

Studies on Fungal Pathogens Associated with Guava Fruit Rot in Gaya District, Bihar

Manisha Kumari¹, Manoj Kumar² and V. K. Prabhat³

¹P.G. Department of Botany, Magadh University, Bodh Gaya.

²Department of Botany, S. N. Sinha College, Tekari, Gaya.

³P.G. Department of Botany, Ram Yas P.G. College, Malak Balu, Nawabganj, Prayagraj.

Abstract

Guava is an important commercial fruit of Bihar cultivated widely in Gaya district for its nutritive value. However, fruit rot causes 25-45% losses both in orchard and storage. The present study was conducted during 2023-25 in five blocks of Gaya namely Tekari, Belaganj, Wazirganj, Amas and Gaya Sadar. A total of 150 diseased fruits were collected and isolation was done on Potato Dextrose Agar medium. Six fungi were found associated with the rot. Colletotrichum gloeosporioides was dominant with 58.2% frequency followed by Botryodiplodia theobromae (42.5%), Fusarium solani, Aspergillus niger, Phomopsis psidii and Rhizopus stolonifer. Koch's postulate was proved on healthy fruits. In vitro, Bavistin 0.2% completely checked mycelial growth, while Trichoderma viride showed 72.4% inhibition among bio-agents. The study gives first detailed account of guava rot mycoflora of Gaya and suggests integrated management

Keywords: Guava, Fruit Rot, Colletotrichum, Gaya, Management

Introduction:

Guava (*Psidium guajava* L.) of family Myrtaceae is known as poor man's apple due to low cost and high content of Vitamin C, pectin and minerals. India is the largest producer of guava and Bihar has 29,000 ha area under it. In Gaya district Allahabad Safeda and Lucknow-49 are mainly grown. Despite favourable climate, productivity is low due to fungal diseases. Fruit rot is the most serious disease affecting fruits in field and storage. It starts as small water-soaked brown spots which enlarge, become dark brown to black and cause softening, rotting and foul smell. The disease causes fruit drop and complete loss of market value. Fruit rot is a complex disease. *Colletotrichum gloeosporioides* causing anthracnose and *Botryodiplodia theobromae* causing stem-end rot are reported as primary pathogens, while *Fusarium*, *Aspergillus*, *Phomopsis* and *Rhizopus* act as secondary invaders. High humidity, 25-30°C temperature and poor orchard sanitation during rainy season favour disease. In Gaya farmers store fruits in jute bags and bamboo baskets without treatment which increases post-harvest loss. Chemical control creates residue and resistance problems, hence bio-control by *Trichoderma* is gaining importance. No systematic work has been done in Gaya district so far. Therefore present study was undertaken to survey incidence, isolate and identify pathogens, prove pathogenicity and evaluate fungicides and bio-agents.

Material And Methods

Field survey was done in Tekari, Belaganj, Wazirganj, Amas and Gaya Sadar blocks during 2023-25 in summer, rainy and winter seasons. Five villages per block and three orchards per village were surveyed. 100 fruits from 10 trees per orchard were observed for incidence calculation. Diseased samples were collected in sterile polythene bags and brought to P.G. Department of Botany, Magadh University, Bodh Gaya.

Isolation was done by tissue isolation method. Diseased tissue pieces of 3-4 mm from junction of healthy and infected portion were surface sterilized with 0.1% mercuric chloride for 30 seconds, washed thrice with sterile water and inoculated on PDA medium. Plates were incubated at 27±2°C for 5-7 days and pure cultures were obtained by hyphal tip method. Identification was based on cultural and microscopic characters using manuals of Gilman and Barnett and Hunter and confirmed from ITCC, IARI, New Delhi. Frequency was calculated as number of samples with a fungus divided by total samples.

Pathogenicity was tested on healthy surface sterilized Allahabad Safeda fruits by inoculating 5 mm mycelial disc and spore suspension (10⁶ spores/ml). Control was kept with sterile agar disc. Fruits were kept in moist chamber at 90% humidity and 28°C. Efficacy of Bavistin (0.1, 0.2%), Mancozeb (0.2, 0.25%) and Copper Oxychloride (0.2, 0.3%) was tested by poisoned food technique and bio-agents *Trichoderma viride*, *T. harzianum* and *Pseudomonas fluorescens* by dual culture method. Per cent inhibition was calculated by Vincent formula.

Result And Discussion:

