



E-ISSN: 2278-4136

P-ISSN: 2349-8234

www.phytojournal.com

JPP 2020; 9(5): 1488-1490

Received: 06-07-2020

Accepted: 30-08-2020

Shalu Yadav

M.Sc. Scholar, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Vijay Bahadur Singh

Associate Professor, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Gulab Chand Yadav

Associate Professor, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Sharvan Kumar

Ph.D., Scholar, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Pankaj Kumar Verma

M.Sc. Scholar, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Corresponding Author:**Shalu Yadav**

M.Sc. Scholar, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

Estimation of direct selection parameter in okra [*Abelmoschus esculentus*(L.) Moench]

Shalu Yadav, Vijay Bahadur Singh, Gulab Chand Yadav, Sharvan Kumar and Pankaj Kumar Verma

Abstract

The experiment was conducted at Main Experimental Station, Department of Vegetable Science, Acharya Narendra Deva University of Agriculture and Technology, Kumarganj, Ayodhya during *Kharif*, 2019 in Randomized Block Design with three replications using thirty six genotypes of okra collected from different sources to study the correlation and path coefficients at phenotypic and genotypic levels among different quantitative characters. Characters like petiole length (0.236) average fruit weight (0.195), have positive significant and desirable association with fruit yield. Thus, there is an ample scope for improving characters through direct selection. Petiole length (0.310) average fruit weight(0.229) plant height(0.109) fruit circumference (0.032) and days to 50% flowering (0.008) were identified as most important traits which had positive direct effect on total fruit yield per plant while, the negative direct effect on yield by rest of the dependent traits were very low.

Keywords: Estimation, parameter, okra, *Abelmoschus esculentus*

Introduction

Okra is the most traditional and popular vegetable in India and it is extensively cultivated in summer and rainy season. It is one of the important vegetable crops which are grown throughout the tropical, subtropical and temperate parts of the world. It has been grown commercially in India, Turkey, Iran, Western Africa, Yugoslavia, Bangladesh, Afghanistan, Pakistan, Burma, Japan, Malaysia, Brazil, Ghana, Ethiopia, Cyprus and the Southern United States. Okra [*Abelmoschus esculentus* (L.) Moench $2n = 2x=130$] is one of the important member of the family Malvaceae. Okra is an African word and is native to northern Africa including the area of Ethiopia and Sudan. It is a summer and rainy season crop and is widely cultivated from tropics to sub tropics (Kochar, 1986) [2].

Okra (*Abelmoschus esculentus* L.) is probably an amphidiploids (allotetraploid) derived from *Abelmoschus tuberculatus* ($2n = 58$), a wild species from India, and a species (*Abelmoschus ficulneus* (L.) Wight and Arn. ex Wight) with $2n = 72$ chromosomes. Another edible okra species are *Abelmoschus caillei* (A. Chev.). Stevels occurs in the humid parts of West and Central Africa. There are strong indications that *Abelmoschus caillei* amphidiploids with *Abelmoschus esculentus* being one of the parental species. The lowest chromosome number $2n=56$ reported in *Abelmoschus angulosus* whereas, the highest chromosome number $2n=196$ reported in *Abelmoschus manihot* var. *Caillei* (Singh and Bhatnagar, 1975, Siemonsma, 1982a, 1982b) [8, 6, 7]. Largest area and production is in India followed by Nigeria in the world. India ranks first in the world with 72 per cent of the total world production of okra. The information about correlation among different component of yield is necessary for designing efficient plant breeding programme through selection and for simultaneous improvement of yield components. Therefore, such information can be obtained by the studying genotypic and phenotypic correlation coefficient between yield and yield contributing characters. Path coefficients analysis is helpful in portioning the observed correlation coefficient into direct and indirect effect and there effective use in selection programme.

