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# Stem end rot of mango: Characterizing disease dynamics and fruit quality deterioration from farm to retail in Saurashtra

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**Abstract**
A roving survey was conducted from May to July 2024 across orchards, wholesale and retail mango markets in Junagadh and Gir Somnath districts of the Saurashtra region of Gujarat. The survey revealed a significant increase in mango stem end rot (SER) severity as fruits moved from field to market. Field incidence ranged from 3.34-30.06% (severity: 1.65-13.6%), escalating to 11.69-28.39% incidence (severity: 7.59-17.82%) in wholesale markets and 15.03-40.08% incidence (severity: 14.19-37.95%) in retail markets. A similar trend was observed for fruit weight loss, which increased from 9.50-15.60% in the field to 11.71-18.13% in wholesale and 13.19-26.35% in retail markets. This progressive escalation in disease prevalence and fruit deterioration highlight the critical post-harvest management challenges posed by stem end rot across the mango supply chain.

**Keywords:** Mango, stem end rot, post-harvest disease, fruit quality, supply chain, Saurashtra, disease dynamics, retail deterioration

## Introduction
Mango (*Mangifera indica* L.) a member of the Anacardiaceae family, is an important fruit crop of India as well as tropical and sub-tropical countries of world. With its rich cultural and religious significance spanning generations, the mango stands as a revered symbol, acclaimed as the "king of tropical fruits" (Yadav *et al*., 2018) [11]. The mango is commercially grown and popular in more than 80 countries worldwide. Among them, India is the largest producer of mango accounting for nearly 50 per cent of the total production of the world (Senjaliya *et al*., 2022) [8]. India occupies top position among mango growing countries of the world with an area of 2.39 million hectares and annual production of 22.66 million tonnes (Anonomous, 2024) [1]. The mango industry faces significant post-harvest losses, with fungal diseases being a primary culprit. These losses can be as high as 50%, particularly impacting perishable fruits like mangoes more severely than other crops (Eckert and Ogawa, 1985) [3]. During transport, storage and sale, on an average of 17.7% of mangoes rot due to fungal infections (Sharma *et al*., 1994) [9]. Among the various post-harvest diseases, stem end rot, caused by *L. theobromae*, is a major concern in India (Johnson *et al*., 1991) [5]. Globally, stem end rot is considered the second most severe post-harvest mango disease after anthracnose (Dodd *et al*., 1997) [2]. Stem end rot initially appears as a small, light brown lesion on the mango's skin around the stem. Which later form a circular snuff brown black patch having fringed margin, under humid condition through which a light brown exudation occurred (Pathak and Srivastava, 1967) [6].
This comprehensive approach aimed to understand the progression of the disease from harvest through to retail sale and to identify potential intervention points for disease management. Additionally, the survey intended to assess the pathogenic diversity of *L. theobromae*, the primary causal agent, across different locations.

## Materials and Methods
An intensive roving survey was carried out during the summer season of 2024 (May to July) in major mango-producing regions of Junagadh and Gir Somnath districts to assess the severity of stem end rot diseases of mango. The survey encompassed mango 69 orchards, 14 wholesale and 18 retail mango markets. Naturally infected as well as randomly selected unripe fruits of mango cv. Kesar showing typical symptoms of stem end rot were picked up

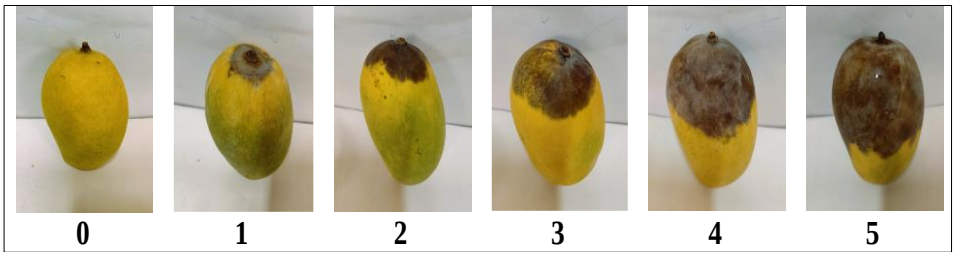
from both the orchards and markets during survey. Each sample containing 60 fruits. It was collected in paper bags then bring to the laboratory and stored at room temperature for 24 hours. Stored samples were examined every day for post-harvest diseases and fruits showing typical stem end tot disease symptoms were sorted out for the isolation and confirmation of the causal agents. The numbers of infected fruits were recorded and per cent disease incidence was calculated by using following standard formula as given by Gupta (2007) [4]. The fruit weight loss was also calculated by using following formula.

