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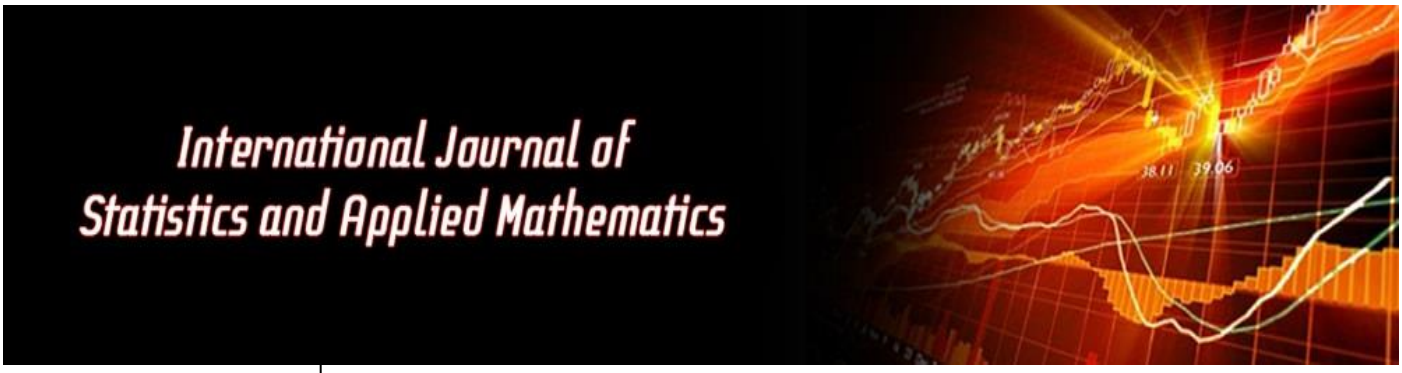


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# A study on performance of *Hibiscus rosa-sinensis* L.

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**Abstract**
The present study was planned to assess mean performance of twenty genotypes of Hibiscus. Significant treatment differences indicated appreciable amount of variability for all character studied in present investigation A high degree of variation was observed in respect of all seventeen characters studied excepts number of secondary branches per plant. Among the twenty genotypes studied, HCH-15-014 was found best for pot planting as with least height and E-W and N-S spread. Number of flowers per plant was recorded at high magnitude by genotypes *viz.* HCH-15-003, HCH-15-009 and HCH-15-016. The genotype HCH-15-004 was recorded maximum flower weight and total weight of flowers per plant. The genotypes HCH-15-015 and HCH-15-011 respectively recorded maximum pedicle and style length.

**Keywords:** Hibiscus, mean performance, genotypes and growth parameters

## Introduction
*Hibiscus rosa-sinensis* L. commonly known as china rose or Jaswand and is one of the important cut flower produced in all states of India. It is one of beautiful shrub grown in tropical and subtropical region of the country and widely grown in our Indian gardens and produced flowers almost throughout the year. The flowers are in many colours including white Red, Pink, Yellow, Magenta, Orange etc. It is grown in countries like Hawaii, USA. (Florida), Sri Lanka and India. Nakasone and Rauch (1980) [4] reported that Hibiscus is cultivated widely in Hawaii. Hawaii has the reputation of possessing the world's richest collection and being the center for evolving new varieties.

In Maharashtra it is generally grown in every kitchen garden either in soil or in pots. Numbers of local types (different colours and shapes) are available in country with different bloom period. While reviewing the breeding aspects of this crop, it was observed that very limited systematic attempts were made to improve this crop indicating the need of developing new varieties with desirable attributes. Success of plant breeding depends upon selection of elite genotypes which ultimately depends on information of mean performance, variability, correlation and path analysis study, heritability, genetic advance, genetic advance as percent mean and genetic diversity.

Analysis of variance for each character helps meaningful comparison of variation of several traits of plants within population (Panse and Sukhatme,1985) [6]. Therefore, keeping the above points in view, present study was undertaken to study the mean performance in *Hibiscus rosa-sinensis* L.

## Materials and Methods
The experiment was conducted in a randomized block design with two replications. Each plot contains six plants spaced at 1.8 X 1.0 m at Modibaug, Horticulture section, College of Agriculture, Shivajinagar, Pune -5 (M.S) during year 2015-2017. The experimental material consisted of 20 genetically diverse genotypes of *Hibiscus rosa-sinensis* L. obtained from different sources. All cultural practices and application of fertilizers were common for all the Varieties. The usual cultural practices like weeding, irrigation and plant protection measures were followed as and when required during the growth period of the crops. Three plants per treatment were used for recording the observations on weight of flower (gm), pedicel length (mm), style length (mm), weight of flowers per plant (g), days for initiation of flower bud from planting, longevity of flower, diameter of flower (cm), days to anthesis, length of flower bud

(cm), number of nodes at which first flower appeared, number of petals / flower, plant height (cm) at 360 dap, plant spread (EW) in cm, plant spread (NS) in cm, number of primary branches / plant, number of secondary branches per plant and number of flowers per plant were recorded. The analysis of variance was done as suggested by (Panse and Sukhatme, 1985) [6].

