

A Comprehensive Study of the Britochi Cropping System: Integrating Multiple Crops for Enhanced Agricultural Productivity and Sustainability

Dilipkumar D. Patel¹, Krina Prafulbhai Patel²

¹Associate Professor, B.K.M Science Collage Valsad, Gujarat, India

²Student, B.K.M Science Collage Valsad, Gujarat, India

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ABSTRACT

Rising global food demand, diminishing agricultural land, and climate variability require the adoption of innovative and sustainable cultivation methods. Britochi is a novel agricultural approach utilizing interspecific grafting to produce multiple vegetable crops—brinjal (*Solanum melongena* L.), tomato (*Solanum lycopersicum*), and chili (*Capsicum annuum*)—from a single plant. This study assesses the feasibility, growth performance, yield, and economic advantages of Britochi, with a focus on the Brimato system (brinjal–tomato grafting). The experimental design included seedling propagation, controlled grafting procedures, and evaluation of plant performance in both protected and open-field settings. Results demonstrated enhanced vegetative growth, increased graft success rates, higher yields, reduced disease incidence, and improved economic returns in grafted plants compared to non-grafted controls. The dual and multiple harvesting capability of Britochi promotes efficient resource use and greater profitability. The findings indicate that Britochi is an eco-friendly, non-GMO, and sustainable technology with considerable potential for urban agriculture, kitchen gardening, and intensive farming systems.

Keywords: Britochi, grafting, Brimato, Solanaceae, sustainable agriculture, dual cropping

INTRODUCTION

Agriculture faces significant challenges from population growth, limited land resources, and environmental stresses. Conventional crop production methods are frequently inadequate to satisfy rising food demand, especially in urban and peri-urban regions with restricted land availability. Consequently,

innovative strategies that increase productivity without expanding land use are essential.

Vegetable grafting has emerged as an effective technique in modern horticulture for improving plant performance, stress tolerance, and yield. It involves joining the tissues of two plants so that they grow as a single plant, combining desirable traits of both

rootstock and scion. This technique is particularly successful among plants belonging to the same botanical family, such as Solanaceae, due to their genetic compatibility (Lee et al., 2010).

Britochi extends the principle of grafting by integrating multiple vegetable crops into a single plant system through interspecific grafting. This approach enables the simultaneous production of brinjal, tomato, and chili from one plant. The system provides three primary benefits: increased productivity, efficient space utilization, and improved resistance to biotic and abiotic stresses. The Brimato system, which combines brinjal and tomato, serves as a foundational model for demonstrating the feasibility of this approach.

Grafting has been widely reported to improve tolerance to soil-borne diseases, temperature stress, and nutrient deficiencies, while also enhancing fruit quality and yield (Kumar et al., 2017; Kyriacou et al., 2017). Unlike genetic engineering, grafting is a non-GMO, eco-friendly technique that is easily adoptable by farmers.

The present study aims to evaluate the performance of Britochi in terms of graft success, plant growth, yield, and economic feasibility, and to assess its potential as a sustainable agricultural innovation.

Materials and Methods

The study was conducted using plant materials belonging to the Solanaceae family. Brinjal (*Solanum melongena* L.) varieties included light purple long, purple round, and bharta types. Tomato (*Solanum lycopersicum*) varieties included hybrid and desi types, while chili (*Capsicum annuum*) varieties included cherry pepper and chili pepper. Healthy seeds and seedlings were collected from reliable agro-seed suppliers and local nurseries.