$$\text{Disease Incidence (\%)} = \frac{\text{Number of diseased fruits}}{\text{Total number of fruits}} \times 100$$

$$\text{Disease Incidence (\%)} = \frac{\text{Number of diseased fruits}}{\text{Total number of fruits}} \times 100$$

Likewise; to assess the disease severity, observations were taken on area of fruit surface showing symptoms in 0-5 scale as given by Prasannakumar *et al*., (2002) [7].

| Grade | Description |
|---|---|
| 0 | No symptoms on fruit surface |
| 1 | 0.1- 5 per cent area covered by lesions |
| 2 | 5.1-10 per cent area covered by lesions |
| 3 | 10.1- 25 per cent area covered by lesions |
| 4 | 25.1-50 per cent area covered by lesions |
| 5 | >50 per cent area covered by lesions |




Further, per cent disease intensity (PDI) was calculated by using following formula as given by Wheeler, (1969) [10].

$$\text{PDI} = \frac{\text{Sum of all individual rating}}{\text{Total no. of fruits observed} \times \text{Maximum disease grade}} \times 100$$

**Results and Discussion**

The findings revealed a consistent trend of increasing disease prevalence, severity and fruit weight loss as mango moved from the field to wholesale markets and finally to retail markets in both districts. In Gir Somnath district, the lowest disease levels were recorded at the field level with 10.15% incidence, 4.27% severity and 11.49% fruit weight loss. These parameters increased at the wholesale stage to 19.10% incidence, 14.84% severity and 14.68% fruit weight loss, reaching the highest levels in retail markets with 22.26% incidence, 20.62% severity and 18.38% fruit weight loss.

A similar trend was observed in Junagadh district. At the field level, disease incidence was 9.53%, severity 4.10% and fruit weight loss 11.26%. These levels increased to 17.62% incidence, 11.53% severity and 14.10% fruit weight loss in wholesale markets, peaking in retail markets with 23.99% incidence, 22.51% severity and 19.30% fruit weight loss. Notably, retail market losses in Junagadh district were slightly higher than those recorded in Gir Somnath. This progressive escalation in disease prevalence and fruit deterioration highlights the critical role of post-harvest handling, transportation, storage and market conditions in aggravating stem end rot in mango.

**1. Field survey for stem end rot diseases of mango**

A detailed field survey covering 69 villages across eight talukas of Junagadh and Gir Somnath districts revealed substantial variation in stem end rot incidence and severity (Table 1 and Plate 1). The highest disease incidence (30.06%) was recorded in Ramrechi village, while the highest severity (14.28%) occurred in Talala village, both located in Gir Somnath district. In contrast, the lowest disease incidence (1.67%) and severity (0.34%) were observed in Ratang village of Junagadh district.

Several villages, including Chhachhar, Ghusiya and Motha in Gir Somnath district and Manpur in Junagadh district, were completely free from the disease during the survey period. Analysis of fruit weight loss data indicated a direct correlation between disease severity and fruit weight reduction. Villages with high disease levels, such as Ramrechi (15.60% fruit weight loss) and Talala (14.93%), recorded significantly greater losses compared to normal physiological levels. Conversely, villages free from stem end rot disease (e.g., Chhachhar - 9.50%, Ghusiya - 9.95%, Motha - 10.05% and Manpur - 9.92%) exhibited fruit weight losses within or near the expected physiological range. These findings demonstrate the localized nature of disease prevalence at the orchard level and highlight the influence of disease-free orchards on minimizing post-harvest losses.

**2. Wholesale market survey for stem end rot diseases of mango**

The survey of 14 major wholesale mango markets across Junagadh and Gir Somnath districts revealed notable variations in disease incidence, severity and fruit weight loss (Table 2 and Plate 1). Among all the surveyed markets, the highest disease incidence (28.39%) was recorded at APMC Mango Market Yard, Talala, while the highest severity (18.81%) occurred at APMC Market Yard, Kodinar.