**Results and Discussion**

Significant treatment differences indicated appreciable amount of variability for all character studied in present investigation (Table 1). Similar results was reported by Ahmed *et al*. (2013) for Sixteen genotypes of Roselle (*Hibiscus sabdariffa*). The variability of number of flowers per plant (yield) ranged between 13 to 74 with mean of 33.67. Like-wise other growth, duration, yield and flower quality attributes showed wide range of variability *viz.* Plant height (52.24-247.68 cm); East-West plant spread (27.75-143.76 cm); North-South plant spread (25.98-127.75 cm); number of primary branches per plant (3.33-19.50); number of secondary branches per plant (2.66-15.50). The durational attributes *viz.* number of node at which first flower appeared (12.93-43.76); days for initiation of flower bud from planting (88.00-194.50) and days to anthesis from initiation of flower bud (15.66-28.16). The flower characters *viz.* Pedicel length (12.73-103.20 mm); Length of flower bud (2.46-3.57 cm). Weight of flower (8.88-113.24 g) style length (19.23-71.35 mm); weight of flowers per plant (164.96-4925.24 g), diameter of flower (4.45-15.72 cm); number of petals per flower (5.00-37.00) and longevity of flower (8.13-16.83 hrs.). Similarly wide range of variability was also recorded in respect of stem colour. At initial stage, leaf shape, leaf margin; leaf venation colour; bloom period (6 months to 12 months) presence of flower eyes and its colour. No any variation in respect of number of stigma (5.00) lobes leaf margin colour (green) was recorded for all genotypes. Similar results were reported by Gilman and Watson (2014) [5] in *Hibiscus syriacus* L. Falusi *et al*. (2014) [2] and Salih *et al*. (2014) [3] were also reported variability for several parameters in *Hibiscus sabdariffa* L.

Among the twenty genotypes studied, HCH-15-014 was found best for pot planting as with least height and E-W and N-S spread (Table 2). The genotypes HCH-15-017 and HCH-15-018 was found best for number of primary and secondary branches per plant; the genotypes HCH-15-016; HCH-15-007 and HCH-15-001 for early initiation of flower bud from planting. The genotypes HCH-15-017 and HCH-15-019 (least days for anthesis from days of initiation of flower bud); the genotypes *viz.*,HCH-15-008; HCH-15-004; HCH-15-001 and HCH-15-018 for longer longevity; the genotypes HCH-15-011 for maximum flowering diameter and longer flower bud, the genotype HCH-15-015 (for least flowering node); for maximum number of petals per flower the genotypes HCH-15-004; HCH-15-008 and HCH-15-018 recorded their superiority. Number of flowers per plant, the important parameter recorded at high magnitude by genotypes *viz.* HCH-15-003, HCH-15-009 and HCH-15-016. The genotype HCH-15-004 was recorded maximum flower weight and total weight of flowers per plant. The genotypes HCH-15-015 and HCH-15-011 respectively recorded maximum pedicle and style length. Anuja *et al*. (2012) [1] studied 30 genotypes of French Marigold and indicated that there were highly significant differences between the genotypes for flower yield.

**Table 1:** Analysis of Variance for 17 characters in *Hibiscus rosa-sinensis* L.

| Sr. No. | Characters | Mean Sum of Squares | | |
|---|---|---|---|---|
| | | Replication (1) | Treatments (19) | Errors (19) |
| 1 | Plant height (cm) | 104.491 | 3967.653** | 496.680 |
| 2 | Plant Spread E-W (cm) | 65.613 | 1420.282** | 117.411 |
| 3 | Plant Spread N-S (cm) | 0.689 | 1067.078** | 120.450 |
| 4 | No. of branches (Primary) per plant | 2.347 | 25.867** | 3.383 |
| 5 | No. of branches (Secondary) per plant | 0.131 | 22.550* | 8.063 |
| 6 | Days for initiation of flower bud from planting | 193.600 | 2698.268** | 22.547 |
| 7 | Days to anthesis | 0.025 | 19.642** | 1.867 |
| 8 | Longevity of flower (hrs.) | 0.021 | 11.526** | 0.023 |
| 9 | Length of flower bud (cm) | 0.040 | 0.215** | 0.066 |
| 10 | Number of node at which first flower appeared | 47.067 | 132.819** | 23.473 |
| 11 | Diameter of flower (cm) | 0.116 | 12.216** | 0.439 |
| 12 | Number of petals per flower | 152.100 | 153.179** | 1.995 |
| 13 | Number of flowers per plant | 0.025 | 570.488** | 22.078 |
| 14 | Weight of flower (g) | 0.227 | 1326.775** | 9.98 |
| 15 | Weight of flowers per plant (g) | 1657.373 | 2387037.787** | 42620.712 |
| 16 | Pedicel length (mm) | 0.529 | 779.123** | 21.471 |
| 17 | Style length (mm) | 10.032 | 362.694** | 9.176 |

*Significant at 5%, **Significant at 1% level.