Materials and Methods

The research work was undertaken at the Main Experimental Station, Department of Vegetable Science, Narendra Deva University of Agriculture and Technology Narendra Nagar (Kumarganj), Ayodhya (U.P.) India during the *Kharif*, 2019. Geographically the experimental site (Kumarganj, Ayodhya) falls under humid sub-tropical climate and is located at 26.47° N latitude and 82.12 °E longitude at an altitude of 113 meter above the mean sea level. The experiment was conducted using thirty six genotypes in Randomized Block Design with three replications.

Observations were recorded on thirteen quantitative characters viz. node to first flower appearance days to 50% flowering, plant height (cm) number of node per plant petiole length(cm), number of branches per plant, days to first fruit harvest plant height, fruit length(cm), fruit circumference (cm), average fruit weight (g), number of fruit per plant total fruit yield per plant (g). The correlation coefficient was carried out as per Searle (1961) [4] and path coefficient analysis as suggested by Dewey and Lu (1959) [1].

Results and Discussion

In the present study, correlations between thirteen characters were worked out in all possible combinations at phenotypic and genotypic levels are presented in Table- 1 and 2. A perusal of data (Table-1 and 2) revealed that genotypic correlations were higher in magnitude than the corresponding values of phenotypic correlation coefficients suggesting therefore, a strong inherent relationship in different pair of characters. Umrao *et al.* (2015) [9] had also reported higher estimates of genotypic correlation than the corresponding phenotypic correlation between yield and yield component.

The most important trait total fruit yield per plant had exhibited highly significant and positive phenotypic correlation with petiole length (0.236) and average fruit weight (0.195). Thus, these characters emerged as most important association of fruit yield in okra. Similar results have been reported by Mehta *et al.* (2006) [3].

The direct and indirect effects of different characters on fruit yield at phenotypic and genotypic level have been presented in Table-3 and 4. The highest positive direct effect on fruit yield per plant was exerted by petiole length (0.310), average fruit weight (0.229), plant height (0.109), fruit circumference (0.032), and days to 50% flowering (0.008). However, the positive direct effects of rest of the traits on fruit yield were very low. The negative direct effects on yield by either of the dependent traits were very low. Sharma and Prasad (2015) [5] had also reported negative direct effect of number of branches per plant (-0.041) on total fruit yield per plant. This indicated that direct selection based on petiole length would result in an appreciable improvement of fruit yield per plant in okra.

Thus, emphasis should give on petiole length and average fruit weight while selections for higher fruits yield in okra.

Table 1: Estimates of phenotypic correlation coefficient among thirteen characters in okra

| Character | Node to first flower appearance | Days to 50% flowering | Days to first fruit harvest | Fruit length (cm) | Fruit circumference (cm) | Plant height (cm) | Number of branches per plant | Crop duration (days) | Petiole length (cm) | Average fruit weight (g) | Node per plant | Number of fruits per plant | Total fruit yield per plant (g) |
|---------------------------------|---------------------------------|-----------------------|-----------------------------|-------------------|--------------------------|-------------------|------------------------------|----------------------|---------------------|--------------------------|----------------|----------------------------|---------------------------------|
| Node to first flower appearance | 1.000 | 0.179 | 0.143 | -0.022 | -0.121 | -0.048 | -0.049 | -0.196 | 0.098 | 0.043 | -0.157 | -0.123 | -0.008 |
| Days to 50% flowering | | 1.000 | 0.639** | 0.143 | 0.016 | 0.161 | 0.08 | -0.081 | 0.212* | 0.114 | 0.088 | 0.032 | 0.068 |
| Days to first fruit harvest | | | 1.000 | 0.208* | 0.091 | 0.066 | 0.007 | -0.08 | 0.303** | 0.099 | -0.006 | 0.08 | 0.077 |
| Fruit length (cm) | | | | 1.000 | -0.354** | 0.173 | 0.213* | 0.036 | 0.013 | 0.104 | -0.04 | 0.007 | 0.014 |
| Fruit circumference (cm) | | | | | 1.000 | -0.207* | -0.215* | 0.013 | -0.083 | 0.188 | 0.052 | 0.08 | 0.064 |
| Plant height (cm) | | | | | | 1.000 | 0.176 | 0.121 | 0.01 | -0.026 | 0.044 | -0.004 | 0.088 |
| Number of branches per plant | | | | | | | 1.000 | -0.093 | -0.132 | -0.007 | 0.091 | -0.069 | -0.017 |
| Crop duration (days) | | | | | | | | 1.000 | -0.059 | 0.051 | 0.094 | 0.059 | 0.109 |
| Petiole length (cm) | | | | | | | | | 1.000 | -0.216* | -0.019 | -0.019 | 0.236* |
| Average fruit weight (g) | | | | | | | | | | 1.000 | -0.144 | -0.107 | 0.195* |
| Node per plant | | | | | | | | | | | 1.000 | 0.308** | -0.188 |
| Number of fruits per plant | | | | | | | | | | | | 1.000 | -0.110 |

