

**Research article**

## Association of characters and selection parameters for high tuber yield in Potato (*Solanum tuberosum* L.)

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[Accepted: 14 April 2020]

**Abstract:** The present study was undertaken on twenty genotypes for the information of the nature of the correlation among the different yield parameters. Genotypic correlation was higher than phenotypic correlation in all the characters. Yield showed significant positively correlated with number of sprouts/plant, height of plant, diameter of shoot, length of leaf, in both genotypic and phenotypic levels during the experiments.

**Keywords:** Genetic advance - Growth parameter - Crop productivity - Crop duration.

[Cite as: Tiwari A, Mishra A, Saxena V, Saxena S & Raghuvanshi AP (2020) Association of character and selection parameters for high tuber yield in Potato (*Solanum tuberosum* L.). *Tropical Plant Research* 7(1): 205–208]

### INTRODUCTION

Potato (*Solanum tuberosum* L.) is one of the most versatile vegetable crops, that furnishes appreciable amount of vitamin B and vitamin C as well as some minerals, which is capable of giving highly in return as yields in short span of time. Good quality Potato is the most important aspect in breeding program grade yield in potato, a complex character has high quality content and also associated with many interrelated components. Tuber production is improved by using proper genotypes and environment under different regions. Time of showing and planting methods is also very important for high yield (Nanda 2009). The major potato growing states in the country are Uttar Pradesh, West Bengal, Bihar, Assam, Madhya Pradesh, Punjab, Gujrat and Himanchal. It is cultivated in rabi season where the crop grown is 1.23 Lakh hectares of area with 37.98 lakh metric tones production and average yield of 31.0 qt ha<sup>-1</sup> (Anonymous 2017). Keeping to the view the present study was carried out in correlation of potato in different growth parameters including yield.

### MATERIAL AND METHODS

The material consisted of 20 genotype culture/strain of potato used in present study. The material was grown in a randomized block design with three replication at the experimental plot of the department of horticulture Chandrra Shekhar Azad University of Agriculture and Technology, Kanpur. Tubers were planted in rows, the spacing between row to row was 60 cm and in plant to plant 20 cm. Ten plants from each genotypes were selected for recording data on then quantitative characters of potato yield attributing character for the estimate of correlation method was suggested by Aljibouri *et al.* (1958).

### RESULTS AND DISCUSSION

The analysis of the variance for the characters revealed that the twenty varieties taken for this study highly significant differences among selected genotypes. The maximum heritability were recorded in yield qt ha<sup>-1</sup> of plant 99,750, height of plant 98,406. All the quantitative characters in potato revealed a considerable variation in plant material of potato. Morphological and genetic variability which gave important information of all the treatment. It was found that variable has mostly positive relationships. High heritability and genetic advance (GA) in yield qt ha<sup>-1</sup> indicated that there was influence of additive genetic variance. Sprouting of potato tuber was positively correlated with the diameter of the shoot (0.18672) length of leaf (0.10834), width of leaf (0.18730), number of days required for crop maturity (0.01104) and yield in qt ha<sup>-1</sup> (0.06955) in the case of phenotypic correlation study (Table 1). The present observations were in accordance with the Pandita & Sidhu

(1980) and Gerg & Bhutani (1991). Number of sprouts/plant was positively correlated with all the characters of potato accepted the number of days required for sprouting in the phenotypic level. Width of leaf, number of days for crop maturity and yield of potato crop also showed positive correlation.