The Centre of Excellence for Mango at Talala exhibited the lowest disease incidence (11.69%) and severity (7.59%), demonstrating the potential benefits of improved handling and storage infrastructure in reducing post-harvest losses. In terms of fruit weight loss, the highest percentage (18.13%) was observed at APMC Mango Market Yard, Talala, corresponding with high disease levels. In contrast, the Centre of Excellence for Mango recorded the lowest fruit weight loss of 11.71%. These results emphasize the critical role of post-harvest market practices and infrastructure in either mitigating or exacerbating stem end rot losses at the wholesale level.

### 3. Retail market survey for stem end rot diseases of mango

Assessed the incidence and severity of mango stem end rot at the retail level (Table 3 and Plate 1). The significant variations were observed in stem end rot prevalence and severity at the retail level. Among the surveyed retail markets, the highest disease incidence (40.08%) and severity (37.95%) were notably recorded in Vegetable Market, Dhal Road (Junagadh), whereas the lowest disease incidence (15.03%) and severity (14.19%) were recorded at Fruits Market, Sakkarbaug (Junagadh).

Furthermore, analysis of fruit weight loss in various retail mango markets as presented in Table 3 revealed that the highest losses were observed at Vegetable Market, Dhal Road (26.35%). The lowest losses were recorded at Fruits Market, Sakkarbaug (13.19%).

Collectively, the surveys demonstrated a clear trend: disease prevalence, encompassing incidence and severity as well as associated fruit weight loss, was minimal at the field level, progressively increasing through the wholesale stage and reaching its maximum at the retail distribution level. This escalating trend is primarily attributed to the cumulative effects of post-harvest handling, transportation stresses, prolonged storage and varying environmental conditions encountered at each stage of the supply chain. These factors collectively favor the development of the pathogen (*L. theobromae*) and subsequent fruit deterioration, leading to significant economic losses highlighted by the increasing fruit weight reduction due to stem end rot of mango.

## Conclusion

A roving survey conducted from May to July during the summer seasons of 2024 across 69 orchards, 14 wholesale and 18 retail mango markets in Junagadh and Gir Somnath districts of Saurashtra, revealed widespread stem end rot. Disease severity significantly increased as fruit progressed from fields to markets: field incidence ranged from 3.34-30.06% (1.65-13.6% severity), escalating in wholesale markets (11.69-28.39% incidence and 7.59-17.82% severity) and retail markets (15.03-40.08% incidence and 14.19-37.95% severity). A similar trend was observed in fruit weight loss, emphasizing the intensification of disease during post-harvest stages. Variations are attributed to differences in horticultural practices, environmental conditions and post-harvest handling and storage across various regions and locations.

## Conflict of Interest

The authors have no conflict of interest.

## Acknowledgement

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**Table 1:** Field survey for stem end rot diseaseof mango