Figures in parentheses indicate degree of freedom

**Table 2:** Mean performance of 20 Hibiscus genotypes for 18 characters

| Genotypes | Plant height (cm) | Plant Spread (cm) | | No of branches per plant | | Days for initiation of flower bud from planting | Days to anthesis | Longevity of flower (Hrs.) | Length of flower bud (cm) | Number of nodes at first flower appeared |
|---|---|---|---|---|---|---|---|---|---|---|
| | | E-W | N-S | Primary | Secondary | | | | | |
| HCH-15-001 | 68.38 | 35.53 | 37.23 | 6.66 | 5.66 | 93.50 | 22.33 | 14.15 | 2.61 | 12.93 |
| HCH-15-002 | 104.91 | 52.98 | 46.16 | 3.33 | 5.99 | 181.00 | 23.00 | 9.42 | 3.10 | 40.70 |
| HCH-15-003 | 116.53 | 62.46 | 49.18 | 10.16 | 10.16 | 105.50 | 25.66 | 11.45 | 3.11 | 17.96 |
| HCH-15-004 | 120.09 | 47.53 | 47.03 | 10.16 | 7.33 | 96.50 | 21.99 | 15.25 | 2.76 | 15.89 |
| HCH-15-005 | 84.54 | 51.95 | 53.83 | 4.83 | 9.49 | 180.00 | 22.00 | 8.13 | 3.43 | 17.56 |
| HCH-15-006 | 82.73 | 32.96 | 34.34 | 7.33 | 4.83 | 111.00 | 21.16 | 9.26 | 3.18 | 17.36 |
| HCH-15-007 | 89.68 | 29.76 | 32.03 | 6.50 | 3.16 | 90.50 | 19.50 | 8.42 | 2.68 | 15.49 |
| HCH-15-008 | 76.41 | 39.50 | 42.93 | 9.99 | 7.33 | 123.50 | 28.16 | 16.83 | 3.02 | 15.83 |
| HCH-15-009 | 131.35 | 68.11 | 83.51 | 6.83 | 15.50 | 121.50 | 16.99 | 9.62 | 3.44 | 21.80 |
| HCH-15-010 | 78.16 | 37.93 | 35.98 | 5.66 | 8.33 | 193.50 | 18.83 | 9.64 | 3.34 | 23.23 |
| HCH-15-011 | 97.55 | 57.15 | 50.06 | 6.49 | 5.83 | 130.00 | 21.16 | 8.49 | 3.57 | 19.53 |
| HCH-15-012 | 100.49 | 55.92 | 50.21 | 6.16 | 7.49 | 193.00 | 20.33 | 9.54 | 3.37 | 29.06 |
| HCH-15-013 | 78.68 | 50.58 | 51.11 | 6.83 | 9.33 | 126.00 | 18.16 | 9.82 | 3.25 | 17.59 |
| HCH-15-014 | 52.24 | 27.75 | 25.98 | 5.16 | 2.66 | 123.00 | 17.16 | 11.33 | 2.69 | 16.16 |
| HCH-15-015 | 71.39 | 39.55 | 37.50 | 11.33 | 4.50 | 119.50 | 18.83 | 9.42 | 3.00 | 14.83 |
| HCH-15-016 | 89.28 | 41.73 | 43.15 | 12.16 | 2.99 | 88.00 | 18.16 | 10.90 | 2.79 | 17.49 |
| HCH-15-017 | 247.68 | 143.76 | 127.75 | 19.50 | 4.50 | 142.50 | 15.66 | 11.72 | 3.15 | 43.76 |
| HCH-15-018 | 189.38 | 100.46 | 83.77 | 11.99 | 13.83 | 166.50 | 19.33 | 12.87 | 2.71 | 24.06 |
| HCH-15-019 | 108.06 | 57.16 | 60.41 | 8.66 | 7.33 | 194.50 | 15.83 | 9.21 | 2.46 | 22.99 |
| HCH-15-020 | 90.16 | 60.65 | 48.11 | 8.99 | 6.16 | 113.00 | 19.83 | 8.72 | 2.66 | 19.56 |
| SE (m) ± | 15.76 | 7.66 | 7.76 | 1.30 | 2.01 | 3.36 | 0.97 | 0.11 | 0.18 | 3.43 |
| C.D at 5% | 46.65 | 22.68 | 22.97 | 3.85 | 5.94 | 9.94 | 2.86 | 0.32 | 0.54 | 10.14 |
| Mean | 103.89 | 54.67 | 52.02 | 8.43 | 7.12 | 134.65 | 20.20 | 10.71 | 3.02 | 21.19 |