*,**Significant at 5% and 1% probability level, respectively

Table 2: Estimates of genotypic correlation coefficient among thirteen traits in okra germplasm

| Character | Node to first flower appearance | Days to 50% flowering | Days to first fruit harvest | Fruit length (cm) | Fruit circumference (cm) | Plant height (cm) | Number of branches per plant | Crop duration (days) | Petiole length (cm) | Average fruit weight (g) | Node per plant | Number of fruits per plant | Total fruit yield per plant (g) |
|---------------------------------|---------------------------------|-----------------------|-----------------------------|-------------------|--------------------------|-------------------|------------------------------|----------------------|---------------------|--------------------------|----------------|----------------------------|---------------------------------|
| Node to first flower appearance | 1.000 | 0.212 | 0.247 | -0.011 | -0.094 | 0.079 | -0.024 | 0.167 | 0.114 | 0.058 | -0.558 | -0.456 | -0.011 |
| Days to 50% flowering | | 1.000 | 0.924 | 0.219 | 0.034 | 0.231 | 0.064 | -0.291 | 0.247 | 0.124 | -0.089 | 0.051 | 0.082 |
| Days to first fruit harvest | | | 1.000 | 0.195 | 0.081 | 0.034 | 0.003 | -0.365 | 0.393 | 0.112 | -0.049 | 0.563 | 0.111 |
| Fruit length (cm) | | | | 1.000 | -0.435 | 0.4 | 0.237 | 0.041 | -0.008 | 0.105 | 0.107 | 0.003 | 0.014 |
| Fruit circumference (cm) | | | | | 1.000 | -0.384 | -0.247 | 0.019 | -0.087 | 0.191 | 0.237 | 0.393 | 0.072 |
| Plant height (cm) | | | | | | 1.000 | 0.206 | -0.408 | -0.043 | -0.076 | -0.135 | -0.092 | 0.151 |
| Number of branches per plant | | | | | | | 1.000 | -0.513 | -0.16 | -0.008 | 0.265 | -0.083 | -0.014 |
| Crop duration (days) | | | | | | | | 1.000 | -0.222 | 0.082 | -0.137 | -0.233 | 0.067 |
| Petiole length (cm) | | | | | | | | | 1.000 | -0.256 | -0.026 | -0.052 | 0.244 |
| Average fruit weight (g) | | | | | | | | | | 1.000 | -0.54 | -0.434 | 0.201 |
| Node per plant | | | | | | | | | | | 1.000 | 0.404 | -0.604 |
| Number of fruits per plant | | | | | | | | | | | | 1.000 | -0.423 |

Table 3: Direct and indirect effects of twelve characters on fruit yield per plant at phenotypic level.

