

The Sacred Lotus

An Incredible Wealth of Wetlands

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The lotus is very much a part of Indian cultural traditions. Its importance has long been recognized and it has been grown for use as food, medicine and also for cultural and religious activities. Significantly, the longevity of the lotus seed is phenomenal, with viable seeds dated as being 1300 years old. Seed germination of the lotus is very rare in Nature; however, farmers' knowledge and experience may show how lotus seeds can be germinated.

Introduction

The lotus, *Nelumbo nucifera* Gaertn., is the national flower of India, under the family Nelumbonaceae. It is regarded as sacred and treated as a symbol of purity and sanctity because of the unique beauty of its flower. The lotus was extant 135 million years ago in aquatic habitats of the Northern Hemisphere. Historically, the lotus has been grown in the far East for 5000–7000 years [1], with evidence of its cultivation more than 3000 years ago for use as food, medicine and for cultural and religious activities [2]. In Buddhism, lotus symbolizes purity and is placed at the shrine to maintain serenity; more than 1000 years ago, Buddhist monks had grown the lotus extensively at a particular lake in China [2]. In Sanskrit, the lotus has many names such as *Padma*, *Kamal*, and *Pankaja*; all the names carry distinct meanings: *Padma* signifies that the lotus manifests itself by unfolding its petals and emitting fragrance as soon as the sun rises, whereas *Kamal* means that the presence of the lotus makes the water body vivacious [3]. *Pankaja* means 'growing in mud' which is considered to be a humble origin, but even so it ascends untainted above the water body with a flower of great aesthetic beauty.

Keywords

Lotus, cultural heritage, seed germination, propagation, lifecycle, plucking.



Cultural Heritage

Culturally, the lotus is considered auspicious in society, with evidence of its use in many spheres: the flowers are used from deities to dead bodies, from shrine to graveyard, are exchanged between couples during wedding ceremonies as a token of love, and garlands of flowers are offered to deities on occasion. People believe that if they go out to work after seeing the lotus, they may achieve success. In China, the seeds have been traditionally believed to be a symbol of fertility: newly-wed couples are expected to give birth to a male child if they eat food fortified with lotus seeds as an ingredient [2]. In rural Bengal, leaves are used as plates for mass gatherings during religious ceremonies. Ponds having lotuses are believed to be sacred and therefore, most of the shrine ponds preserve lotuses, apart from maintenance of aesthetic beauty [3].

Therapeutically flowers are used as astringents in diarrhoea, cholera, fever and recommended as cardiac tonic. Seeds are used to curb vomiting, and given to children as a diuretic, for skin diseases and leprosy, and are considered as an antidote to poison. Petioles are considered as astringent, useful for burning sensations and piles. The root in powder form is prescribed for curing piles, dysentery, and dyspepsia, and is used as a paste for skin infections and ringworm [4]. Lotus honey is considered as good as *Amrita* in Ayurveda and believed to be valuable as it can cure many common ailments [5]. Virtually, all parts of the lotus plant are used: the rhizome is used as food, seed as medicine, thalamus as fruit, leaves as plate (thali), stalks as pickle, petals for colour extraction, and tender leaves as food after being blended with vegetables [3].

Flowers' Variety

Usually, three varieties of lotus flowers are found in India, based on petal colour, such as white, reddish-white and reddish. Reddish-white flowers are more in demand compared to the other two varieties. White flowers are used for the preparation of garlands.



Figure 1 (a). A view of double flower. **(b)** A view of single flower.

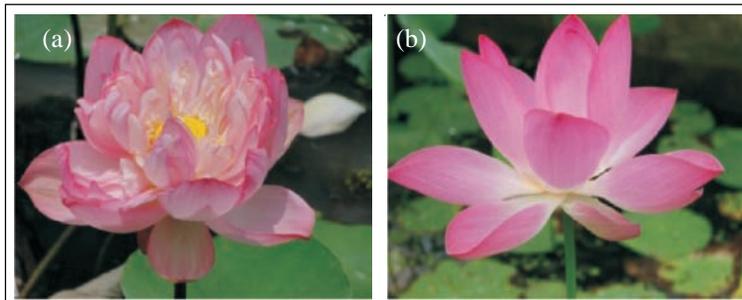
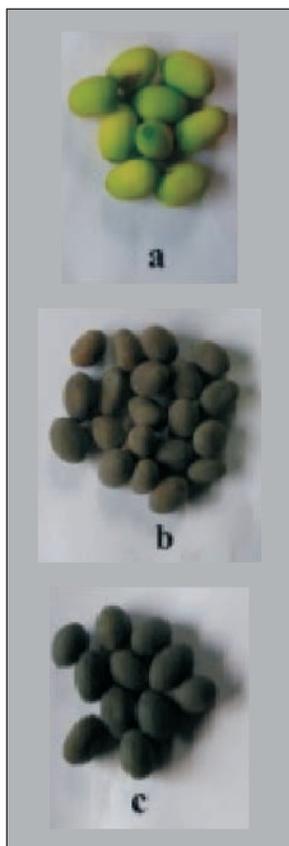


Figure 2. Different types of mature fruits: a: green; b: grey; c: black-grey.



