



Morphological Characterization of Double Tuberoses (*Polianthes tuberosa* L.) Based on DUS Guidelines in Assam Condition

Kishalayee Gogoi* and Madhumita Choudhury Talukdar

Department of Horticulture, Assam Agricultural University, Jorhat-785013, Assam

*Corresponding Author E-mail: kishalayee@gmail.com

Received: 21.02.2019 | Revised: 30.03.2019 | Accepted: 7.04.2019

ABSTRACT

An experiment was carried out in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during 2016-18, to study Morphological characterization of double tuberoses (*Polianthes tuberosa* L.) based on DUS guidelines in Assam condition. The experiment was laid out with four double tuberoses genotypes in Randomized Block Design (RBD) with four replications. Results indicated that morphological traits based on DUS guidelines contributing largely to the variability were those related to leaf colour, leaf variegation, pigmentation at leaf base on abaxial side, bud and flower colour, flower type, rows of tepal, tepal tip, inflorescence, flower shape, flower tube shape, tepal colour on abaxial side, bud length, flower diameter and days taken for flowering. Morphological characterization showed distinct differences in six floral characters and one foliage (vegetative character) characters.

Key words: Tuberoses, Morphological Traits, DUS, Genotypes, Floral Characters

INTRODUCTION

Tuberoses (*Polianthes tuberosa* L.) is a bulbous fragrant ornamental plant, native to Mexico. In India, tuberoses occupies a prime position in the floriculture industry. The major portion of tuberoses flowers consumption is in the form of loose flowers and cut flowers. The loose flowers of tuberoses have high demand in the market for making garlands and other floral arrangements. The tuberoses flowers are valued more because they impart sweet and lingering pleasant fragrance. The highly fragrant single petaled flowers contain 0.08 to 0.14 per cent concrete which is used in high grade perfumes. There is a good demand for tuberoses concrete

and absolute in the international market and fetches a good price. Its essential oil is exported at an attractive price to France, Italy and other countries³. Hence, tuberoses is extensively cultivated as a source of raw material for perfume industry². Since Assam is agro climatically most suited for growing tuberoses, there is a great scope for building up of commercial cut flower market for tuberoses in this region. Cut flower industry is still in its infancy in Assam and growers are unaware of the importance of different tuberoses cultivars as per demand in both local and international market.

Cite this article: Gogoi, K. and Talukdar, M. C., Morphological Characterization of Double Tuberoses (*Polianthes tuberosa* L.) Based on DUS Guidelines in Assam Condition, *Int. J. Pure App. Biosci.* 7(3): 38-43 (2019). doi: <http://dx.doi.org/10.18782/2320-7051.7312>

Therefore there is need to introduce different tuberose cultivars as a cut flower, source of essential oil and possibly more way towards export in this area. Looking to the potential of some tuberose cultivars there is an urgent need to evaluate them under Assam conditions so that suitable cultivars could be recommended for this region. Though many tools are now available to study relationship among cultivars including various types of molecular markers, however, morphological characterization is the first step in description and classification¹.

MATERIAL AND METHODS

The present investigation included 4 genotypes of the species conducted in the Experimental Farm, Department of Horticulture, Assam Agricultural University, Jorhat during 2016-18. The genotypes taken were Vaibhav,

Subhasini, Mexican Double and Calcutta Double. The experiment was laid out in randomized block design with four replications. The soil was brought to a fine tilth by giving deep ploughings. The field was divided into plots for allotment of various treatments. Sixteen plots were laid out to accommodate all the four treatments replicated four times. The gross size of an individual plot was 2.5 x 1.5 m in each replication. Medium sized bulbs of 3.0 - 3.5 cm diameter weighing about 25 grams were selected and treated with Bavistin 1.5g/l water for half an hour. The treated bulbs were planted in rows at 30 x 25 cm spacing accommodating 28 plants per plot. The test guidelines were developed by Dr. Meenakshi Srinivas, Principal Scientist at IIHR, Bangalore.