| Sr. No. | Taluka | Village/City | Latitude-Longitude | Disease Incidence (%) | Disease Severity (%) | Fruit weight loss (%) |
|---|---|---|---|---|---|---|
| **(1) Junagadh District** | | | | | | |
| 1 | Junagadh | Baliyavad | 21.583588°N - 70.567981°E | 16.7 | 5.28 | 11.97 |
| 2 | | Dungarpur I (J K farm) | 21.458206°N - 70.490525°E | 5.01 | 3.61 | 10.72 |
| | | Dungarpur II (Shree Hari Farm & Gaushala) | 21.456681°N - 70.496975°E | 10.02 | 4.62 | 11.63 |
| 3 | | Junagadh I (Sakkarbaug Farm) | 21.541424°N - 70.467811°E | 20.04 | 9.2 | 13.88 |
| | | Junagadh II (Lalbaug Farm) | 21.514820°N - 70.450925°E | 18.37 | 6.64 | 12.91 |
| | | Junagadh III (Sagdividi) | 21.484670°N - 70.436421°E | 11.69 | 3.61 | 10.69 |
| 4 | | Khadiya | 21.445119°N - 70.515281°E | 6.68 | 2.67 | 10.76 |
| **Mean** | | | | **12.64** | **5.09** | **11.79** |
| 5 | Keshod | Magharwada | 21.375926°N - 70.287143°E | 8.35 | 5.05 | 10.69 |
| 6 | | Manekvada | 21.385951°N - 70.269381°E | 6.68 | 3.35 | 10.45 |
| **Mean** | | | | **7.51** | **4.20** | **10.57** |
| 7 | Mendarada | Amargadh | 21.310020°N - 70.439080°E | 3.34 | 1.65 | 10.41 |
| 8 | | Kenedipur | 21.275988°N - 70.487028°E | 10.02 | 5.30 | 11.54 |
| 9 | | Khodiyal Nani | 21.291792°N - 70.482689°E | 16.7 | 7.44 | 12.37 |
| 10 | | Malanka | 21.236222°N - 70.508349°E | 6.68 | 2.67 | 11.39 |
| 11 | | Manpur | 21.290304°N - 70.454379°E | 0.00 | 0.00 | 9.92 |
| 12 | | Najapur | 21.330587°N - 70.454253°E | 10.02 | 3.35 | 12.15 |
| **Mean** | | | | **7.79** | **3.40** | **11.30** |
| 13 | Vanthali | Balot | 21.511044°N - 70.342745°E | 3.34 | 2.93 | 11.02 |
| 14 | | Dhanfuliya | 21.450513°N - 70.394115°E | 6.68 | 2.04 | 10.98 |
| 15 | | Kajaliyala Mota | 21.434558°N - 70.344053°E | 11.69 | 3.06 | 11.23 |
| 16 | | Kajaliyala Nana | 21.451319°N - 70.378391°E | 16.7 | 6.26 | 12.76 |
| 17 | | Kanjha | 21.445061°N - 70.298373°E | 18.37 | 7.62 | 12.97 |
| 18 | | Kanjhadi | 21.438974°N - 70.328883°E | 8.35 | 2.72 | 10.68 |
| 19 | | Santalpur | 21.464764°N - 70.279093°E | 8.35 | 4.95 | 10.72 |
| 20 | | Shapur | 21.463342°N - 70.379125°E | 21.71 | 8.84 | 13.98 |
| 21 | | Tinmas | 21.424226°N - 70.269191°E | 11.69 | 3.74 | 11.21 |
| 22 | | Vanthali | 21.481939°N - 70.323712°E | 23.38 | 9.52 | 14.78 |
| **Mean** | | | | **13.03** | **5.17** | **12.03** |
| 23 | Visavadar | Ishvariya | 21.324893°N - 70.637471°E | 8.35 | 3.63 | 10.69 |
| 24 | | Piyava Gir | 21.267330°N - 70.670307°E | 11.69 | 4.08 | 10.81 |
| 25 | | Rajpara | 21.266562°N - 70.782313°E | 5.01 | 2.28 | 10.69 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 26 | | Ratang | 21.307517°N - 70.601976°E | 1.67 | 0.34 | 10.08 |
| 27 | | Visavadar | 21.341277°N - 70.741905°E | 6.68 | 3.01 | 10.79 |
| **Mean** | | | | **6.68** | **2.67** | **10.61** |
| **District Mean** | | | | **9.53** | **4.10** | **11.26** |
| **(2) Gir Somnath District** | | | | | | |
| 28 | Gir Gadhada | Babariya | 20.970580°N - 70.861403°E | 1.67 | 0.68 | 10.23 |
| 29 | | Bhakha | 20.976649°N - 70.814448°E | 18.37 | 7.38 | 12.68 |
| 30 | | Gir Gadhada | 20.936079°N - 90.908147°E | 4.98 | 1.74 | 10.54 |
