

Yucca gloriosa L. (Agavaceae) - A Potential Ornamental Plant in India

Rita Gupta, E Roshini Nayar, Anjula Pandey and DC Bhandari

Division of Plant Exploration and Germplasm Collection, National Bureau of Plant Genetic Resources, New Delhi-110012, India

Yucca gloriosa L. widely known for its value as ornamental and garden hedge was observed in flowering during 2001 to 2003 in the parts of Delhi and adjoining areas. This species in comparison with other species of the genera was found suitable for plantation on the roadside, road dividers (verge) and landscape in different parts of urban India. Botanical description, ecology, ornamental value and different uses of *Y. gloriosa* have been highlighted.

Key Words: *Yucca gloriosa*, Ornamental, Garden plant, Hedge plant, Botanical description

Introduction

Yucca gloriosa L. an ornamental shrub found growing in some parts of Delhi drew the attention of the authors because of its beautiful showy, greenish-white flowers. Observations of flowering and fruiting were made at different growth period from south and west parts of Delhi during 2001 to 2003. Herbarium specimens and seeds samples were collected and deposited in the National Herbarium of Cultivated Plants (NHCP), National Bureau of Plant Genetic Resources, New Delhi (HS no. 17869, Seed Sample no. 2495). In the present communication the ornamental value of the species (in comparison to other species of the genera) for planting on the roadside, road dividers (verge) and landscape areas in parts of urban India has been discussed.

Yucca species are native to hot and dry parts of Mexico, North America, Central America and the West Indies and introduced in different parts of the world for ornamental value (Ellison, 1995). The genus comprising of 40-50 species are stem-less perennial growing to the stature of small trees. Four species are recorded as having been introduced in India (Wealth of India, 1976), of which three (*Y. aloifolia* L., *Y. filamentosa* L. and *Y. gloriosa* L.) are commonly found (Babu, 1977). All three species are reported for ornamental and have potential use as medicine, fibre and detergent. Flowers and fruits of *Y. aloifolia* and *Y. filamentosa* are edible and rhizomes of *Y. gloriosa* is a source of Costa Rica Arrowroot starch.

All of them grow well in hot and dry conditions, in sub-tropical and semi-temperate zones. *Y. aloifolia* is common in the gardens of warm tropical regions and along road sides in Himalaya (altitude 2000m) (Hajra and Verma, 1996; Polunin and Stainton, 1985) and Bilaspur, Chhattisgarh (Khanna *et al.*, 2005). *Y. filamentosa*, is an evergreen rare shrub from tropical regions of India. *Y. gloriosa* is more common that thrives well in arid to

semi-arid regions and has become naturalized in parts of Himalaya and in the peninsular India. The tough rosette of evergreen leaves and showy flowers make it suitable as ornamental in different gardens of the world including India (Wealth of India, 1976).

On the basis of comparison in ecological and botanical characters, it was observed that all three species of *Yucca* have same origin and habitat. *Y. filamentosa* and *Y. gloriosa* are acaulescent shrubs with woody stems whereas *Y. aloifolia* is caulescent shrub and tallest among the three with simple stem and stiff leaves with sharp tips and denticulate margin that can easily cause painful punctures. *Y. filamentosa* having filamentous, blue green strappy leaves spread by short side growth. *Y. gloriosa* is a medium high plant with leaves crowned at the ground or at summit of the trunk. Flowers of *Y. aloifolia* and *Y. filamentosa* are creamy white whereas in *Y. gloriosa* flowers are greenish-white, reddish or purplish-tinged. Panicle of *Y. aloifolia* is shortest as compared to *Y. filamentosa* and *Y. gloriosa*. In comparison to others, *Y. gloriosa* has restricted growth and does not spread as a weed. It is propagated by seed, cuttings or suckers. The plant is a perennial with characteristic secondary growth that makes it a tough hedge plant. Observations pertaining to origin, distribution, habitat, botanical characters and economic uses have been recorded in Tables 1 and 2.

Botanical description of *Y. gloriosa* L. (<http://en.wikipedia.org/wiki/Yucca>)

***Yucca gloriosa* L.** (Maheshwari, 1963): A short-trunked, perennial, branched or unbranched small tree up to 3.4 m tall with several small stems arising from the base; base thickened in the adult specimens; **Leaves:** 60-75 X 5 cm, dark green to light grey-green, margins entire, smooth, stiff, forming a crown at the ground or at the summit of the trunk, apex sharp needle-pointed;

