



## Research Article

# PERFORMANCE OF RIDGE GOURD (*Luffa acutangula* L. Roxb.) VARIETIES AND NATURE OF CULTIVATION ON GROWTH AND FLOWERING ATTRIBUTES

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**Abstract-** The trellising system of ridge gourd cultivation recorded maximum length of vine at 45 days after sowing and at last harvest, branches per plant, leaf area per plant at 60 DAS, chlorophyll content index at 60 DAS and female flowers per plant as well as minimum days for first male and female flower, days for female flower initiation to edible maturity, node on first female flower, number of male flowers per plant and sex ratio. Pusa Nasdar recorded maximum length of vine at 45 DAS, leaf area per plant at 60 DAS, CCI at 60 DAS and number of female flowers per plant as well as minimum days for first male and female flower, days for female flower initiation to edible maturity, node on first female flower, number of male flowers per plant and sex ratio. PKM-1 recorded maximum length of vine at last harvest and branches per plant.

**Keywords-** Trailing, Trellising, Kniffin, Ridge gourd

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## Introduction

Ridge gourd (*Luffa acutangula* L. Roxb.), popularly known as kalitori and called as angled gourd, angled loofah, chinese okra, silky gourd and ribbed gourd. Ridge gourd belongs to genus *Luffa* of *cucurbitaceae* and has chromosome number  $2n = 26$ . Trailing is giving physical support to the plant or branches which prevents them for falling and leads them to grow in the desired direction. Trailing helps to the plants for increasing vine length, number of leaves and side branches which will increase carbohydrate accumulation. To increase the productivity of crop, it is essential to standardize the agro techniques such as trailing of vines with appropriate manner to improve the fruit set, fruit yield and good quality of fruits. Trailing helps to obtain desired sunlight and it improves fruit yield and quality by keeping plants and fruits above the ground level as well as reduce the damages occurred from high soil temperature. This present field evaluation was conducted to find out the suitable nature of cultivation and variety for ridge gourd cultivation under North Gujarat region.

## Material and Methods

This field study was carried out at Horticulture Instructional Farm, C.P. College of Agriculture, S. D. Agricultural University, Gujarat during summer 2015. Experiment was laid out in Factorial Randomized Block Design with four replications for two factors viz., nature of cultivation (S) and varieties (V). Nature of cultivation factor was with two levels viz., trellising system ( $s_1$ ) and non-trellising ( $s_2$ ) system and six varieties viz., Gujarat Anand Ridge Gourd-1 ( $v_1$ ), HisarKalitori ( $v_2$ ), Pusa Nasdar ( $v_3$ ), Arka Sujath ( $v_4$ ), PKM- 1 ( $v_5$ ) and Local ( $v_6$ ). Thus making total twelve treatment combinations. Six varieties of ridge gourd were sown into two conditions i.e. trellising system and non-trellising system. Under trellising system plants were grown over the kniffin structure. Kniffin were prepared with the help of 6 ft heighted cement poles. The cement poles were fixed in soil at 45 cm depth at 5 m apart along the length of the rows. The end poles were supported with one extra pole for

strengthening each kniffin and 18 gauge G. I. wires were stretched and fastened on poles at 45, 90 and 120 cm height above the ground. Under non-trellising system plants were grown as per the conventional system of planting. In this method vines were allowed to trail freely on the ground surface.

Five plants were randomly selected and tagged for taking observations from all the treatments in each replication. The data collected for all growth and flowering parameters were subjected to statistical analysis by adopting 'Analysis of Variance' techniques [1] as per the procedure of Factorial Randomized Block Design. Leaf area per plant and chlorophyll content index was recorded by leaf area index machine (Systemics, leaf area meter 211) and SPAD meter (CCM-200, Opti-sciences) respectively.