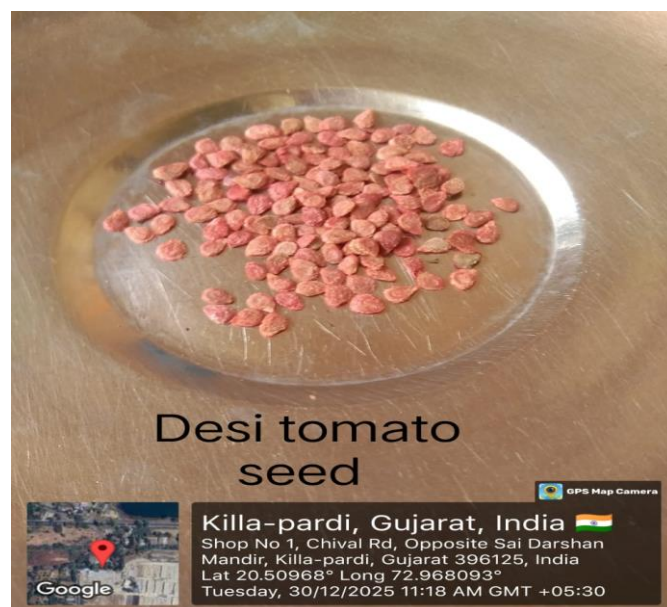
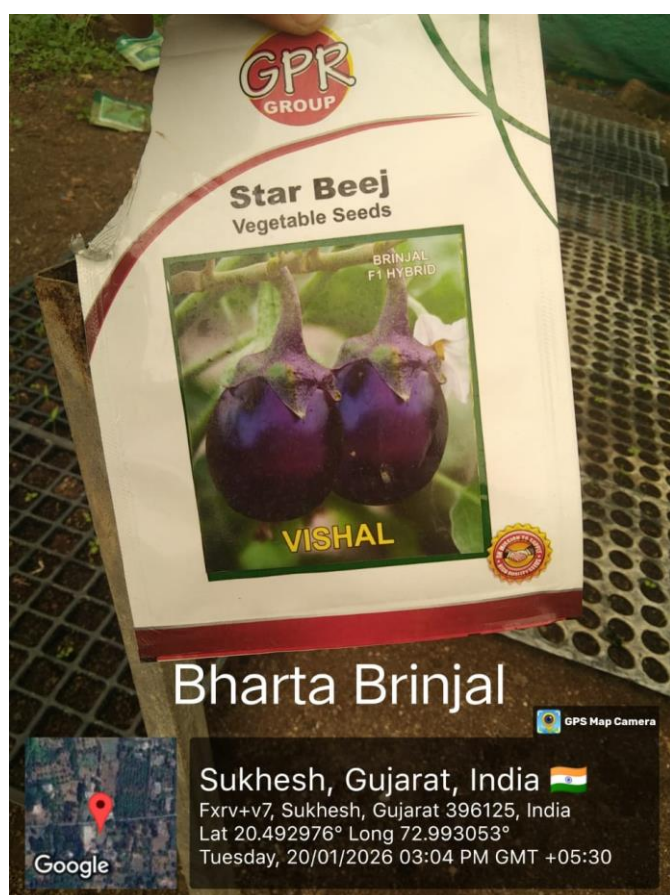
Seed Photos

Brinjal Seed Photos





Tomato Seed Photos





Chili Seed Photos



Seeds were sown in nursery trays filled with sterilized potting mixture consisting of soil, sand, and farmyard manure (FYM) or cocopeat. The seedlings were maintained under controlled environmental conditions with regular irrigation and partial shade until they reached the 3–4 true leaf stage, which is optimal for grafting.

Grafting was performed using a sterilized sharp blade to make precise slanting or wedge cuts on both rootstock and scion. Care was taken to ensure proper alignment of cambial tissues for successful union. Grafting clips or plastic tubes were used to secure the

graft junction. In the Britochi system, multiple scions (brinjal, tomato, and chili) were grafted onto a single compatible rootstock.

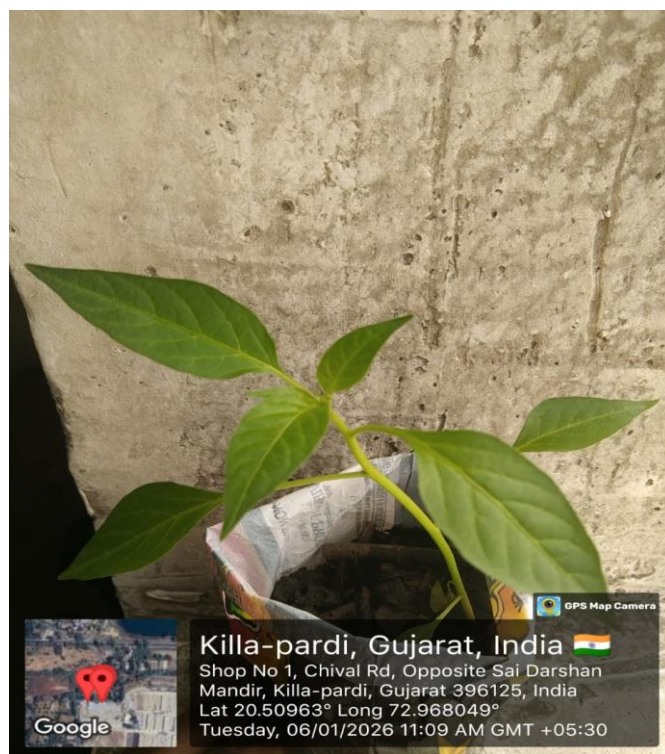
After grafting, the plants were placed in a healing chamber or under a shade net with high humidity and low light conditions to promote graft union. Humidity was maintained using plastic covers and misting with spray bottles. The grafted plants were monitored for 7–14 days for successful union formation.