The reddish variety is of low yield as compared to the other two and that is why farmers usually do not cultivate it. There are two types of flowers, namely double flowers and single flowers: double flowers have 100–150 petals per flower, whereas single flowers have 25–50 petals per flower (*Figures 1a and 1b*). The three varieties of lotus have both single and double flowers.

Cultivation and Harvest

Seed Germination – a Secret Trait

Significantly, the longevity of lotus seed is phenomenal, with the world's record for long-term seed viability reported as 1300 years for a seed from China. [2,6]. The importance of exceptionally long-term viability of seeds is the secret of their ability to resist ageing for many hundred years – a trait reflected in their possible capability to mend cellular damage [7,8]. This may be important for future research with regard to senescence and ageing.

Criteria to Germinate

Very seldom do lotus seeds germinate, as has been demonstrated by many unsuccessful efforts. However, the germination of lotus seeds depends upon proper selection of fruits, primarily based on the colour of pericarp (fruit coat) along with a few other traits. Experienced farmers are able to select black-grey colour of seeds, which is indicative of proper maturation for obtaining effective germination. There are three types of fruit maturation which is determined based on the colour of fruit coat: green, grey and black-grey (*Figure 2*). Besides, fruits which sink are more likely to germinate than buoyant ones. Each fruit is single seeded; out of





Figure 3 (left). Seedlings attached with thalamus.

Figure 4 (center). a: Plumule ; b: radicle; c: seedling with well-developed fibrous roots.

Figure 5 (right). a: Rudi-mentary radicle replaced with fibrous roots.

30–35 fruits, 15–17 (50%) become mature. However, only 3–4 seeds are able to germinate, which accounts for only 10 % of the total numbers of carpels of a flower. Once seeds germinate, sprouted seedlings remain intact as long as they are submerged in water (*Figures 3, 4 and 5*). Unlike other plants, the shoot (plumule) emerges prior to the root (radicle).

Growth and Development of Vegetation

Propagation by the rhizome is the easiest and fastest means of reproduction [1] as a part of lotus growth and spread (*Figure 6*). The rhizome, which is otherwise called ‘genet’ is able to develop new propagules under suitable conditions. The growth of lotus is through two distinct periods: active and dormant . Both vegetative and reproductive growth fall under active period, accompanied by the dormant period; the former covers 6-7 months which commences in March and ends in October. The active period comprises three phases: 1st phase, 2nd phase and 3rd phase (*Figure 7*).

Selection of Flowers to Pluck and Packaging

Generally, commercial harvest starts late at night (around 4.00 am) and is completed before sunrise around 5.30 am. Usually, 30.0 cm down from the

Figure 6 (top). A landscape view of 2nd phase.

Figure 7 (bottom). A conceptual model of the vegetative cycle of lotus.

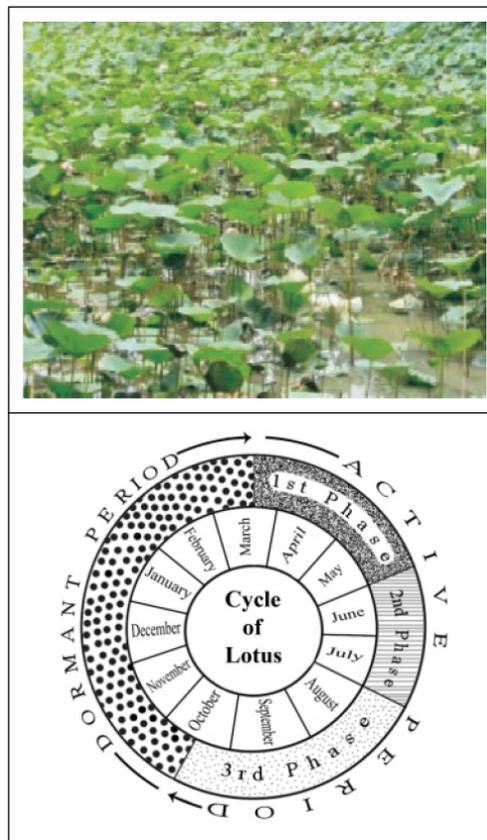


Figure 8 (top). A view of plucking of flowers.

Figure 9 (bottom). Packaging of lotus flowers.



flower base (actually base of thalamus) is preferable for plucking (*Figures 8 and 9*). With such plucking, the flower-bud remains intact as it is protected from shrinkage due to evapo-transpiration.

Epilogue

The lotus is a potential bio-resource with much research required to resolve many questions related to it, but it has yet to be given due importance. This article aims to highlight its significance to readers and researchers who may investigate its many qualities, including the secret of the seeds' longevity. On the other hand, its quality as a horticultural crop may be harnessed at commercial scales for the economic benefit of people. Fortunately, India is endowed with vast wetlands of different types such as fallow wetlands (beel, jheel, karanjali), ponds, canals, channels,



reservoirs, ditches and lakes. Most of these are either partly utilized or remain fallow due to weed infestation. In such cases, the lotus has the potential to be cultivated utilizing fallow wetlands just as cereal crops are. Lotus cultivation is expected to ensure the livelihood of a substantial number of farming communities in our country since the demand for the lotus as a horticultural crop is increasing in both national and international markets.

Suggested Reading

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