## Results and Discussion

Data related to growth and flowering parameters of ridge gourd presented in [Table-1] and [Table-2] respectively. All growth and flowering parameters significantly influenced by nature of cultivation (S). With regards to effect of nature of cultivation, significantly maximum length of vine at 45 DAS and at last harvest (156.16 and 399.33 cm respectively), number of branches per plant (20.96), leaf area per plant and chlorophyll content index at 60 DAS (3560 cm<sup>2</sup> and 29.62 respectively) were recorded for trellising system ( $s_1$ ). Whereas, minimum length of vine at 45 DAS and at last harvest (137.71 and 371.94 cm respectively), number of branches per plant (18.34), leaf area per plant and chlorophyll content index at 60 DAS (3419 cm<sup>2</sup> and 27.71 respectively) were recorded for non-trellising system ( $s_2$ ). Superior growth parameters were observed from trellising system ( $s_1$ ) of cultivation. These results were might be attributed to the difference in nature of cultivation. In trellising system plant were trailed and allowed to grow freely without any infection by soil pathogens. In trellising system plant vines were didn't affected by any human beings during intercultural operations. So plants were attained more vine length than non-trellising system. Similar to these results were reported

by [2, 3] in bitter gourd as well as [4] in bottle gourd.

In this study of all flowering parameters viz., minimum days taken to initiation of first male and female flower (33.34 and 42.61 respectively), days taken for female flower initiation to edible maturity (5.82), number of node on which first female flower appear (16.07), number of male flowers per plant (305.99) and sex ratio of female and male flower (10.45) while maximum number female flowers per plant (30.01) were recorded for trellising system (s<sub>1</sub>). Maximum days taken to initiation of first male and female flower (35.12 and 45.11 respectively), days taken for female flower initiation to edible maturity (6.61), number of node on which first

female flower appear (18.30), number of male flowers per plant (329.02) and sex ratio of female and male flower (26.76) while minimum number female flowers per plant (12.47) were recorded for trellising system (s<sub>1</sub>). Superior flowering parameters were recorded in trellising system of cultivation than non-trellising system of cultivation. In trellising system early flowering and high number of flowers were recorded due to fast vine growth and high vine length as well as high number of nodes. Fruits were quickly reached edible and harvestable stages because of ganging fruits in trellising system. The same results were reported by [3] in bitter gourd and [4] in bottle gourd.