| 31 | | Jamvala Gir | 20.979042°N - 70.764687°E | 11.67 | 3.44 | 10.95 |
| 32 | | Thordi Gir | 20.962310°N - 70.849940°E | 20.04 | 9.52 | 13.57 |
| 33 | | Umedpara | 20.910678°N - 70.888208°E | 6.68 | 4.32 | 10.81 |
| **Mean** | | | | **10.57** | **4.51** | **11.46** |
| 34 | Kodinar | Arnej | 20.892096°N - 70.693607°E | 5.01 | 2.95 | 10.43 |
| 35 | | Chhachhar | 20.862337°N - 70.759635°E | 0.00 | 0.00 | 9.50 |
| 36 | | Dudana | 20.804720°N - 70.718877°E | 4.96 | 1.70 | 10.29 |
| 37 | | Ghantvad | 20.926157°N - 70.752069°E | 15.03 | 5.06 | 12.52 |
| 38 | | Govindpurbhandariya | 20.861901°N - 70.751308°E | 13.36 | 3.71 | 11.94 |
| 39 | | Sugala | 20.898305°N - 70.758609°E | 10.02 | 3.40 | 10.35 |
| 40 | | Vadnagar | 20.839359°N - 70.701840°E | 18.37 | 5.44 | 13.10 |
| **Mean** | | | | **9.53** | **3.18** | **11.16** |
| 41 | Talala | Ankolvadi | 21.035751°N - 70.671481°E | 20.04 | 8.25 | 13.68 |
| 42 | | Bhimdeval | 20.962854°N - 70.605108°E | 15.03 | 4.42 | 12.45 |
| 43 | | Bhojde | 21.142919°N - 70.591644°E | 10.02 | 2.64 | 12.05 |
| 44 | | Borvav | 21.093035°N - 70.582900°E | 10.02 | 8.62 | 11.78 |
| 45 | | Dhava | 20.070902°N - 70.600638°E | 16.7 | 5.44 | 11.89 |
| 46 | | Gabha | 21.011351°N - 70.513137°E | 21.71 | 10.23 | 13.56 |
| 47 | | Ghusiya | 21.014164°N - 70.484392°E | 0.00 | 0.00 | 9.95 |
| 48 | | Gundaran | 21.041436°N - 70.570518°E | 3.34 | 2.64 | 10.45 |
| 49 | | Hadmatiya | 21.010435°N - 70.637838°E | 15.03 | 8.16 | 12.86 |
| 50 | | Jambur | 21.033318°N - 70.606521°E | 6.68 | 4.95 | 11.76 |
| 51 | | Jasapur | 21.088958°N - 70.640775°E | 1.67 | 1.32 | 10.09 |
| 52 | | Mal Jinjava | 21.008304°N - 70.469004°E | 18.37 | 3.98 | 13.22 |
| 53 | | Moruka | 21.067597°N - 70.647694°E | 8.35 | 7.26 | 11.33 |
| 54 | | Pipalava | 21.036585°N - 70.528286°E | 23.38 | 11.56 | 13.78 |
| 55 | | Ramrechi | 21.068714°N - 70.533996°E | 30.06 | 13.6 | 15.60 |
| 56 | | Surva | 21.040239°N - 70.636655°E | 15.03 | 6.68 | 12.88 |
| 57 | | Talala | 21.065881°N - 70.537923°E | 25.05 | 14.28 | 14.93 |
| 58 | | Umrethi | 21.024384°N - 70.461598°E | 6.68 | 2.69 | 10.76 |
| **Mean** | | | | **13.73** | **6.48** | **12.39** |
| 59 | Una | Delwada | 20.787505°N - 71.044114°E | 3.34 | 1.7 | 10.21 |
| 60 | | Kanakbarda | 20.839283°N - 71.115082°E | 8.35 | 3.74 | 11.03 |
| 61 | | Kothari | 20.799600°N - 71.060948°E | 6.68 | 2.72 | 10.78 |
| 62 | | Motha | 20.826334°N - 71.139042°E | 0.00 | 0.00 | 10.05 |
| 63 | | Nathej | 20.854910°N - 71.086352°E | 10.02 | 4.12 | 11.26 |
| 64 | | Sankhada | 20.827985°N - 71.158311°E | 5.01 | 2.04 | 10.63 |
| **Mean** | | | | **5.57** | **2.38** | **10.66** |
| 65 | Veraval | Dabhor | 20.941146°N - 70.359892°E | 18.37 | 8.38 | 13.41 |
| 66 | | Khandheri | 20.959670°N - 70.590470°E | 6.68 | 2.72 | 10.83 |
| 67 | | Moraj | 20.983943°N - 70.431815°E | 11.67 | 3.40 | 11.16 |
| 68 | | Pandava | 20.965736°N - 70.507501°E | 5.01 | 2.02 | 10.68 |
| 69 | | Savni | 20.968933°N - 70.465891°E | 15.03 | 7.72 | 12.92 |
| **Mean** | | | | **11.35** | **4.84** | **11.80** |
| **District Mean** | | | | **10.15** | **4.27** | **11.49** |

