedic literature testify the medicinal and curative properties of different types of rice grown in India. Medicinal rice varieties like Kanthi Banko (Chhattisgarh), Meher, Saraiphul & Danwar (Orissa), Atikaya & Kari Bhatta (Karnataka), are very common in India. Few varieties cultivated in restricted pockets of Kerala for their medical properties e.g. Chennellu, Kunjinellu, Erumakkari & Karuthachembavu etc.

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