



Genotypic Variability in Early Growth Traits of Potato

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Potato (*Solanum tuberosum* L.) possesses wide genetic diversity that is often expressed through differences in early growth and establishment. Early growth traits are critical determinants of plant Vigor and subsequent performance. This study was undertaken to examine genotypic differences among selected potato genotypes based on early-stage growth attributes under controlled conditions. Parameters related to sprouting behavior, initial shoot development, leaf production, and biomass accumulation were evaluated. Considerable variation was observed among genotypes, reflecting inherent genetic differences. The findings emphasize the usefulness of early growth traits as practical indicators for preliminary selection of promising potato genotypes and provide valuable information for breeding and improvement programs.

Keywords: Potato, early growth, genotypic variation, morphological traits

Introduction

Potato (*Solanum tuberosum* L.) is a globally important tuber crop valued for its high productivity, nutritional significance, and versatility in food systems. Improvement of potato largely depends on the availability and effective utilization of genetic variability present within cultivated and breeding materials. Expression of such variability is often evident during the early stages of plant growth, making early growth traits useful indicators for genotype evaluation. Traits expressed during initial growth, including sprouting ability, early shoot elongation, and leaf development, strongly influence plant establishment and competitiveness. Genotypes with superior early vigor are generally better equipped to utilize available resources efficiently, which can contribute to improved overall performance. Evaluating these characteristics at early stages allows rapid identification of promising genotypes and reduces dependence on long-duration field assessments. The present investigation focuses on assessing the extent of genotypic variability among potato genotypes based on selected early growth traits, with the objective of identifying attributes that may be useful for preliminary selection and future breeding efforts.

Materials and Methods

Experimental Material: Uniform, healthy seed tubers of selected potato genotypes were used as planting material. Care was taken to select tubers of comparable size and physiological condition to minimize non-genetic variation.

Experimental Conditions and Design: The experiment was conducted under controlled growing conditions using a completely randomized design with appropriate replications. Tubers were planted in a suitable growth medium and maintained under optimal temperature, light, and moisture regimes to ensure uniform emergence and growth.

Data Collection: Observations were recorded on early growth parameters such as time taken for sprouting, sprout length, plant height, number of leaves per plant, and fresh biomass at

defined intervals. Standard measurement procedures were followed to ensure consistency and accuracy.

Statistical Analysis: Recorded data were analysed statistically to evaluate differences among genotypes. Mean performance was compared to determine the magnitude of variability present in the studied traits.

Results and Discussion

Analysis of the recorded data revealed noticeable differences among potato genotypes for all early growth traits, indicating the presence of substantial genotypic variability. Variation in sprouting time and sprout length suggested differences in physiological vigor among genotypes. Certain genotypes exhibited faster emergence and stronger initial shoot growth, reflecting better early establishment. Differences in plant height and leaf number during the early growth phase indicated variability in growth rate and canopy development. Genotypes with greater leaf production and biomass accumulation demonstrated enhanced early vigor, which may contribute positively to photosynthetic efficiency. Such variability in early growth traits has been reported to be genetically controlled and can be effectively utilized for selection. The observed trends highlight the importance of early-stage evaluation in potato improvement programs. Assessment of early growth performance provides useful insights into genotype behavior and can serve as a practical tool for narrowing down promising material for further testing.

Conclusion

The study confirmed the existence of considerable genotypic variability among potato genotypes with respect to early growth characteristics. Differences in sprouting behavior, shoot development, and biomass accumulation reflect inherent genetic diversity. Evaluation of these traits at early growth stages offers an efficient and reliable approach for preliminary screening of potato genotypes. Genotypes exhibiting superior early vigor may be further exploited in breeding and improvement programs aimed at enhancing crop establishment and productivity.

References

1. Burton, W. G. (1989). *The potato*. Longman Scientific and Technical, Harlow.
2. FAO. (2022). *Potato and food security*. Food and Agriculture Organization of the United Nations.
3. Hay, R. K. M., & Porter, J. R. (2006). *The physiology of crop yield*. Blackwell Publishing.
4. Murphy, H. J., & Goven, M. J. (1959). Factors affecting the early growth of potato plants. *American Potato Journal*, 36, 123–131.
5. Naik, P. S., & Karihaloo, J. L. (2007). Micropropagation for production of quality potato seed in Asia-Pacific. *Asia-Pacific Consortium on Agricultural Biotechnology*, 1–24.
6. Struik, P. C., & Wiersema, S. G. (1999). *Seed potato technology*. Wageningen Pers, Wageningen.
7. Bradshaw, J. E., & Ramsay, G. (2005). Utilisation of the potato gene pool for crop improvement. *Genome*, 48, 985–993.
8. Hawkes, J. G. (1990). *The potato: evolution, biodiversity and genetic resources*. Belhaven Press, London.
9. Kumar, R., Kang, G. S., & Singh, B. P. (2011). Genetic variability and character association studies in potato. *Potato Journal*, 38(2), 164–170.
10. Pandey, S. K., Singh, S. V., Kumar, D., & Manivel, P. (2005). Stability analysis for tuber yield and its components in potato. *Potato Journal*, 32(3–4), 137–144.
11. Sleper, D. A., & Poehlman, J. M. (2006). *Breeding field crops*. Blackwell Publishing, Ames.