**Table 2:** Wholesale market survey for stem end rot disease of mango

| Sr. No. | Taluka | Wholesale Market | Latitude-Longitude | Disease Incidence (%) | Disease Severity (%) | Fruit weight loss (%) |
|---|---|---|---|---|---|---|
| **(1) Junagadh District** | | | | | | |
| 1 | Junagadh | Gujarat Fruits Supplier, Dolatpara | 21.547884°N - 70.466259°E | 18.37 | 13.53 | 14.15 |
| 2 | | Ram Mango Supplier, Vanthali road | 21.479147°N - 70.340051°E | 15.03 | 8.25 | 13.01 |
| 3 | | Sardar Patel Market Yard, Dolatpara | 21.549877°N - 70.466103°E | 25.05 | 18.15 | 17.42 |
| **Mean** | | | | **19.48** | **13.31** | **14.86** |
| 4 | Vanthali | APMC, Mango Market Yard, Vanthali | 21.483024°N - 70.355232°E | 20.04 | 13.24 | 14.78 |
| **Mean** | | | | **20.04** | **13.24** | **14.78** |
| 5 | Visavadar | Keshubhai Patel Market Yard, Visavadar | 21.358127°N - 70.747782°E | 13.36 | 8.04 | 12.65 |
| **Mean** | | | | **13.36** | **8.04** | **12.65** |
| **District Mean** | | | | **17.62** | **11.53** | **14.10** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **(1) Gir Somnath District** | | | | | | |
| 6 | Kodinar | APMC Market Yard, Kodinar | 20.797589°N - 70.697546°E | 21.71 | 18.81 | 15.97 |
| **Mean** | | | | **21.71** | **18.81** | **15.97** |
| 7 | Talala | Anil Farm - Golden Baug and Nursery, Sasan Gir | 21.172676°N - 70.575134°E | 20.04 | 9.56 | 14.21 |
| 8 | | APMC, Mango Market Yard, Talala | 21.073319°N - 70.543962°E | 28.39 | 17.82 | 18.13 |
| 9 | | Gajera Kesar Mango Supplier - Talala | 21.057271°N - 70.634889°E | 21.71 | 13.20 | 15.49 |
| 10 | | KKM Mango Supplier- Galiyavad | 21.047673°N - 70.500257°E | 20.4 | 13.40 | 14.75 |
| 11 | | Maruti Mango Supplier, Talala | 21.035924°N - 70.536443°E | 23.38 | 15.84 | 16.02 |
| 12 | | Talala (COE for Mango) | 21.065455°N - 70.538032°E | 11.69 | 7.59 | 11.71 |
| 13 | | Talala Gir Mango Supplier, Pipalava | 21.036397°N - 70.536456°E | 18.37 | 10.24 | 14.01 |
| **Mean** | | | | **20.56** | **12.52** | **14.90** |
| 14 | Veraval | APMC Market, Kajli | 20.894304°N - 70.419163°E | 15.03 | 13.20 | 13.19 |
| **Mean** | | | | **15.03** | **13.20** | **13.19** |
| **District Mean** | | | | **19.10** | **14.84** | **14.68** |