**Table 1.** Phenotypic correlation coefficients among ten characters of potato.

| Characters                                | Sprouting of tuber | Number of days required for sprouting | Number of sprouts/plants | Height of plants (cm) | Diameter of shoot (cm) | Number of leaves/shoot | Length of leaf (cm) | Width of leaf (cm) | Number of days required/crop maturity | Yield in qt ha <sup>-1</sup> |
|---|--------------------|---------------------------------------|--------------------------|-----------------------|------------------------|------------------------|---------------------|--------------------|---------------------------------------|------------------------------|
| Sprouting of tuber                        | 1.00000            |                                       |                          |                       |                        |                        |                     |                    |                                       |                              |
| Number of days required                   | -0.2341            | 1.00000                               |                          |                       |                        |                        |                     |                    |                                       |                              |
| Number of sprouts/plant                   | -0.03109           | -0.22271                              | 1.00000                  |                       |                        |                        |                     |                    |                                       |                              |
| Height of plants                          | -0.09651           | -0.03288                              | 0.73289                  | 1.00000               |                        |                        |                     |                    |                                       |                              |
| Diameter of shoot                         | 0.18672            | -0.26006                              | 0.78228                  | 0.64068               | 1.00000                |                        |                     |                    |                                       |                              |
| Number of Leaves/shoot                    | -0.00659           | 0.11196                               | 0.15543                  | 0.38572               | 0.29553                | 1.00000                |                     |                    |                                       |                              |
| Length of leaf                            | 0.10834            | -0.06354                              | 0.35180                  | 0.58901               | 0.38689                | 0.70068                | 1.00000             |                    |                                       |                              |
| Width of leaf                             | 0.18730            | -0.43178                              | 0.19236                  | 0.40993               | 0.39728                | 0.50616                | 0.68493             | 1.00000            |                                       |                              |
| Number of days required for crop maturity | 0.01104            | -0.01192                              | 0.49515                  | 0.50299               | 0.54434                | 0.27797                | 0.34844             | 0.18959            | 1.00000                               |                              |
| Yield in qt ha <sup>-1</sup>              | 0.06955            | -0.07936                              | 0.83858                  | 0.89493               | 0.83507                | 0.32885                | 0.53931             | 0.37585            | 0.62099                               | 1.00000                      |

Table 2. Genotypic correlation coefficients among ten characters of potato.

| Characters                                | Sprouting of tuber | Number of days required for sprouting | Number of sprouts/plants | Height of plants (cm) | Diameter of shoot (cm) | Number of leaves/shoot | Length of leaf (cm) | Width of leaf (cm) | Number of days required/crop maturity | Yield in qt ha <sup>-1</sup> |
|---|--------------------|---------------------------------------|--------------------------|-----------------------|------------------------|------------------------|---------------------|--------------------|---------------------------------------|------------------------------|
| Sprouting of tuber                        | 1.00000            |                                       |                          |                       |                        |                        |                     |                    |                                       |                              |
| Number of days required                   | -0.32193           | 1.00000                               |                          |                       |                        |                        |                     |                    |                                       |                              |
| Number of sprouts/plant                   | -0.04267           | -0.32251                              | 1.00000                  |                       |                        |                        |                     |                    |                                       |                              |
| Height of Plants                          | -0.98040           | -0.07719                              | 0.76200                  | 1.00000               |                        |                        |                     |                    |                                       |                              |
| Diameter of shoot                         | 0.22426            | -0.35429                              | 0.92284                  | 0.73312               | 1.00000                |                        |                     |                    |                                       |                              |
| Number of Leaves/Shoot                    | -0.01765           | 0.13859                               | 0.17894                  | 0.40533               | 0.27114                | 1.00000                |                     |                    |                                       |                              |
| Length of leaf                            | -0.10327           | -0.15884                              | 0.40362                  | 0.64451               | 0.54355                | 0.83814                | 1.00000             |                    |                                       |                              |
| Width of leaf                             | 0.20593            | -0.57220                              | 0.21120                  | 0.42498               | 0.43778                | 0.53309                | 0.77822             | 1.00000            |                                       |                              |
| Number of days required for crop maturity | 0.01955            | -0.03317                              | 0.51272                  | 0.50923               | 0.61899                | 0.30063                | 0.38517             | 0.19554            | 1.00000                               |                              |
| Yield in qt ha <sup>-1</sup>              | 0.07006            | -0.11304                              | 0.86572                  | 0.90218               | 0.93882                | 0.34643                | 0.58646             | 0.38783            | 0.62499                               | 1.00000                      |

In genotypic correlation coefficient, the sprouting of tuber was positively correlated with the diameter of shoot (0.22426), length of leaf (0.10327), width of the leaf (0.20593), number of days required for crop maturity (0.01955) (Table 2). The Number of sprouts/plant shown significantly positive correlated with height of plant, diameter of shoot, length of leaf number of days required for sprouting and yield of crop. These findings are in close conformity with those of Mishra *et al.* (1994). The results of present study are in agreement with the different findings for number of stem per plant, plant tubers weight, total tuber yield *via* no. of tubers per plant (Shashi 2011, Patel *et al.* 2018). In general the value of genotypic correlation slightly higher than their phenotypic counterparts.

## CONCLUSION

The research revealed a wide range of variability for all traits. Based on the present investigation it may be concluded that crop productivity, sprouts/plant, crop duration/maturity days were the most important for quality tuber yield. The maximum phenotypic and genotypic coefficient of variation was noted for number of sprout/plant weight of tuber/plant and width of leaf. Therefore, emphasis on these characters in selection and importance of “A” grade yield in potato breeding may be rewarding and effective.

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