

Study of Spongy Tissue Incidence in Mango (*Mangifera Indica* L.) Varieties in Parbhani District of Maharashtra, India

¹Dudhate B. K., ²Gadgile D. P.

¹Department of Botany, Shri Shivaji College, Parbhani (M.S.), India

²Department of Botany, Madhavrao Patil College, Palam Dist. Parbhani (M.S.), India

DOI: <https://doi.org/10.51583/IJLTEMAS.2025.140500078>

Received: 30 May 2025; Accepted: 09 June 2025; Published: 19 June 2025

Abstract: Several mango varieties, including local ones, were collected from the different vendors in the Parbhani fruit market and studied to measure the incidence of spongy tissue disorder. Incidence was measured using a disease incidence formula. Among these, Alphonso, Badam, Kesar, Parbhani Hapus, and Local mango fruits showed spongy incidence. It was observed that the incidence of spongy tissue in different varieties sampled was contrasting. The highest incidence was found in Alphonso fruits, whereas the lowest was found in Kesar fruits.

Keywords: Incidence, spongy tissue disorder, mango fruits, quality

I. Introduction

India is home to one of the world's most extensive collections of mango (*Mangifera indica* L.) cultivars. Mangoes are grown in every state in the country. Physiological changes and microbial spoiling during storage make mangoes more susceptible to postharvest diseases. Amongst these diseases, spongy tissue was recorded to be the most important, resulting in heavy postharvest loss. The existence of spongy tissue, a physiological ripening disorder in Alphonso mango fruit, was first noted in 1932 by Cheema and Dani. In different localities of the world, several researchers have described this disorder with various names such as lumpy tissue, stem end cavity, jelly seed, spongy tissue, internal breakdown, and pulp breakdown (Bally, 2006).

The spongy tissue incidence in mango fruits was studied by Katrodia (1985), Shivashankara and Mathai (1999), Ravindra and Shivashankara (2004), Raja (2009), Shivashankar *et al.*, (2007), and Thomas *et al.*, (1993).

In the present study, the incidence of spongy tissue that causes postharvest degradation and decay of commercially significant fruits from the Parbhani district in the Marathwada region of Maharashtra is being studied. This also evaluated post-harvest spongy tissue incidence to compare the degree of infestation in various mango varieties. Spongy tissue disease is among the biggest threats to fresh mango fruit production and marketing worldwide.

II. Materials and Methods

Matured mango fruits (about thirty) of each variety were collected from the local fruits market, Parbhani (Dist. Parbhani, Maharashtra) and brought to the laboratory of the Department of Botany, Shri Shivaji College, Parbhani (M.S.), India for further investigation. Initially, all fruits were surface sterilized with 30% ethanol. The fruits were sorted out from each mango variety and were cut on both sides to observe the occurrence of spongy tissue. The following formula was used to calculate the spongy incidence in mangoes:

No. of fruits exhibiting

Spongy tissue symptom

Incidence of spongy tissue (%) = $\frac{\text{No. of fruits exhibiting Spongy tissue symptom}}{\text{Total number of fruits examined}} \times 100$

Total number of fruits examined

III. Results and Discussion

Spongy tissue disease incidence in mango fruits was measured in terms of percentage. It was observed that the incidence of spongy tissue in different varieties sampled was found to be dissimilar, as represented in Table 1. The disease incidence was recorded only in Alphonso, Badam, Kesar, Parbhani Hapus, and local varieties. The highest (23.3 percent) of disease incidence (PDI) was measured in the Alphonso, followed by Badam (16.7 percent), Parbhani Hapus (13.3 percent), local mango variety (10 percent), and Kesar (6.7 percent). Fig. 1 reveals the percentage of disease incidence (PDI) amongst the spongy mango varieties.

Table 1: Spongy tissue incidence in different mango varieties

Sr.	Mango Variety	Spongy mango/ total mango fruits sampled	Spongy Tissue Incidence (%)
1	Alphonso	07/30	23.3
2	Amrapali	00/30	Nil

3	Badam	05/30	16.7
4	Dasheri	00/30	Nil
5	Kesar	02/30	6.7
6	Lalbagh	00/30	Nil
7	Langra	00/30	Nil
8	Local variety	03/30	10.0
9	Malika	00/30	Nil
10	Parbhani Hapus	04/30	13.3
11	Totapuri	00/30	Nil