**Table 3:** Retail market survey for stem end rot disease of mango

| Sr. No. | Taluka | Wholesale Market | Latitude-Longitude | Disease Incidence (%) | Disease Severity (%) | Fruit weight loss (%) |
|---|---|---|---|---|---|---|
| **(1) Junagadh District** | | | | | | |
| 1 | Junagadh | Fruit Market, Aazad chowk | 21.519337°N - 70.461473°E | 30.06 | 27.72 | 22.87 |
| 2 | | Fruits Market, Sakkarbaug road | 21.540518°N - 70.463033°E | 15.03 | 14.19 | 13.19 |
| 3 | | Joshipara Market, Joshipara | 21.530668°N - 70.451905°E | 35.07 | 33.33 | 23.56 |
| 4 | | Madhuram Vegetable Market, Vanthali Road | 21.501165°N - 70.427114°E | 28.39 | 27.37 | 22.12 |
| 5 | | Moti Baug | 21.507804°N - 70.448895°E | 20.04 | 18.46 | 17.08 |
| 6 | | Reliance Smart Bazaar, Zanzarda | 21.524245°N - 70.438624°E | 23.38 | 23.10 | 21.76 |
| 7 | | Swaminarayan Temple, Vanthali Road | 21.504385°N - 70.442199°E | 18.37 | 15.84 | 16.02 |
| 8 | | The Great Gujri Sunday Market, Gandhigram | 21.509586°N - 70.457155°E | 33.4 | 30.36 | 23.21 |
| 9 | | Vegetable and Fruits Market, Mangnath | 21.518899°N - 70.462325°E | 25.05 | 24.75 | 20.32 |
| 10 | | Vegetable Market, Dhal road | 21.522683°N - 70.465263°E | 40.08 | 37.95 | 26.35 |
| **Mean** | | | | **26.89** | **25.31** | **20.65** |
| 11 | Vanthali | Vegetable and Fruit Market, Vanthali | 21.477208°N - 70.334612°E | 23.38 | 22.42 | 19.54 |
| **Mean** | | | | **23.38** | **22.42** | **19.54** |
| 12 | Visavadar | Vegetable Market, Visavadar | 21.341135°N - 70.752239°E | 21.71 | 19.80 | 17.71 |
| **Mean** | | | | **21.71** | **19.80** | **17.71** |
| 13 | Kodinar | Old Vegetable Market, Pedhavada | 20.794359°N - 70.701308°E | 23.38 | 20.46 | 19.76 |
| 14 | | Vegetable and Fruit Market, Sardarnagar | 20.810215°N - 70.688879°E | 18.37 | 16.83 | 16.19 |
| | | | | | | |
| 15 | Talala | Vegetable Market, Gayatrinagar | 21.056422°N - 70.531996°E | 21.71 | 20.79 | 17.64 |
| 16 | | Vegetable Market, Talala | 21.056676°N - 70.532081°E | 26.72 | 24.75 | 20.17 |
| **Mean** | | | | **24.21** | **22.77** | **18.90** |
| 17 | Veraval | Main Vegetable Market, Kharakuva | 20.905470°N - 70.365033°E | 18.37 | 18.15 | 16.55 |
| 18 | | Vegetable and Fruit Market, Veraval | 20.910375°N - 70.369689°E | 25.05 | 22.73 | 19.98 |
| **Mean** | | | | **21.71** | **20.44** | **18.26** |
| **District Mean** | | | | **22.26** | **20.62** | **18.38** |


