



Postharvest Diseases of Economically Important Vegetables and Their Management Practices

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India is the second largest producer of vegetable after China in the world, contributing about 16% (191.77 MT) share of global vegetable production (Timur R.A. 2022). However, the production of vegetable is attacked by pathogens and insect pests from pre-harvest to postharvest. The postharvest losses with 40-60% was recorded in vegetable crops which may be due to highly perishable nature (15-20%), packaging and storage (15-20%), and transport (30-40%) (Tripathi *et al.*, 2022). Several fungal and bacterial pathogens spoiled the vegetables after harvesting. Postharvest losses are practically more common in developing or under developing countries, where there is lack of transport and cold storage facilities. The major postharvest losses are caused by different fungal pathogens such as *Botrytis*, *Fusarium*, *Alternaria*, *Phomopsis*, *Colletotrichum*, *Diplodia*, *Penicillium*, *Geotrichum*, *Rhizopus*, *Monilinia*, *Sclerotinia*, *Botryosphaeria*, etc and the major bacterial pathogens causing bacterial soft rots of vegetables are various species of *Erwinia*, *Pseudomonas*, *Xanthomonas* etc. (Henry, L.D.C and Devasahayam, T.H.L., 2011). Furthermore, there are several other environmental factors which smooth the progress of infection and spreading of the pathogens. As a result of postharvest losses, the market value of the product is drastically reduced or non marketable.

The major economically important postharvest diseases of vegetable crops caused by fungi and bacteria are listed below:-

Some of the economically important postharvest diseases of vegetable crops caused by fungi

| Phytophthora blight of Beans | |
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| 1. Phytophthora Blight of Beans : | <i>Phytophthora phaseoli</i> Symptom: The infection occurs on the pods. The infection starts from the distal end and infected part covered entirely with whitish mycelia growth. Later the pods become dry and remained hanging to the plant. |
| 2. Neck rot of Onion : | <i>Botrytis spp.</i> Symptom: Initial symptoms usually begin at the neck, where affected tissue softens, becomes water soaked and turns brown. In a humid atmosphere, a gray and feltlike growth (where spores are produced) appears on rotting scales, and mycelia may develop between scales |
| 3. Green/Blue Mould : | <i>Penicillium sp (P. expansum, P. italicum, P. digitatum)</i> Symptom: It is one of the most economically important |

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| | | postharvest diseases of both fruits and vegetables. Initial <i>symptoms</i> include a soft water-soaked area on the peel, followed by development of a circular colony of white mould and later turn bluish or greenish in color. |
| 4. Anthracnose of Chilli and Bell Pepper | : | <i>Colletotrichum capsici</i> Symptom: The characteristic symptom of this disease appears as dark sunken lesion in a concentric pattern. The decay penetrates the fruit and discolored the seeds. |
| 5. Fruit Rot | : | <i>Rhizopus sp</i> (Bread mould) Symptom: The symptoms consist of soft, mushy brown rot with black fruiting bodies (sporangia). |
| | : | <i>Monilinia fructigena</i> Symptom: The primary and most frequent symptom is fruit rot. Initial fruit lesions are brown, circular, and firm. Eventually the whole fruit decays and turns brown. |
| | : | <i>Alternaria alternate</i> Symptom: The symptoms appear at the blossom end of the fruit. Affected fruits become dry and brown to black. |
| 6. Sour Rot of Tomato | : | <i>Geotrichum candidum</i> Symptom: Affected fruits have a pickled appearance and definite sour odour. |
| 7. Dry Rot of Potato | : | <i>Fusarium sp.</i> Symptom: The symptoms appear as sunken and wrinkled brown to black tissue patches on tubers. Infected tubers become dry and shriveled. Fungal infection accompanied by toxin development in the rotten tubers raises more concern for consumer health. |
| 8. Black scurf of Potato | : | <i>Rhizoctonia solani</i> Symptom: The black scurf of potato showed the symptom as raised, hard, black patches, irregular in size or shape on the surface of the tuber. |
| 9. Black mould | : | <i>Aspergillus sp</i> Symptom: The affected lesion covered with black sooty mass on the outer scales. It is a common and major disease of onion and garlic. |
| 10. Onion Smudge | : | <i>Colletotrichum circinanas</i> Symptom: It is a major postharvest disease of onion and garlic. Attacked at all growth stages but it is more common on bulbs during storage. The characteristic symptoms appear as small, dark-green to black dots on the outer scales. Later, the spots enlarge and merge together to form blotches, giving a smudge appearance. This disease is more common to the white onions. |
| Some of the economically important postharvest diseases of vegetable crops caused by bacteria | | |
| 11. Soft Rot of Vegetables | : | <i>Erwinia caratovora</i> pv <i>caratovora</i> Symptom: At the initial stage, the infected fruits become water soaked and turn light brown in color. In later stages, bacterial ooze may develop from affected areas, and secondary organisms follow, often invading the rotted tissue. |
| 12. Brown rot of Onion | : | <i>Pseudomonas aeruginosa</i> Symptom: The characteristic symptom of this disease is the dark brown discoloration. The rot begins at the neck of the bulbs which later gives foul smell when squeezed and later spreads to the neighboring bulbs. |

Integrated Postharvest Disease Management

A) Cultural practices:

- Preventing injuries to the produce occurring at different stages of harvest, handling, transport, packaging and storing
- Packaging materials such as boxes, crates, baskets, etc should be disinfected thoroughly with sulfur dioxide.
- Providing adequate ventilation and cushioning materials in the containers
- Providing adequate calcium nutrition to reduce intensity of decay
- Adopting sanitary measures by eliminating dried panicles and mummified vegetable crops
- Eliminating all infected twigs and shoots and their proper disposal
- Applying organic manure instead of inorganic fertilizers

B) Physical methods:

- Treatment of apples and citrus fruits with UV-C light to reduce mould development
- Hot air and hot water treatment at recommended temp and duration to reduce decay severity
- Sanitization of store house and container

C) Chemical Methods:

- Applying Aluminium and bisulphate salts to restrict disease development.
- Application of suitable fungicide before harvesting.

D) Biological methods:

- *Trichoderma pseudokoningii*
- *Candida sake*, *Acremonium breve*
- *Trichoderma viride*
- Applying formulations containing *Pseudomonas putida* or *P. fluorescens* to reduce postharvest bacterial disease incidence.

Conclusion

Further, focusing on recent research on root causes of postharvest diseases would provide an impact factor for effective management of postharvest diseases.

References

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