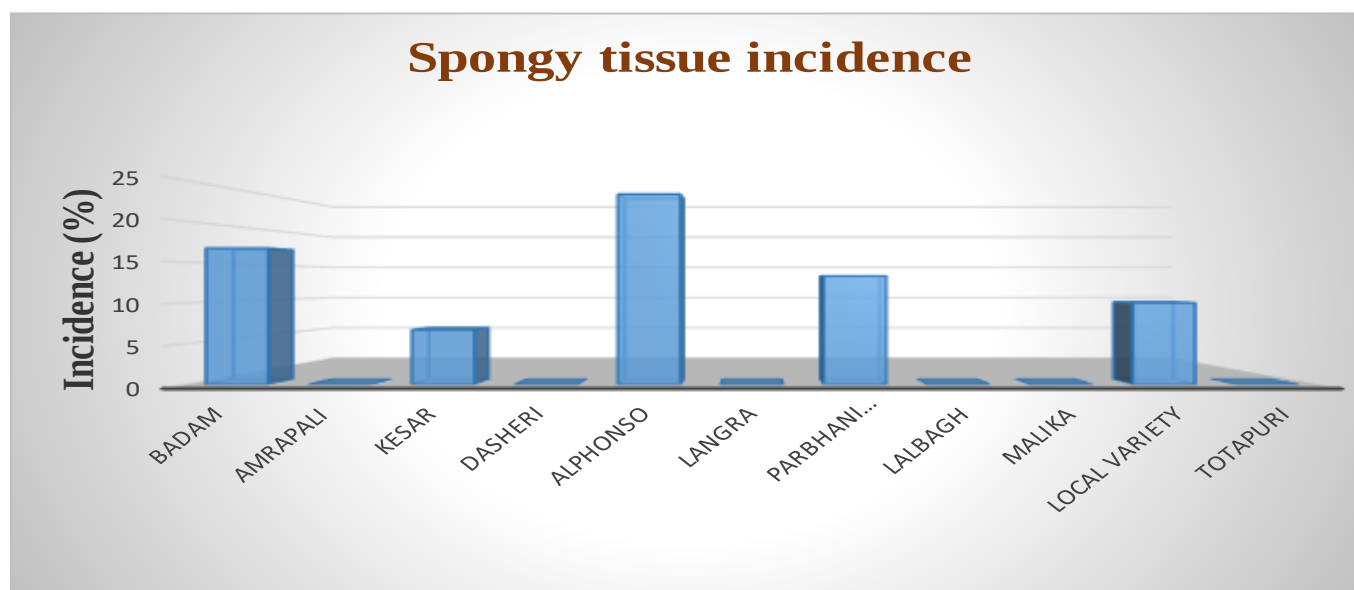


Fig 1: Spongy tissue incidence (%) in different mango varieties

Similar results of spongy incidence in mango were reported by some researchers. Burondkar *et al.*, (2009) studied the incidence and location of spongy tissue in Alphonso mango. Limaye *et al.*, (1975) also reported contrasting spongy tissue incidence in mango varieties. They found the highest spongy incidence at 46.67% in Alphonso as compared to 36.67% in Vanraj, 26.67% in Olour, 13.33% in Goamankar, 10.0% in Vellaikolamban, 6.67% in Swarnarekha, and 3.33% in Fernandrin. Rane *et al.*, (1976) reported that cultivars such as Doodhpeda, Kesar, Neelum, Dashehari, and Pairi did not show spongy incidence and were unsusceptible to spongy tissue. Raymond (1997) reported that Van Dyke fruit had a higher incidence of internal breakdown than Tommy Atkins however no incidence in Irwin fruits.

IV. Conclusion

Mango is a rich source of antioxidants and hence recommended to use in our daily diet because of its several health benefits. Spongy tissue makes it unsuitable for human consumption. Spongy tissue in mango is found to be more common in some varieties and can result in significant financial loss for growers and exporters. The spongy incidence also varies within the fruit. Thus, Alphonso is more prone to spongy tissue incidence than other varieties. The results suggest that spongy tissue incidence in several mango varieties differs significantly.

References

1. Bally I. S. (2006) The effect of pre-harvest nutrition and crop load on fruit quality and postharvest disease in mango (*Mangifera indica* L.) Ph.D. Thesis submitted to the University of Queensland, Gatton, Australia
2. Burondkar M. M., Jadhav B. B., Chetti M. B. (2009) Effect of Plant Growth Regulators, Polyamine and Nutrients on Fruit Quality and Occurrence of Spongy Tissue in Alphonso Mango *Acta Horticulturae* 820: 689-696
3. Katrodia J. S. (1985). Spongy tissue in mango-causes and control measures. *Acta Horticulturae* 231: II International Symposium on Mango
4. Limaye V. P., Gungate R. T., Joshi G. D. (1975). Studies on the occurrence of spongy tissue in some varieties of mango (*Mangifera indica* L.). *Dapoli Agricultural College Magazine* 10:36-37

5. Thomas P., Saxena S. C., Chandra R., Rao R., Bhatia C. R. (1993). X-ray imaging for detecting spongy tissue, an internal disorder in fruits of 'Alphonso' mango (*Mangifera indica* L.). *Journal of Horticulture Science* 68 (5): 803-806.
6. Raja M. E. (2009). Investigation on causes and correction of spongy tissue in Alphonso mango (*Mangifera Indica* L.). *Acta Horticulturae* 820:697-706
7. Rane D. A., Katrodia J. S., Kulkarni D. N. (1976). Problem of spongy tissue development in mango (*Mangifera indica* L.) cv. Alphonso, a review. *Journal of Maharashtra Agricultural University* 1:89-94.
8. Ravindra V., Shivashankar S. (2004). Spongy tissue in Alphonso mango significance of in situ seed germination events. *Current Science* 87(8): 1045-1048
9. Raymond Luc (1997). Histological and Nutritional Studies of Internal Breakdown in Mango (*Mangifera Indica* L.) fruit. Ph.D. Thesis submitted to the University of Florida.
10. Shivashankara, K. S., Mathai, C. K. (1999). Relationship of leaf and fruit transpiration rates to the incidence of spongy tissue disorder in two mango (*Mangifera indica* L.) cultivars. *Scientia horticulturae* 82(3): 317-323.
11. Shivshankar S., Ravindra V., Louis L. (2007) Biochemical changes in seed and mesocarp of mango (*Mangifera indica* L.) cv. 'Alphonso' and their significance during the development of spongy tissue *Journal of Horticultural Science & Biotechnology* 82 (1) 35-40