Table 1: Optimum stage of observation of each characteristic during the growth and development of plant

Decimal code	Stages
0	Planting
01	Sprouting
02	Leaf Emergence
03	Initiation of Inflorescence
04	Inflorescence Emergence
05	Opening of 1 Pair of florets

Table 2: Characteristics based on DUS guidelines

Sl. No	Character	State	Stage of observation	Type of Assessment
1.	Leaf colour	Light green Dark green	02	VS
2.	Leaf variegation	Absent Present	02	VG
3.	Pigmentation at leaf base on abaxial side	Weak Medium Strong	02	VG
4	Bud length	Short <5 cm Medium 5-6 cm Long >6 cm	05	MS
5	Bud colour	Green Pink	05	VG
6	Flower colour	White Yellow Pink	05	VG
7	Flower type	Single Double	05	VG

8	Flower diameter	Small <4 cm Medium 4 - 4.5 cm Large >4.5 cm	05	MS
9	Tepal tip	Acute Apiculate Obtuse	05	VG
10	Rows of tepal	1 >3	05	MG
11	Inflorescence	Straight Crooked Slightly Bent	05	VG
12	Flower shape	Tubular Narrow funnel Broad Funnel	05	VG
13	Flower tube shape	Bent Straight	05	VG
14	Tepal colour on abaxial side	Greenish Tinge Pinkish Tinge	05	VG
15	Anthers	Normal Malformed	05	VG
16	Days taken for flowering	Early 90-100days Late >100 days	05	MG

*** MG: Measurement by a single observation of a group of plants or parts of plants

MS: Measurement of a number of individual plants or parts of plants

VG: Visual assessment by a single observation on a group of plants or parts of plants

VS: Visual assessment by observations of individual plants or parts of plant

RESULTS AND DISCUSSION

The morphological markers in 4 genotypes of tuberose are presented in Table 3. In the present study, there was no variation among tuberose varieties for few traits/characters viz. leaf colour, leaf variegation, flower colour, flower type, rows of tepal, inflorescence, flower shape, flower tube shape and anthers. Thus tuberose varieties are very difficult to be differentiated on the basis of these traits. However, varieties evaluated for rest of the traits differed clearly from each other and form reliable morphological descriptor profile. The descriptors have been explained separately on the basis of foliage and flower characteristics¹.

From the morphological descriptors (Table 3) it was observed that the colour of leaves of Suvasini, Vaibhav, Mexican Double and Calcutta Double were light green and they exhibited non variegated leaves. Variation in pigmentation at leaf base on abaxial side was observed among the cultivars. Cultivar Suvasini showed weak pigmentation, Cultivars Vaibhav, Mexican Double and Calcutta

Double showed strong pigmentation. Based on the length of the buds cultivars are grouped into short(< 5cm), medium(5-6cm) and long(> 6cm). Cultivars viz. Vaibhav and Calcutta Double produced short buds. Cultivars viz. Suvasini and Mexican Double produced medium buds. The colour of the flower bud plays an important role in consumer acceptability and marketability. Tuberose cultivars are grouped in to two groups i.e. flower bud with green tinge and flower bud with pink tinge. Cultivars viz. Suvasini, Mexican Double and Calcutta Double falls under pink coloured group whereas cultivar Vaibhav falls under green coloured group. All cultivars exhibited white coloured flowers. The flower tepal colour on abaxial side recorded considerable variation. Tuberose cultivars viz. Suvasini, Mexican Double and Calcutta Double exhibited pinkish tinge on abaxial side. Whereas Vaibhav exhibited greenish tinge on abaxial side of the petal. Tuberose cultivars are classified into two groups based on arrangement of perianth viz.