Table 1. Observations on *Yucca* species in India

| Phyto-geographical, and botanical features | <i>Y. aloifolia</i> | <i>Y. filamentosa</i> | <i>Y. gloriosa</i> |
|--|--|--|--|
| Origin | Mexico, West Indies and USA | Mexico, West Indies and USA | Mexico, North America, Central America and West Indies |
| Distribution | Temperate to sub-temperate regions; | Mainly in tropical regions | Tropical to sub-tropical regions; naturalised in Indian gardens in peninsular and lower slopes |
| Habitat | Hot and dry parts | Hot and dry parts | Hot and dry parts |
| Habit | Caulescent shrub, 6.0-7.5 m tall | Acaulescent shrub, 2.5-3.0 m tall | Acaulescent shrub, 3.0-4.0 m tall |
| Leaf | Dagger-like, very sharp pointed apex, grey-green, up to 75 cm, finely toothed, pungent reddish-brown horn at the top | Oblong-lanceolate, long curly threads on margins, up to 75 cm long | Stiff smooth, pointed tip, forming a tough crown of secondary branches at the ground, up to 75 cm long |
| Flower | Panicles 0.60-0.90 m long, creamy-white flowers, often tinged with purple colour | Panicles 1.0-3.6 m long, yellow-white flowers | Panicle 1.0-1.8 m or longer, greenish-white, reddish or purplish-tinged |
| Fruit | Black purple, baccate | Dry capsule | Dry, drooping capsule |
| Seed | Black compressed | Black compressed | Black, shiny, irregularly compressed |
| Flowering and fruiting | June-August | July-August | June-August |

Inflorescence: paniculate with alternate branches, 1.0-1.8 m, partially inferior to the leaves; **Flowers:** campanulate to elongate, numerous, pendulous, greenish-white, reddish or purplish-tinged, closely packed in a narrowly conical, solitary, drooping, bell-shaped, hermaphrodite; perianth lobes waxy; **Stamens:** six, embracing the ovary; styles connate forming a central canal; stigmas three, bilobed and forming a stigmatic chamber below; **Scape:** solitary central, woody, 2 m or even more in height; **Fruits:** a dry, drooping, green capsule, brownish on ripening, indehiscent, 5-8 X 2.5 cm, obovate; **Seeds:** black, shiny, irregularly compressed, thickened, roundish; **Flowering and fruiting:** June to late August.

Distribution, ecology and uses

Y. gloriosa grows on sand dunes along the coast and barrier islands of the southeastern USA, along with other species (*Y. filamentosa*, *Y. recurvifolia* and *Opuntia* species). This species has been successfully planted over a wide range of habitat and soil conditions. Generally it thrives well in arid to semi-arid conditions and adapted to diverse climatic and ecological habitats from rocky deserts, grassland, in mountainous regions, and even in sub-tropical and semi-temperate regions. It has been reported from Bilaspur (Chhattisgarh) (Khanna *et al.*, 2005), and Tamil Nadu (Henry *et al.*, 1989). Some of the significant uses for which this species has been introduced in India are given below:

Ornamental value: Like many other *Yucca* species, *Y. gloriosa* is also valued as ornamental for gardens, as hedge plant and also in pots (Maheshwari and Singh, 1965;

Wiersema and Loen, 1999). Plant is very handsome with creamy-white pendulous attractive flowers. This species is observed growing on the roadsides, especially on the flyovers and on road divider and public gardens. Bold sword like foliage provides it a handsome appearance suitable for landscape. The plant flowers during end of summer and autumn when blooming in most other ornamentals is over.

Fibre value: Rough fibre obtained from leaves is used in same way as that of sisal (*Agave sisalana* Perr.), jute (*Corchorus olitorius* L.) and hemp (*Cannabis sativus* L.) and used for making carpets and mats, ropes, cords, paper-making, etc. (Gamble, 1957; Wealth of India, 1976). The fibre extracted from leaves is wiry, round, moderately flexible and strong but harsh with good dyeing capacity. It is more water-resistant than hemp.

Medicinal value: The fruit is reported to be purgative (Hussain *et al.*, 1992; Kirtikar and Basu 1975). The Santal tribals use the plant for rheumatism, sores and ulcers, and also for dysentery, bronchitis, asthma, leprosy, hemorrhagic septicemia, etc. (Singh *et al.*, 1965).

Starch and detergent: The rhizome is a source of Costa Rica Arrowroot (Ambasta *et al.*, 1986; Tanaka, 1976). The underground parts possess detergent property used as an ingredient in soap manufacturing. Extract is employed to produce foam in beverages (Singh *et al.*, 1965; Watt, 1972).

Other uses: Some of the other potential uses include planting as windbreaks, dried plant parts as fuel (lowest ignition temperature), a trunk used as stockade and leaves for thatching and thin stem as tool handles.