**Plate 1:** Survey for stem end rot disease of mango

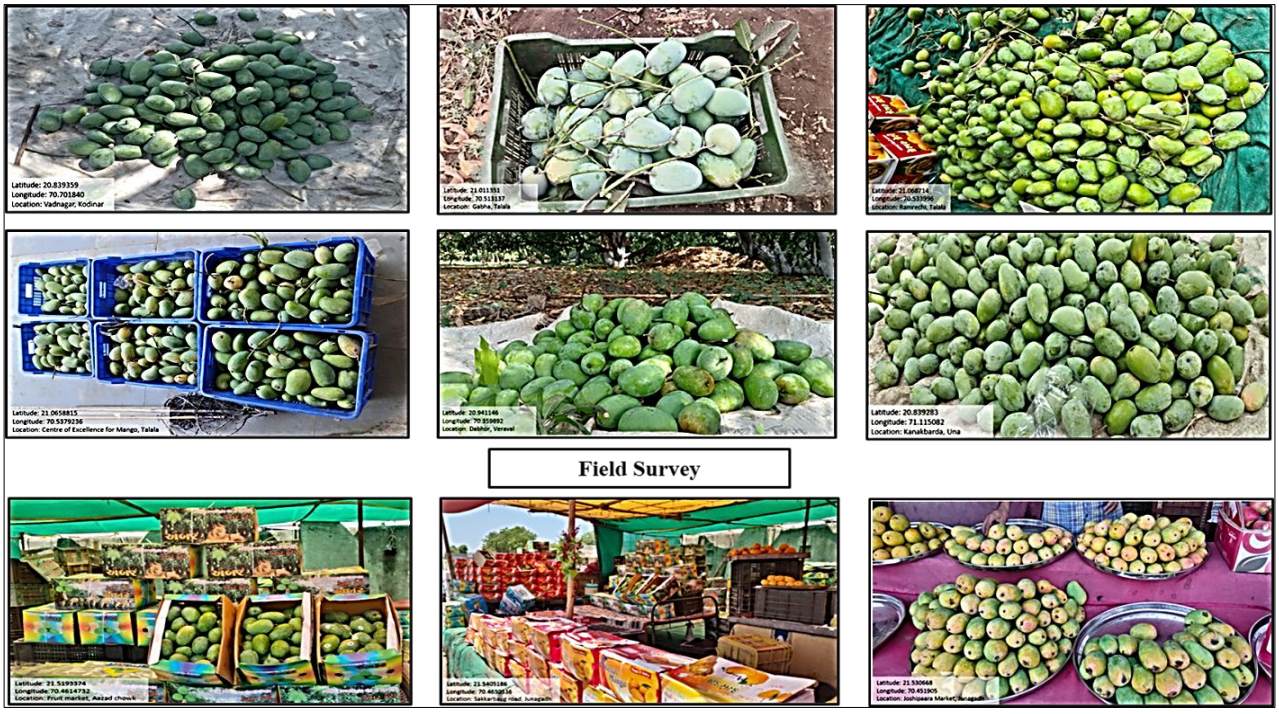


**Plate 2:** Survey for stem end rot disease of mango

**Retail Survey**

**Plate 3:** Survey for stem end rot disease of mango



**Wholesale Survey**

**Plate 4:** Survey for stem end rot disease of mango

**References**


1. Anonymous. Area and production of horticulture crops for 2024-25 (First Advance Estimate). Department of Agriculture and Farmer's Welfare, Ministry of Agriculture and Farmer's Welfare, Government of India; 2024. https://agriwelfare.gov.in/en/StatHortEst. Accessed 2025 Apr 21.
2. Dodd JC, Prusky D, Jeffries P. Fruit diseases: botany, production and uses. Wallingford (UK): CAB International; 1997. p. 257-280.
3. Eckert JW, Agawa JM. The chemical control of post-harvest diseases in subtropical and tropical fruits. Annu Rev Phytopathol. 1985;23(1):421-454.
4. Gupta S. Studies on post-harvest diseases of mango: etiology and biological control [M.Sc. (Agri.) thesis]. Pantnagar (India): G.B. Pant University of Agriculture and Technology; 2007.
5. Johnson GI, Cooke AW, Mead AJ, Wells IA. Stem end rot of mango in Australia: causes and control. Acta Hortic. 1991;291(1):288-295.
6. Pathak VN, Srivastava DN. Mode of infection and prevention of *Diplodia* stem end rot of mango fruits (*Mangifera indica* L.). Plant Dis Rep. 1967;51(9):744-746.
7. Prasannakumar MK, Nargund VB, Khan ANA. Impact of post-harvest treatments on fruit diseases and physico-chemical properties of mango (*Mangifera indica* L.). J Mycol Plant Pathol. 2002;32(3):372-375.
8. Senjaliya HJ, Patel HN, Kanzaria DR, Polara ND, Parasana JS, Varu DK, *et al*. Evaluation of medium to large sized varieties of mango. Pharma Innov. 2022;11(2):95-98.
9. Sharma IM, Raj H, Kaul JL. Studies on post-harvest diseases of mango and chemical control of stem end rot and anthracnose. Indian Phytopathol. 1994;47(2):197-200.
10. Wheeler BEJ. An introduction to plant diseases. London (UK): John Wiley and Sons Ltd; 1969. p. 301.
11. Yadav D, Yadav KS, Singh SP. Mango taxonomy and botany. J Pharmacogn Phytochem. 2018;7(2):3253-3258.