single and double in which former consists of a single row of tepals which is used as loose flower and later with more than a single row of tepals which suits as cut flower. All the four cultivars were grouped under double. Double cultivars consist of more than one row of tepal. Based on the flower diameter the cultivars are categorized as small (< 4cm), medium(4-4.5cm) and large(> 4.5cm). Cultivars viz. Vaibhav and Calcutta Double fall under small group. Cultivars viz. Suvasini and Mexican Double fall under medium group. Variation in tepal tip of flowers was observed in tuberos which is having prominent tepal tip of acute, apiculate and obtuse. Cultivar Vaibhav were having acute tip where as cultivars Suvasini and Calcutta Double were having apiculate tip and cultivar Mexican Double was having obtuse tip. Straight spikes are more preferable than crooked and bent spikes. All the cultivars Suvasini, Vaibhav, Mexican Double and Calcutta Double recorded straight spike. Cultivars Vaibhav, Suvasini, Mexican Double

and Calcutta Double fall under narrow funnel group. All the produced straight flower tube. Anthers of double cultivars are found malformed. Cultivars viz. Suvasini, Vaibhav and Mexican Double took 90-100 days for flowering and they are grouped as early. Whereas Calcutta Double took more than 100 days for flowering and it grouped as late.

The morphological characterization of four cultivars clearly brought out the differences. The data presented indicated that these cultivars did not differ significantly when nine traits i.e. leaf colour, leaf variegation, flower colour, flower type, rows of tepal, inflorescence, flower shape, flower tube shape and anthers taken into consideration. However, distinct differences were noticed in six floral characters and one in foliage (vegetative character). Bharti *et al.*¹, also performed DUS testing on fifteen tuberos cultivars and distinct differences noticed in thirteen floral characters and ten in foliage characters (vegetative character).

Table 3: Morphological characters based on DUS guidelines

Sl no	Cultivars	Leaf colour	Leaf variagation	Pigmentation at leaf base on abaxial side	Bud length	Bud colour	Flower colour	Tepal colour on abaxial side	Flower type
1	Subhasini	Light green	Absent	Weak	Medium	Pink	White	Pinkish tinge	Double
2	Vaibhav	Light green	Absent	Strong	Short	Green	White	Greenish tinge	Double
3	Maxican Double	Light green	Absent	Strong	Medium	Pink	White	Pinkish tinge	Double
4	Calcutta Double	Light green	Absent	Strong	Short	Pink	White	Pinkish tinge	Double

Continue.

Sl no	Cultivars	Rows of tepal	Flower diameter	Tepal tip	Inflorescence	Flower shape	Flower tube shape	Anthers	Days taken for flowering
1	Subhasini	>1	Medium	Apiculate	Straight	Narrow funnel	Straight	Malformed	Early
2	Vaibhav	>1	Small	Acute	Straight	Narrow funnel	Straight	Malformed	Early
3	Maxican Double	>1	Medium	Obtuse	Straight	Narrow funnel	Straight	Malformed	Early
4	Calcutta Double	>1	Small	Apiculate	Straight	Narrow funnel	Straight	Malformed	Late



Light green coloured leaf

Flower tube shape (Straight)



Calcutta Double

Mexican Double



Subhasini

Vaibhav

REFERENCES

1. Bharti, H., Singh, P.K. and Singh, C.M., Morphological characterization of tuberose (*Polianthes tuberosa* Linn.) germplasms using DUS testing. *Progressive Horticulture*, **47(2)**: (2015).
2. Gandhi, P., *Evaluation of Tuberose (Polianthes tuberosa L.) for quality, yield and tolerance/ resistance to root knot nematode (Meloidogyne incognita)*. Master of Science thesis submitted to College of Horticulture Venkataramannagudem, West Godavari, Dr Y.S.R. Horticulture University. (2017).
3. Sadhu, M.K. and Bose, T.K., Tuberose for most artistic garland. *Indian Hort.*, **18(3)**: 17-20 (1973).
4. Srinivas, M., Guidelines for the conduct of test for distinctiveness, uniformity and stability. (2013).