**Table-1** Growth parameters of ridge gourd under different nature of cultivation and different varieties

| Treatments                       | Length of vine (cm) |                 | Number of branches per plant | Leaf area per plant (cm <sup>2</sup> ) | Chlorophyll content index |
|----------------------------------|---------------------|-----------------|------------------------------|--|---------------------------|
|                                  | At 45 DAS           | At last harvest |                              |  |                           |
| <b>Nature of cultivation (S)</b> |                     |                 |                              |  |                           |
| s <sub>1</sub>                   | 156.16              | 399.33          | 20.96                        | 3560                                   | 29.62                     |
| s <sub>2</sub>                   | 137.71              | 371.94          | 18.34                        | 3419                                   | 27.71                     |
| S.Em±                            | 2.98                | 5.92            | 0.33                         | 30.69                                  | 0.55                      |
| C.D. at 5%                       | 8.59                | 17.04           | 0.96                         | 88.36                                  | 1.57                      |
| <b>Varieties (V)</b>             |                     |                 |                              |  |                           |
| v <sub>1</sub>                   | 164.40              | 340.18          | 19.43                        | 3339                                   | 29.70                     |
| v <sub>2</sub>                   | 155.76              | 379.23          | 19.25                        | 3193                                   | 27.42                     |
| v <sub>3</sub>                   | 192.31              | 408.90          | 19.82                        | 3977                                   | 34.34                     |
| v <sub>4</sub>                   | 115.27              | 430.49          | 21.26                        | 3841                                   | 32.21                     |
| v <sub>5</sub>                   | 110.86              | 436.27          | 22.75                        | 3587                                   | 23.62                     |
| v <sub>6</sub>                   | 142.99              | 318.72          | 15.40                        | 2999                                   | 24.69                     |
| S.Em±                            | 5.16                | 10.25           | 0.58                         | 53.15                                  | 0.95                      |
| C.D. at 5%                       | 14.87               | 29.52           | 1.66                         | 153.03                                 | 2.73                      |
| <b>Interaction (SxV)</b>         |                     |                 |                              |  |                           |
| s <sub>1</sub> v <sub>1</sub>    | 173.20              | 358.27          | 20.67                        | 3420                                   | 30.77                     |
| s <sub>1</sub> v <sub>2</sub>    | 163.23              | 390.63          | 20.48                        | 3237                                   | 28.58                     |
| s <sub>1</sub> v <sub>3</sub>    | 209.53              | 435.41          | 21.17                        | 4097                                   | 35.12                     |
| s <sub>1</sub> v <sub>4</sub>    | 120.23              | 439.48          | 22.53                        | 3908                                   | 32.67                     |
| s <sub>1</sub> v <sub>5</sub>    | 118.83              | 449.03          | 24.92                        | 3642                                   | 24.82                     |
| s <sub>1</sub> v <sub>6</sub>    | 151.98              | 323.16          | 16.02                        | 3055                                   | 25.75                     |
| s <sub>2</sub> v <sub>1</sub>    | 155.60              | 322.09          | 18.19                        | 3259                                   | 28.63                     |
| s <sub>2</sub> v <sub>2</sub>    | 148.31              | 367.83          | 18.02                        | 3149                                   | 26.26                     |
| s <sub>2</sub> v <sub>3</sub>    | 175.10              | 382.39          | 18.47                        | 3857                                   | 33.56                     |
| s <sub>2</sub> v <sub>4</sub>    | 110.32              | 421.51          | 19.99                        | 3774                                   | 31.76                     |
| s <sub>2</sub> v <sub>5</sub>    | 102.89              | 423.51          | 20.59                        | 3533                                   | 22.43                     |
| s <sub>2</sub> v <sub>6</sub>    | 134.01              | 314.29          | 14.78                        | 2942                                   | 23.63                     |
| S.Em±                            | 7.30                | 14.50           | 0.82                         | 75.17                                  | 1.34                      |
| C.D. at 5%                       | NS                  | NS              | NS                           | NS                                     | NS                        |
| C. V. %                          | 9.94                | 7.52            | 8.30                         | 4.31                                   | 9.34                      |

All growth and flowering parameters significantly influenced by varieties (V). Among six varieties, Pusa Nasdar (v<sub>3</sub>) recorded maximum length of vine at 45 DAS (192.31 cm). Variety PKM-1 (v<sub>5</sub>) recorded maximum length of vine at last harvest (436.27 cm) and number of branches per plant (22.75) which was statistically at par with variety Arka Sujath for length of vine at last harvest (430.49 cm) and number of branches per plant (21.26). Maximum leaf area per plant and CCI (3977 cm<sup>2</sup> and 34.34 respectively) were recorded for variety Pusa Nasdar (v<sub>3</sub>) at 60 DAS which was statistically at par with variety Arka Sujath for leaf area per plant (3841 cm<sup>2</sup>) and chlorophyll content index (32.21). Minimum length of vine (110.86 cm) at 45 DAS and chlorophyll content index (23.62) at 60 DAS were recorded for variety PKM-1 (v<sub>5</sub>). While minimum length of vine at last harvest (318.72 cm), number of branches per plant (15.40) and leaf area per plant (2999 cm<sup>2</sup>) at 60 DAS were recorded for variety Local (v<sub>6</sub>). Every varieties are having its own genetic nature for high vine length, leaf area, branches and CCI. But all varieties will not perform same as in all environments. Pusa Nasdar recorded high number of branches per plant, it's the reason for high leaf area per plant. Similar to these results were observed by [5] and [6] in bitter gourd, [7] and [8] in bottle gourd as well as [9] in watermelon.

