



**ASSESSING THE MORPHOLOGICAL CHARACTERS FOR
TAXONOMIC SIGNIFICANCE AMONG INTRASPECIFIC
VARIATIONS OF THREE *NERIUM ODORUM* CULTIVARS**

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ABSTRACT

Nerium odorum (L.) (Apocynaceae) is one of the most interesting groups of ornamental plants with a high medicinal value. It is the only species currently classified in the genus *Nerium*. Though considerable variation can be observed in gardens around the world, no information on the origin is available and not even attempts have been made so far to study the genomic relations among *Nerium*. The study was

conducted for assessment of intraspecific variation in a highly valuable medicinal plant *Nerium odorum*. This work can lead to development of an efficient protocol to study the morphological relationship between three selected cultivars of *Nerium odorum* using morphological characters.

KEYWORDS: Intraspecific Variations, Medicinal Plant, Observing and Phenotypic Characters.

INTRODUCTION

Nerium odorum (L.) G. Don (family Apocynaceae) is one of the most interesting groups of ornamental plants in the world with a very high medicinal value. *Nerium* is cultivated worldwide as an ornamental plant. It is native to the Mediterranean region as explained by Kingsbury JM (1964): Hardin JW and Arena JM (1974). It is also found in Southern Europe and Southwest Asia, but is naturalizing very easily in many areas due to sub-spontaneous nature of this plant. It is the only species currently classified in this genus. *Nerium odorum* goes by the name Karaveera in Sanskrit and Kanher in Marathi. It is a very familiar plant in

the Western Deccan, and is almost an unfailing associate of water streams and rivers. In Sanskrit medical works of this plant is described as hot and poisonous. Its root is recommended for external application in skin diseases and is a popular remedy for venereal diseases. The oil prepared from the root-bark is recommended for skin diseases of a scaly nature and for Leprosy. The plant is used as a rat poison and an insecticide described by Kirtikar, K.R. and B.D. Bassu (1999). The powdered leaves and bark are used as an insecticide. A green dye is obtained from the flowers used for various purposes. The plant is commonly used for informal hedging in the Mediterranean. The leaves contain small amounts of latex that can be used to make rubber, though the amount is too small for commercial utilization. The plants have an extensive root system and are often used to stabilize soil in warmer areas.

It is one of the most poisonous plants known to this family and it is effective in snakebite cure. This species also produces secondary metabolites as worked by Paper & Franz (1989). Among alkaloids some of which are of pharmacological interest, mainly cardenolides, flavonoids and terpenes by Fu *et al.*, (2005), Zhao *et al.* (2007). For example, oleandrin has been identified as a potent antitumor compound by Manna *et al.* (2000). *Nerium odorum* is also used for wastewater purification and for restoration of riparian woodlands by Adrover *et al.* (2008). Initially, the plants were grown as garden plants because of their beautiful flowers of different colors, such as pink, scarlet red and white. Now a day, new and improved varieties of *Nerium* are also available. *Nerium odorum* is native to India and spread throughout the tropics and subtropics. Though considerable variations can be observed in gardens around the world, no information on the origin is available. Attempts have not been made so far to study the genomic relations among *Nerium*.

In view of these facts the study was conducted for the development of an efficient protocol to study the morphological relationship between three selected cultivars of *Nerium odorum* using morphological characters.

MATERIALS AND METHODS

Collection of plant material

The fresh plant material of *Nerium odorum* was collected from three (3) different locations of ECO Park Patna, Bihar state, India, in the month of September 2014 (Fig. 1). The plants were identified, confirmed and authenticated by Dr. M. P. Trivedi, Associate Prof. in Botany of Patna Science College, Patna similar work done by Gopala Krishna Bhat (2004). After

authentication of the plant, morphological studies carried out including parameters are height of plant, leaf length and breadth, diameter of flowers, flower's colour, floral variations and others similar work was done by Barua *et al.* (2007) on other plant. Detections of different Cultivars were based on the petal colour and shape as described by Shaw *et al.* (2009) in other species. Flower petal was separated as colourless (white) and colour (pink and red).

Plant

Appearance of the 05 plants observed and categorized. Their height was recorded and means value was taken.

Stem

Stem colour, texture, length and width of 05 stems were measured.

Leaf

The length and width (broadest width) of 05 leaves were measured. The length was taken from the base of the leaf lamina to the leaf apex while the width was from one end of the broadest section to the other. Leaf area, colour- above, below, shape, venation, presentation and type were also recorded.

Flower

The diameters of 05 flowers were measured. Flower colours were observed and its floral variations were also recorded. flower- petal, sepal, androecia, gynaecium and their type were also recorded.

Fruit

Five fruits obtained from each of the locations were used for the measurement. Their colour, shape, type and size were measured.