**Contd….**

| Genotypes | Diameter of flower (cm) | Number of petals per flower | Number of flower per plant | Weight of flower (g) | Weight of flowers per plant (g) | Pedicel length (mm) | Style length (mm) | Number of stigma lobes |
|---|---|---|---|---|---|---|---|---|
| HCH-15-001 | 8.64 | 12.00 | 29.00 | 65.34 | 1896.76 | 32.93 | 43.29 | 5.00 |
| HCH-15-002 | 11.90 | 5.00 | 23.50 | 25.50 | 597.96 | 49.69 | 57.42 | 5.00 |
| HCH-15-003 | 7.42 | 5.00 | 74.00 | 11.56 | 857.42 | 12.73 | 19.23 | 5.00 |
| HCH-15-004 | 8.84 | 37.00 | 43.50 | 113.24 | 4925.24 | 65.85 | 44.81 | 5.00 |
| HCH-15-005 | 8.36 | 7.50 | 28.00 | 24.77 | 700.13 | 23.73 | 55.60 | 5.00 |
| HCH-15-006 | 9.23 | 7.50 | 17.50 | 18.86 | 326.60 | 20.50 | 26.02 | 5.00 |
| HCH-15-007 | 5.23 | 7.50 | 48.50 | 13.56 | 657.81 | 34.12 | 39.17 | 5.00 |
| HCH-15-008 | 9.17 | 33.50 | 24.00 | 60.27 | 1457.01 | 51.13 | 34.54 | 5.00 |
| HCH-15-009 | 8.14 | 7.50 | 65.00 | 31.60 | 2054.55 | 53.73 | 61.46 | 5.00 |
| HCH-15-010 | 9.59 | 7.50 | 22.50 | 26.20 | 589.54 | 40.29 | 52.49 | 5.00 |
| HCH-15-011 | 15.72 | 7.50 | 29.00 | 66.71 | 1948.95 | 49.78 | 71.35 | 5.00 |
| HCH-15-012 | 6.53 | 7.50 | 13.00 | 30.17 | 389.78 | 21.86 | 38.54 | 5.00 |
| HCH-15-013 | 9.06 | 7.50 | 42.00 | 49.43 | 2075.73 | 53.27 | 4.57 | 5.00 |
| HCH-15-014 | 6.61 | 7.50 | 26.00 | 22.56 | 584.88 | 45.32 | 43.17 | 5.00 |
| HCH-15-015 | 4.45 | 7.50 | 38.50 | 22.83 | 877.49 | 38.34 | 38.97 | 5.00 |
| HCH-15-016 | 6.82 | 7.50 | 59.00 | 22.83 | 1349.25 | 58.28 | 63.01 | 5.00 |
| HCH-15-017 | 5.62 | 7.50 | 29.00 | 12.95 | 375.69 | 103.20 | 60.96 | 5.00 |
| HCH-15-018 | 7.36 | 16.50 | 26.00 | 30.25 | 786.56 | 40.15 | 44.86 | 5.00 |
| HCH-15-019 | 9.02 | 7.50 | 21.50 | 8.88 | 190.53 | 35.79 | 41.86 | 5.00 |
| HCH-15-020 | 6.89 | 7.50 | 14.00 | 11.80 | 164.96 | 31.60 | 27.12 | 5.00 |
| SE (m) ± | 0.47 | 0.99 | 3.32 | 2.23 | 145.98 | 3.28 | 2.14 | - |
| C.D at 5% | 1.39 | 2.96 | 9.83 | 6.61 | 432.10 | 9.70 | 6.34 | - |
| Mean | 8.23 | 10.70 | 33.67 | 33.47 | 1140.34 | 43.12 | 45.42 | 5.00 |

## Conclusion

The study revealed significant treatment differences, indicating substantial variability across all characteristics examined. Similar findings were reported by Ahmed *et al*. (2013) for sixteen Roselle genotypes and by other researchers for Hibiscus species. The variability in plant height, spread, branch number, flowering time, and flower characteristics such as size, weight, and longevity was considerable. Genotype HCH-15-014 was best for pot planting due to its compact size. HCH-15-017 and HCH-15-018 excelled in branch number, while HCH-15-004 showed the highest flower weight and total flower yield per plant. These findings underscore the potential for selecting superior genotypes for specific horticultural traits.

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