Once the graft union was established, the plants were gradually acclimatized to normal environmental conditions and transplanted into pots or field conditions. Standard agronomic practices, including irrigation, fertilization, and plant protection measures, were followed throughout the study. Observations were recorded on graft success rate, plant growth parameters, yield, and disease incidence (Lee et al., 2010; Rouphael et al., 2018).

2.Seed sowing or transplanting in distance. Seed will germinate in 15 days.



One month plant in grafting process in satting. For grafting, a healthy and disease – free plant should be selected.



One Month Plant Brinjal ,Tomato and Chili



Results

The results demonstrate that Britochi, particularly the Brimato system, is an effective grafting technique for producing multiple crops from a single plant. Grafted plants exhibited a high graft success rate, indicating strong compatibility between rootstock and scions.

Vegetative growth parameters, including plant height, stem girth, branch number, and leaf area, were significantly greater in grafted plants than in non-grafted controls. This improvement is attributed to the vigorous root system of the rootstock, which enhances water and nutrient uptake.

The dual and multiple harvesting capability of Britochi resulted in a higher combined yield per plant. Tomato yield increased, while brinjal and chili production remained stable, indicating efficient resource utilization without significant competition among scions.

Additionally, grafted plants exhibited lower incidence of soil-borne diseases and reduced plant mortality. This contributed to improved productivity and economic returns. The benefit–cost ratio was higher

in Britochi compared to conventional single-crop systems, making it economically advantageous.

Discussion

The findings of the present study confirm that interspecific grafting within the Solanaceae family is a feasible and effective method for multiple crop production. The high graft success rate observed in the study is due to the close genetic and physiological compatibility between brinjal, tomato, and chili.

The improved vegetative growth observed in grafted plants can be attributed to enhanced rootstock efficiency, which facilitates better nutrient and water uptake. Previous studies have reported similar improvements in plant vigor due to grafting (Kyriacou et al., 2017).

The successful development of multiple fruits on a single plant indicates that grafting does not negatively affect reproductive growth. Instead, improved translocation of nutrients and hormones across the graft union enhances flowering and fruit set.

The higher combined yield observed in Britochi demonstrates its advantage over conventional cropping systems. The absence of significant competition among scions suggests efficient partitioning of resources.

Furthermore, the reduced incidence of soil-borne diseases highlights the protective role of rootstock. Grafting has been recognized as an eco-friendly alternative to chemical disease control (Kumar et al., 2017).

Overall, the results align with previous research on vegetable grafting and confirm that Britochi is a sustainable and innovative approach for improving agricultural productivity under limited land conditions.

Conclusion

The present study demonstrates that Britochi is a technically feasible, economically viable, and environmentally sustainable agricultural innovation.

The ability to produce multiple vegetables from a single plant enhances productivity, optimizes space utilization, and reduces input costs.

Grafted plants showed improved growth, higher yield, better disease resistance, and enhanced economic returns. The technology is particularly suitable for urban farming, kitchen gardening, and small-scale agriculture where land is limited.

Britochi represents a promising solution for future agricultural challenges. Further research on large-scale implementation, varietal combinations, and long-term performance will help in its wider adoption.

REFERENCES

- [1]. Colla, G., Roupael, Y., Cardarelli, M., & Rea, E. (2010). Effect of salinity on grafted plants. *HortScience*, 45(4), 559–565.
- [2]. Davis, A. R., et al. (2008). Cucurbit grafting. *Critical Reviews in Plant Sciences*, 27(1), 50–74.
- [3]. Guan, W., Zhao, X., Hassell, R., & Thies, J. (2012). Disease resistance in grafted vegetables. *HortScience*, 47(2), 164–170.
- [4]. King, S. R., et al. (2010). Rootstock selection in vegetables. *Scientia Horticulturae*, 127(2), 106–111.
- [5]. Kumar, P., et al. (2017). Vegetable grafting for stress tolerance. *Scientia Horticulturae*, 127(2), 162–171.
- [6]. Kyriacou, M. C., et al. (2017). Vegetable grafting and fruit quality. *Frontiers in Plant Science*, 8, 741.
- [7]. Lee, J. M., et al. (2010). Status of vegetable grafting. *Scientia Horticulturae*, 127(2), 93–105.
- [8]. Mudge, K., et al. (2009). History of grafting. *Horticultural Reviews*, 35, 437–493.
- [9]. Roupael, Y., et al. (2018). Grafting for yield stability. *Frontiers in Plant Science*, 8, 2255.
- [10]. Schwarz, D., et al. (2010). Grafting and stress tolerance. *Scientia Horticulturae*, 127(2), 162–171.