Minimum days taken to initiation of first male and female flower (25.53 and 34.35 respectively), days taken for female flower initiation to edible maturity (5.79), number of node on which first female flower appeared (13.69), number of male flowers per plant (291.34) and sex ratio of female and male flower (8.79) whereas, maximum number of female flowers per plant (33.47) were recorded for variety Pusa Nasdar (v<sub>3</sub>) which was statistically at par with varieties Arka Sujath for number of node on which first female flower appeared (14.43) and number of female flowers per plant (31.34) as well as Gujarat Anand Ridge Gourd-1 (5.88), Local (6.01), Hisar Kalitori (6.02) and Arka Sujath (6.53) for female flower initiation to edible maturity. It also showed at par with varieties Arka Sujath (307.86) and Gujarat Anand Ridge Gourd-1 (310.79) for number of male flowers per plant. Maximum days taken to initiation of first male and female flower (44.76 and 55.26 respectively), days taken for female flower initiation to edible maturity (7.06) and sex ratio of female and male flower (14.11) as well as minimum number of female flowers per plant (22.64) were recorded with variety PKM-1 (v<sub>5</sub>). Maximum number of node on which first female flower appeared (22.61) and number of male flowers per plant (342.19) were recorded with varieties Local (v<sub>6</sub>) and Hisar Kalitori (v<sub>2</sub>) respectively. Evaluation of suitable variety is necessary for successful cultivation

of crop under particular climatically region. The variation in flowering parameters might be attributed to the various genetic diversities of varieties. Different flowering parameters exploited by various varieties because of various genetic natures. Pusa Nasdar recorded high sex ratio due to high male and less female flowers per

plants. Early flowering recorded in Pusa Nasdar due to early vine growth of plant. The same results were recorded by [3] in bitter gourd, [4,8] in bottle gourd as well as [9] in watermelon.