Table 2. Uses of *Yucca* species for various purposes

| Uses | Plant part | Plant species | References |
|------------|------------------------------|--|--|
| Ornamental | Whole plant | <i>Y. aloifolia</i> , <i>Y. filamentosa</i> , <i>Y. gloriosa</i> | Maheshwari (1963), Maheshwari & Singh (1965), Singh <i>et al.</i> (1965), Wealth of India (1976), Wiersema & Loen (1999) |
| Edible | Flowers, fruits and rhizomes | <i>Y. aloifolia</i> , <i>Y. filamentosa</i> , <i>Y. gloriosa</i> | Ambasta <i>et al.</i> (1986), Kirtikar & Basu (1975), Singh <i>et al.</i> (1965), Tanaka (1976) |
| Fibre | Leaves | <i>Y. aloifolia</i> , <i>Y. filamentosa</i> , <i>Y. gloriosa</i> | Ambasta <i>et al.</i> (1986), Gamble (1957), Singh <i>et al.</i> (1965), Wealth of India (1976), Watt (1972) |
| Medicinal | Fruits | <i>Y. aloifolia</i> , <i>Y. filamentosa</i> , <i>Y. gloriosa</i> | Ambasta <i>et al.</i> (1986), Hussain <i>et al.</i> (1992), Kirtikar & Basu (1975), Singh <i>et al.</i> (1965), Wealth of India (1976) |
| Detergent | Rhizomes | <i>Y. aloifolia</i> , <i>Y. filamentosa</i> , <i>Y. gloriosa</i> | Ambasta <i>et al.</i> (1986), Kirtikar & Basu (1975), Singh <i>et al.</i> (1965), Watt (1972) |

Conclusions

All the three species of *Yucca* in India have ornamental value both for foliage and flowers and have many potential uses. *Y. gloriosa* is found suitable to semi-arid urban areas as hardy and good performer under low water input conditions and has low maintenance requirements (of pruning/ cutting, etc.) than many other species used for similar purpose. This species can be successfully planted on roadsides, on road dividers and flyovers, in parking lots, front or backyards of the houses where intense heat and light prohibits many other plants to grow. It can be used as a good barrier or hedge plant because of sharp leaves and tips/ margins and tough growth. Beside its value as ornamental it can be promoted on commercial scale for quality of fibre for cottage industry. Thus, this plant can be grown more extensively for different uses in various parts of India.

Acknowledgements

Authors express their sincere thanks to the Director, National Bureau of Plant Genetic Resources, New Delhi for providing all the facilities, encouragement and other staff members of the Division for helping in different ways.

References

- Ambasta SP, K Ramachandran, K Kashyapa and Ramesh Chand (eds.) (1986) The Useful Plants of India. Publications and Information Directorate, Council of Scientific and Industrial Research, New Delhi, India, pp 696.
- Babu CR (1977) Herbaceous Flora of Dehra Dun. Council of Scientific and Industrial Research, New Delhi, pp 514.
- Ellison Don (1995) Cultivated Plants of the World. Flora Publications International Pvt. Ltd., pp 564-566.
- Gamble JS (1957) Flora of Presidency of Madras. Vol 3, Botanical Survey of India. Calcutta, pp 1067.
- Hajra PK and DM Verma (1996) Flora of Sikkim. (Flora of India Series 2), Vol 1 Botanical Survey of India, Calcutta, pp 140-141.
- Henry AN, V Chithra and NP Balakrishnan (1989) Flora of Tamil Nadu, India. (Flora of India Series 1), Vol. 3 Botanical Survey of India, Coimbatore, Tamil Nadu, pp 35.
- Hussain Akhtar, OP Virmani, SP Popli, LN Misra, MM Gupta, GN Srivastava, Z Abraham and AK Singh (1992) Dictionary of Indian Medicinal Plants. Central Institute of Medicinal and Aromatic Plants, Lucknow, Uttar Pradesh, pp 498.
- Khanna KK, Anand Kumar and Ajay Kumar Jha (2005) Floristic Diversity of Chhattisgarh. Bishen Singh Mahendra Pal Singh, Cannanught Place, Dehra Dun, Uttarakhand, pp 465.
- Kirtikar KR and BD Basu (1975) Indian Medicinal Plants. Vol.4, Bishen Singh Mahendra Pal Singh, Dehra Dun, Uttarakhand, pp 2503.
- Maheshwari JK (1963) The Flora of Delhi. Council of Scientific and Industrial Research, New Delhi, India, pp 334.
- Maheshwari P and U Singh (1965) Dictionary of Economic Plants in India. Indian Council of Agricultural Research, New Delhi, pp 168.
- Polunin Oleg and Adam Stainton (1985) Flowers of the Himalaya. Oxford University Press, New Delhi, pp 418.
- Singh Umrao, AM Wadhvani, BM Joshi (1965) Dictionary of Economic Plants in India. Indian Council of Agricultural Research, New Delhi, pp 247.
- Tanaka AT (1976) Tanaka's Cyclopedia of Edible Plants of the World. Keigaku Publishing Company, Tokyo, Japan, pp 780-781.
- Watt G (1972) A Dictionary of the Economic Products of India (reprint ed.). Vol. 6(4), Cosmo Publication. Calcutta, India, pp 321-322.
- Wealth of India (1976) The Wealth of India-Raw Materials. Vol.11, Publication and Information Directorate, Council of Scientific and Industrial Research, New Delhi, India, pp 14-16.
- Wiersema JH and B Loen (1999) World Economic Plants - A Standard Reference. CRC Press, Washington, USA, pp 532.