Seed

Five seeds obtained from each of the locations were used for the measurement. The length of each seed was taken from the tip to the base while the width was taken from one end of the widest section to the other of the seed. Their colour, shape and size were also observed.

Root

Five roots obtained from each of the locations were used for the measurement. Their texture and type were recorded.

RESULTS AND DISCUSSION

Plant

Nerium odorum is an evergreen, perennial, glabrous and erect or decumbent much branched under shrub, often woody towards lower side. It is an erect shrub that grows up to 04-07 meter in height and has cylindrical stems (Fig. 1) and table 1.



Figure 1: Whole plant of *Nerium odorum*.

Table 1: Morphological characteristics of three cultivars of *Nerium odorum* (L.)G. Don.

SL. NO.	DIAMETER AND PLACE OF FLOWER	PETAL COLOR	LEAF	FLOWER SMELL	FRUIT
NoW	The flowers grow in clusters at the end of each branch; 2.5–5.8 cm diameter, with a deeply 5-lobed fringed corolla round the central corolla tube.	White	Leaves are in pairs, thick and leathery, dark-green, narrow lanceolate, 5–22 cm long and 1–3.9 cm broad and with an entire margin.	Light sweet scented	The fruits are a long narrow capsule 5–24 cm long, splits open at maturity and release numerous seeds
NoP	The flowers grow in clusters at the end of each branch; 2.5–6.1 cm diameter, with a deeply 5-lobed fringed corolla round the central corolla tube.	Pink	Leaves are in whorls of three, thick and leathery, dark-green, narrow lanceolate, 5–23 cm long and 1–3.9 cm broad and with an entire margin.	sweet-scented	The fruits are a long narrow capsule 5–25 cm long, splits open at maturity and release numerous seeds
NoR	The flowers grow in clusters at the end of each branch; 2.5–6.1 cm diameter, with a deeply 5-lobed fringed corolla round the central corolla tube.	Red	Leaves are in whorls of three, thick and leathery, dark-green, narrow lanceolate, 5–23 cm long and 1–3.9 cm broad and with an entire margin.	sweet-scented	The fruits are a long narrow capsule 5–25 cm long, splits open at maturity and release numerous seeds

NoW- *Nerium odorum* White , NoP- *Nerium odorum* Pink and NoR- *Nerium odorum* Red.

Stem

Stem is usually with white latex and an unpleasant smell, irregularly and nodular. It has flexible branches with green, smooth bark eventually turning to dark grey on maturity. Cut or broken branches exude a thick, white sap. Stems narrowly winged, shortly hairy to glabrous, often woody at base and has cylindrical stems (Fig. 2).



Figure 2: Stem of *Nerium odorum* young green and old grey.

Leaves

N. odorum leaves are simple, lanceolate, , 5–23 cm long and 1–3.9 cm broad, and with an entire margin., narrow, acute in the apex, shortly petiolate, with a coriaceous darkgreen blade narrow, untoothed, short-stalked and dark or grey- green in color. Taste of all leaves is bitter. All leaves have a prominent mid rib, are "Leathery" in texture and usually arise in groups of three from the stem, tertiary venation inconspicuous (Fig. 3).



Figure 3: leaves of *Nerium*

Flowers

The plant produces terminal flower heads grow in clusters at the end of each branch, usually pink or white or red, 2.5–6.1 cm diameter with a deeply 5-lobed fringed corolla round the central corolla tube. They are often, but not always, sweet-scented. Each flower has five petalled although some cultivators have double flowers rose like appearance. (Fig. 4).



Figure 4: Flower of *Nerium odorum* simple and rose like.

Fruit

The fruit consists of a narrow follicle 5–25 cm long which opens to disperse fluffy seeds upon maturity. Oleander can be propagated by seeds but, being allogamous and highly heterozygous. It shows great variability in seedling population (Fig.5).



Figure 5: Fruit of *Nerium odorum* immature

Seed

Fruits are many seeded follicles (189 seeds per fruit on average), so that individual plants often liberate thousands of seeds in spite of the low percent fruit set. The hairy, water-dispersed seeds are released during the rainiest season in the year and germination follows rapidly. All seedlings tracked died before completing 1 year of life, mostly because of desiccation during the first summer drought.

Root

Its roots are tuberous with grey cork. The roots of *Nerium* are generally used in medicine; the root is crooked in shape. Root is prominent, usually branched, 0.5 to 3.9 cm diameter, goes 40 to 95 cm deep into soil (Figure 6).



Figure 6: Root of *Nerium odorum*

CONCLUSION

Morphological evaluation of *Nerium odorum* is for whole plant provided specific parameters that will be useful in scientific evaluation, identification and authentication of the plant and also the survival of this important medicinal plant. Due to its high demand over the world market the genuine plant (*i.e. Nerium odorum*) is rapidly harvested. Further this commercial plant can be minimized from over exploitations by recognizing and saving this plant also promoting cultivation of this plant.

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