**Table-2** Flowering parameters of ridge gourd under different nature of cultivation and different varieties

| Treatments                       | Days taken to initiation of first male flower | Days taken to initiation of first female flower | Days taken for female flower initiation to edible maturity | Number of node on which first female flower appear | Number of male flowers per plant | Number of female flowers per plant | Sex ratio |
|----------------------------------|---|---|--|--|----------------------------------|------------------------------------|-----------|
| <b>Nature of cultivation (S)</b> |   |   |  |  |                                  |                                    |           |
| S <sub>1</sub>                   | 33.34   | 42.61   | 5.82   | 16.07  | 305.99                           | 30.01                              | 10.45     |
| S <sub>2</sub>                   | 35.12   | 45.11   | 6.61   | 18.30  | 329.02                           | 26.76                              | 12.47     |
| S.Em±                            | 0.48  | 0.41  | 0.18   | 0.34   | 4.58                             | 0.55                               | 0.19      |
| C.D. at 5%                       | 1.37  | 1.17  | 0.50   | 0.99   | 13.18                            | 1.59                               | 0.55      |
| <b>Varieties (V)</b>             |   |   |  |  |                                  |                                    |           |
| V <sub>1</sub>                   | 30.89   | 40.09   | 5.88   | 15.55  | 310.79                           | 30.22                              | 10.38     |
| V <sub>2</sub>                   | 29.37   | 37.83   | 6.02   | 17.61  | 342.19                           | 26.08                              | 13.06     |
| V <sub>3</sub>                   | 25.53   | 34.35   | 5.79   | 13.69  | 291.34                           | 33.47                              | 8.79      |
| V <sub>4</sub>                   | 40.82   | 51.44   | 6.53   | 14.43  | 307.86                           | 31.34                              | 9.89      |
| V <sub>5</sub>                   | 44.76   | 55.26   | 7.06   | 19.25  | 325.20                           | 22.64                              | 14.11     |
| V <sub>6</sub>                   | 33.99   | 44.20   | 6.01   | 22.61  | 327.64                           | 26.58                              | 12.55     |
| S.Em±                            | 0.83  | 0.71  | 0.30   | 0.59   | 7.93                             | 0.96                               | 0.33      |
| C.D. at 5%                       | 2.38  | 2.03  | 0.87   | 1.71   | 22.83                            | 2.76                               | 0.95      |
| <b>Interaction (SxV)</b>         |   |   |  |  |                                  |                                    |           |
| S <sub>1</sub> V <sub>1</sub>    | 30.41   | 38.36   | 5.49   | 14.37  | 301.87                           | 31.61                              | 9.67      |
| S <sub>1</sub> V <sub>2</sub>    | 29.14   | 37.01   | 5.51   | 16.59  | 329.18                           | 27.56                              | 12.09     |
| S <sub>1</sub> V <sub>3</sub>    | 24.87   | 33.08   | 5.40   | 13.34  | 281.25                           | 34.38                              | 8.21      |
| S <sub>1</sub> V <sub>4</sub>    | 39.17   | 50.11   | 6.37   | 13.25  | 296.43                           | 32.84                              | 9.07      |
| S <sub>1</sub> V <sub>5</sub>    | 43.57   | 54.57   | 6.60   | 17.43  | 311.44                           | 24.77                              | 12.76     |
| S <sub>1</sub> V <sub>6</sub>    | 32.86   | 42.54   | 5.59   | 21.47  | 315.76                           | 28.92                              | 10.94     |
| S <sub>2</sub> V <sub>1</sub>    | 31.37   | 41.82   | 6.28   | 16.73  | 319.71                           | 28.83                              | 11.10     |
| S <sub>2</sub> V <sub>2</sub>    | 29.60   | 38.64   | 6.53   | 18.63  | 355.20                           | 24.60                              | 14.04     |
| S <sub>2</sub> V <sub>3</sub>    | 26.20   | 35.62   | 6.17   | 14.04  | 301.43                           | 32.56                              | 9.37      |
| S <sub>2</sub> V <sub>4</sub>    | 42.46   | 52.77   | 6.70   | 15.61  | 319.29                           | 29.84                              | 10.70     |
| S <sub>2</sub> V <sub>5</sub>    | 45.95   | 55.95   | 7.52   | 21.06  | 338.96                           | 20.52                              | 15.46     |
| S <sub>2</sub> V <sub>6</sub>    | 35.13   | 45.88   | 6.44   | 23.75  | 339.52                           | 24.24                              | 14.16     |
| S.Em±                            | 1.17  | 0.99  | 0.43   | 0.84   | 11.22                            | 1.36                               | 0.47      |
| C.D. at 5%                       | NS  | NS  | NS   | NS   | NS                               | NS                                 | NS        |
| C. V. %                          | 6.82  | 4.55  | 13.83  | 9.75   | 7.06                             | 9.55                               | 8.11      |

## Conclusion

It is therefore concluded that for superior growth and flowering, cultivation of ridge gourd in trellising system (s<sub>1</sub>) and the variety Pusa Nasdar (v<sub>3</sub>) is most suitable for North Gujarat region.

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## Author contributions

Karthick K<sup>1,\*</sup> - Acquisition of data, analysis and interpretation of data, drafting of manuscript  
 Patel G.S<sup>2</sup> - Investigator the research work and guidelines for research work  
 Girraj Prasad Jat<sup>3</sup> - Study design and conception and helped for acquisition of data

## Abbreviations:

DAS – Days after sowing  
 CCI - Chlorophyll content index  
 G.I. –Galvanized iron  
 ft- Feet  
 i.e.- That is  
 m- Meter  
 cm – Centimeter  
 cm<sup>2</sup>- Centimeter square  
 Viz., – Namely

## Conflict of Interest: None declared

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