| Characters | Node to first flower appearance | Days to 50% flowering | Days to first fruit harvest | Fruit length (cm) | Fruit circumference (cm) | Plant height (cm) | Number of branches per plant | Crop duration (days) | Petiole length (cm) | Average fruit weight (g) | Node per plant | Number of fruit per plant | Correlation with Total fruit yield per plant (g) |
|---------------------------------|---------------------------------|-----------------------|-----------------------------|-------------------|--------------------------|-------------------|------------------------------|----------------------|---------------------|--------------------------|----------------|---------------------------|--|
| Node to first flower appearance | -0.057 | 0.002 | -0.007 | 0.000 | 0.001 | -0.005 | -0.010 | -0.002 | 0.029 | 0.010 | 0.025 | 0.005 | -0.008 |
| Days to 50% flowering | -0.010 | 0.008 | -0.032 | -0.001 | 0.001 | 0.018 | 0.006 | 0.003 | 0.066 | 0.026 | -0.014 | -0.001 | 0.068 |
| Days to first fruit harvest | -0.008 | 0.009 | -0.051 | 0.003 | 0.007 | 0.007 | -0.002 | 0.000 | .091 | 0.023 | 0.001 | -0.003 | 0.077 |
| Fruit length (cm) | 0.001 | 0.002 | -0.011 | -0.010 | -0.029 | .019 | 0.010 | 0.007 | 0.004 | 0.014 | 0.006 | 0.000 | 0.014 |
| Fruit circumference (cm) | 0.007 | 0.000 | -0.005 | 0.003 | 0.032 | 0.050 | -0.022 | -0.008 | -0.026 | 0.043 | -0.008 | -0.003 | 0.064 |
| Plant height (cm) | -0.004 | 0.002 | -0.003 | -0.002 | 0.007 | 0.109 | -0.017 | 0.006 | 0.003 | -0.006 | -0.007 | 0.000 | 0.088 |
| Number of branches per plant | 0.003 | 0.001 | 0.000 | -0.002 | -0.018 | 0.019 | -0.041 | -0.055 | 0.090 | -0.002 | -0.015 | 0.003 | -0.017 |
| Crop duration (days) | -0.006 | 0.002 | -0.007 | 0.000 | -0.010 | -0.005 | 0.025 | -0.002 | 0.031 | 0.010 | 0.066 | 0.005 | 0.109 |
| Petiole length (cm) | -0.006 | 0.001 | 0.002 | 0.000 | -0.007 | 0.001 | -0.015 | 0.005 | 0.310 | -0.050 | 0.003 | 0.001 | 0.236 |
| Average fruit weight (g) | -0.002 | 0.002 | -0.005 | -0.001 | 0.008 | -0.003 | 0.007 | 0.000 | -0.067 | 0.229 | 0.023 | 0.004 | 0.195 |
| Node per plant | -0.031 | 0.001 | 0.000 | 0.000 | 0.004 | 0.005 | -0.006 | 0.003 | 0.040 | 0.033 | -0.160 | 0.011 | -0.188 |
| Number of fruit per plant | 0.007 | 0.000 | 0.004 | 0.000 | 0.007 | 0.000 | 0.002 | -0.002 | -0.006 | 0.024 | 0.051 | -0.037 | -0.110 |

Residual effect-

Table 4: Direct and indirect effect of twelve characters on fruit yield per plant at genotypic level.