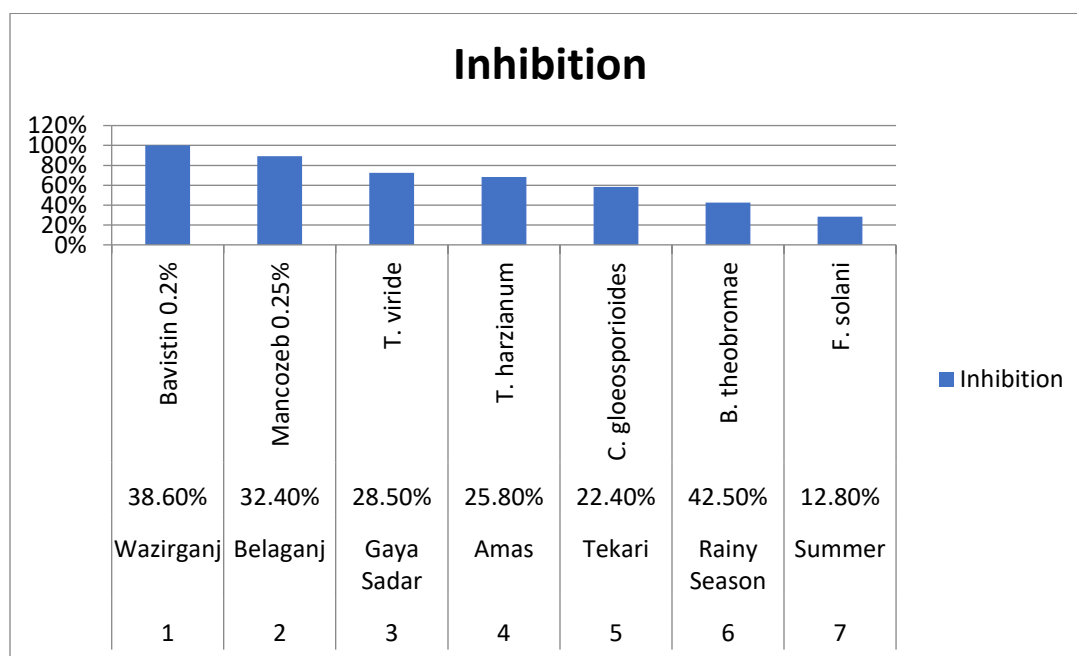
Survey revealed fruit rot is prevalent in all blocks. Maximum mean incidence was in Wazirganj (38.6%) followed by Belaganj (32.4%), Gaya Sadar (28.5%), Amas (25.8%) and Tekari (22.4%). Rainy season showed highest incidence (42.5%) compared to winter (20.2%) and summer (12.8%) due to high humidity. Allahabad Safeda was more susceptible than Lucknow-49, similar

to reports of Pandey et al. and Patel et al. Six fungi were isolated. *C. gloeosporioides* had highest frequency (58.2%) showing its dominance, followed by *B. theobromae* (42.5%), *F. solani* (28.3%), *A. niger* (25.0%), *P. psidii* (18.4%) and *R. stolonifer* (12.5%). Mixed infection of *Colletotrichum* and *Botryodiplodia* was common. All isolates were pathogenic. *C. gloeosporioides* produced dark brown sunken lesions within 4 days and completely rotted fruit in 8 days. *B. theobromae* caused stem-end blackening while *Aspergillus* and *Rhizopus* caused soft rot.

Bavistin 0.2% showed 100% inhibition of *C. gloeosporioides* and 92.4% of *B. theobromae*. Mancozeb 0.25% showed 89.2% and 84.5% inhibition respectively, while Copper Oxychloride was least effective. Among bio-agents *T. viride* showed maximum inhibition (72.4% against *C. gloeosporioides* and 68.2% against *B. theobromae*) followed by *T. harzianum*. This is due to production of volatile metabolites and competition, as reported by Srivastava et al. and Roy et al.

Table 1: Survey of guava fruit rot incidence in Gaya district and its management by fungicides and bio-agents.

S.No	Block	Disease %	Fungicide	Inhibition
1	Wazirganj	38.60%	Bavistin 0.2%	100%
2	Belaganj	32.40%	Mancozeb 0.25%	89.20%
3	Gaya Sadar	28.50%	<i>T. viride</i>	72.40%
4	Amas	25.80%	<i>T. harzianum</i>	68.20%
5	Tekari	22.40%	<i>C. gloeosporioides</i>	58.20%
6	Rainy Season	42.50%	<i>B. theobromae</i>	42.50%
7	Summer	12.80%	<i>F. solani</i>	28.30%



Graph-1

Conclusion

Fruit rot is a major constraint in Gaya district with highest incidence in Wazirganj during rainy season. Six fungi are associated, with *C. gloeosporioides* as primary and most virulent pathogen. Bavistin 0.2% is highly effective but *T. viride* can be used as eco-friendly alternative. Integrated module comprising sanitation, pruning, two sprays of Bavistin at 15 days interval during fruit development, soil application of *T. viride* @5 kg/ha and clean storage is suggested as cost effective and sustainable for farmers of Bihar.

Reference

1. Chaudhary M et al. 2022. Environ Ecol 40: 110-114.
2. Das P et al. 2025. Front Microbiol 16: 10234.
3. Kumar A et al. 2021. J Pharmacognosy 9: 45-49.
4. Kumar R et al. 2013. HortFlora 2: 112-115.
5. Kumari P et al. 2019. Int J Curr Microbiol 8: 1234-1240.
6. Lal S et al. 2014. Indian J Hort 71: 500-504.
7. Pandey BK et al. 2012. Ann Plant Prot Sci 20: 150-153.
8. Pandey S et al. 2015. Plant Pathol J 14: 68-73.
9. Patel RK et al. 2018. Bihar J Hort 8: 25-28.
10. Prasad B et al. 2026. Bihar Agri Univ J 18(1): 5-10.
11. Roy S et al. 2023. Biocontrol J 35: 14-19.
12. Srivastava S et al. 2017. Biological Control 22: 89-93.
13. Singh SP et al. 2005. Indian Phytopathology 58: 206-208.
14. Sharma RL et al. 2016. Pesticide Res J 28: 12-16.
15. Singh A et al. 2020. Indian Phytopath 73: 201-207.
16. Verma S et al. 2022. Food Sci Tech 12: 77-82.
17. Yadav K et al. 2024. J Mycol Res 62: 33-38.