| Characters | Node to first flower appearance | Days to 50% flowering | Days to first fruit harvest | Fruit length (cm) | Fruit circumference (cm) | Plant height (cm) | Number of branches per plant | Crop duration (days) | Petiole length (cm) | Average fruit weight (g) | Node per plant | Number of fruit per plant | Correlation with Total fruit yield per plant (g) |
|---------------------------------|---------------------------------|-----------------------|-----------------------------|-------------------|--------------------------|-------------------|------------------------------|----------------------|---------------------|--------------------------|----------------|---------------------------|--|
| Node to first flower appearance | -0.740 | 0.370 | 0.516 | -0.009 | -0.098 | -0.043 | -0.017 | -0.008 | 0.072 | -0.052 | .241 | -0.211 | -0.011 |
| Days to 50% flowering | -0.157 | 1.742 | -1.930 | 0.189 | 0.035 | -0.124 | 0.046 | .014 | 0.157 | -0.111 | .198 | 0.023 | 0.082 |
| Days to first fruit harvest | -0.183 | 1.610 | -2.088 | 0.168 | 0.084 | -0.018 | 0.002 | .017 | 0.249 | -0.100 | 0.109 | 0.261 | 0.111 |
| Fruit length (cm) | 0.008 | 0.381 | -0.407 | 0.862 | -0.449 | -0.215 | 0.172 | -0.002 | -0.005 | -0.094 | -0.238 | 0.001 | 0.014 |
| Fruit circumference (cm) | 0.070 | 0.060 | -0.169 | -0.375 | 1.032 | 0.206 | -0.179 | -0.001 | -0.055 | -0.172 | -0.528 | 0.182 | 0.072 |
| Plant height (cm) | -0.059 | 0.402 | -0.071 | 0.345 | -0.396 | -0.537 | 0.149 | .019 | -0.027 | 0.069 | 0.301 | -0.043 | 0.151 |
| Number of branches per plant | 0.018 | 0.112 | -0.006 | 0.205 | -0.255 | -0.111 | 0.723 | .024 | -0.101 | .007 | -0.590 | -0.039 | -0.014 |
| Crop duration (days) | -0.123 | -0.507 | 0.762 | 0.036 | 0.020 | 0.219 | -0.370 | .047 | -0.141 | -0.073 | 0.305 | -0.108 | 0.067 |
| Petiole length (cm) | -0.084 | 0.431 | -0.821 | -0.007 | -0.090 | 0.023 | -0.116 | .010 | 0.634 | 0.229 | 0.059 | -0.024 | 0.244 |
| Average fruit weight (g) | 0.043 | 0.216 | -0.233 | 0.091 | 0.198 | 0.041 | -0.005 | 0.004 | -0.162 | -0.897 | .202 | -0.201 | 0.201 |
| Node per plant | 0.413 | -0.155 | 0.102 | 0.092 | 0.245 | 0.073 | 0.191 | 0.006 | -0.017 | 0.484 | -2.226 | 0.187 | -0.604 |
| Number of fruit per plant | 0.337 | 0.088 | -1.176 | 0.002 | 0.406 | 0.049 | -0.060 | 0.011 | -0.033 | 0.389 | -0.900 | 0.463 | -0.423 |

Residual effect-

References

- Dewey DR, Lu KH. A correlation and path coefficient analysis of yield component of the crested wheat grass seed production. *Agron. J.* 1959; 51:515-518.
- Kochar SL. *Tropical Crops. A Text Book of Economic Botany.* Macmillan Indian Ltd, 1986, 263-264.
- Mehta DR, Dhaduk LK, Patel KD. Genetic variability, correlation and pathanalysis studies in okra [*Abelmoschus esculentus* (L.) Moench]. *Agriculture Science Digest.* 2006; 26(1):15-18.
- Searle SR. The value of endive of selection. *Mass Selection Biometrika.* 1961; 21:682-709.
- Sharma RK, Prasad K. Characterisation of promising okra genotypes on the basis of principal component analysis. *Journal of Applied Horticulture (Lucknow).* 2010; 12(1):71-74.
- Siemonsma JS. a. La culture du gombo (*Abelmoschus* spp.) legume fruit. Thesis Univ. Wageningen, Netherlands, 1982.
- Siemonsma JS. West African okra morphological and cytological indications for the existence of a natural amphiploid of *Abelmoschus esculentus* (L.) Moench and *A. Manihot* (L.) Medikus. *Euphytica.* 1982b; 31(1):241-52.
- Singh HB, Bhatnagar A. Chromosome number in okra from Ghana. *Indian J Gen. Pl. Breed.* 1975; 36:26-27.
- Umrao V, Sharma SK, Kumar V, Kumar R, Sharma A, Kumar J. Correlation and path coefficient analysis of yield components in okra [*Abelmoschus esculentus* (L.) Moench]. *Hort Flora Research Spectrum.* 2015; 4(2):139.