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POST HARVEST DISEASES OF VEGETABLES AND FRUITS

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ABSTRACT

The investigation constitutes of the post harvest fungal diseases of vegetables and fruits. A survey of post harvest diseases of different vegetables and fruits were carried out from the study site of a village There were 10 fungal diseases reported on different vegetables like Onion, Tomato , Potato and Carrot. The vegetable diseases were found caused by fungal pathogens like *Aspergillus, Fusarium, Botrytis, Pythium, Sclerotium, Helminthosporium* etc. The study of post harvest diseases of fruits like Citrus, Mango, Banana and Papaya were reported in the study. The fruits diseases was found caused by fungal pathogens like *Penicillium, Alternaria Colletotrichum, Aspergillus ,Fusarium , Erwinia etc.* The symptoms of post harvest diseases were also observed and reported.

KEYWORDS: *Post harvest diseases, Vegetables, Fruits, Fungal pathogens, Symptoms.*

INTRODUCTION

The deterioration of vegetables and fruits are caused due to fungal pathogens .The fungal disease can be caused to plants before harvesting or after harvesting .The diseased plant produce is not suitable for consumption and marketing purpose. The fungal infections may occur through surface wounds which may be formed due to mechanical injury. The vegetables have a significant role in enhancing income, sustainable food and nutritional security. The Vegetables may get suffered from pathogens of fungal or bacterial categories.[1] The Postharvest loss of vegetable may be from 30 to 40% due to poor post harvesting and storage practices.[2] The Postharvest diseases causes qualitative and quantitative loss of vegetables and fruits The disease make them unfit for consumption due to health risks. A fungi yields carcinogenic mycotoxins and mutagenic secondary metabolites.[3] The factors affecting post-harvest losses of fruits and vegetables vary from place to place and varied environmental conditions The yield loss may occur during harvesting, handling, packing, storage and transportation and delivery. The fungal infection decreases the market value of produce and thus hampers economy the grower.[4] The decay of vegetables and fruits may start from germination seeds to flowering and fruit set The blemished vegetables and fruits are not eaten or sold commercial market. The yield loss depends upon the susceptibility of host plant and resistance to fungal pathogen.

Considering the importance of vegetables and fruits for sound health and loss of yield brought due to fungal pathogens attempts were made to study different types of fungal diseases.

MATERIALS AND METHODS

Site of study

The Kalwadi village is located in Akot Tehsil of Akola district in Maharashtra state of India. The study site situated 6 km away from Akot and 52 km from Akola. The total geographical area of village is about 693.6 hectares. The site is located at 21.0567 ^{o}N and 77.0672^{o}E .The diseased samples of different vegetables and fruits were collected from the site .The study area constitutes of cultivated field of several types of vegetable and fruit plants.

Collection of Sample

The disease infected vegetables and fruits were picked up and collected in polythene bags The samples were brought to the laboratory. The symptoms of disease were observed carefully and the same was noted.

Isolation of fungal pathogens

The fungal pathogens were isolated from diseased part of vegetable and fruits. The infected tissues were allowed to grow on PDA culture media in petridishes. After the full growth of mycelium and reproductive bodies the same was stained in Cotton blue and mounted in lacto phenol on clean glass micro slide.

Identification fungal pathogens

The temporary preparation of slide was observed under compound microscope The identification of fungal

pathogens were made on the basis of somatic structure fruiting bodies, asexual and sexual reproductive structures. The keys was used for identification of fungal pathogens.

RESULTS AND DISCUSSION

In the present investigation a survey of postharvest diseased vegetables and fruits were carried out. The vegetables like Onion, Tomato, Potato and Carrot was screened for the fungal infection and symptoms developed thereof (Table 1).The symptoms of different diseases and their causal organism were recorded as follows.

1) Grey mold disease

It is a post harvest disease caused by a fungal pathogen *Botrytis cinerea.* The disease develops during the processing of vegetables and fruits .The condition of rain, heavy dew or fog are responsible for disease initiation and development The symptoms of the disease are seen in the form of watery lesions with light brown to tan coloured central region which contains dark brown specks..The affected area is converted into a soft watery mass .The greyish mycelium and spores were observed in the infected tissues.

Table 1: Post harvest diseases of Vegetables.

S.N.	Name of the Plant	Scientific Name	Name of the Disease	Causal Organism
1	Onion	*Allium cepa*	Black mold rot	*Aspergillus niger, Fusarium oxysporum*
2	Tomato	*Solanum lycopersicum*	Grey mold	*Botrytis cinerea, Botryotinia fuckeliana*
3	Tomato	*Solanum lycopersicum*	Watery soft rot	*Sclerotinia spp.*
4	Tomato	*Solanum lycopersicum*	Cottony leak	*Pythium spp.*
5	Potato	*Solanum tuberosum*	Dry rot	*Fusarium spp.,Gibberella* spp.
6	Potato	*Solanum tuberosum*	Black scurf	*Rhizoctonia solani, Thanatephorus cuvumeris*
7	Potato	*Solanum tuberosum*	Silver scurf	*Helminthoporium solani*
8	Potato	*Solanum tuberosum*	Skin spot	*Polyscytalum pustulans*
9	Carrot	*Daucas carrota*	Grey mold	*Botrytis cinerea*
10	Carrot	*Daucas carrota*	Watery soft rot	*Sclerotium rolfsii*

2) Black mold disease

This disease is caused by a fungus *Aspergillus niger* The fungal pathogen potentially produces toxins in the produce. The black powdery mass of spores is produced on exterior part of onion bulb and among the scales of bulbs. The infection affects on the scales and that becomes dry and papery.

3) Dry rot disease

The disease is caused to potato by a fungal pathogen *Fusarium solani* The potato tubers is affected during storage condition The disease shows dry and dark spots on the peel or skin which later becomes sunken and wrinkled with irregular concentric rings. These spots shrinks and brusts out.The internal tissues become brown with cavities filled with white tufts of mycelium. The rotting progress into the whole potato tuber and become dry, hard and shrivelled.

Table 2: Post harvest diseases of Fruits.

S.N.	Name of the plant	Scientific Name	Name of the Disease	Causal Organism
1	Citrus	*Citrus spp.*	Blue mold	*Penicillium italicum*
2	Citrus	*Citrus spp*	Green mold	*Penicillium digitatum*
3	Citrus	*Citrus spp*	Brown rot	*Phytophthora citrophthora and P. parasitics*
4	Mango	*Mangifera indica*	Anthracnose	*Colletotrichum gloeosporioides, Glimerella cingulata.*
5	Mango	*Mangifera indica*	Rot	*Phomopsis mangiferae, Pestalotiopsis mangiferae*
6	Mango	*Mangifera indica*	Grey mold	*Botrytis cinerea, Botryotinia fuckeltiana*
7	Banana	*Musa paradisica*	Anthracnose	*Colletrichum musar*
8	Banana	*Musa paradisica*	Crown rot	*Fusarium, verticillium, Colletotrichum musae*
9	Papaya	*Carica papaya*	Anthracnose	*Colletotrichum spp.*
10	Papaya	*Carica papaya*	Black rot	*Phoma caricarpapayae, Mycosphaerella caricae,*

A survey of postharvest diseases of fruits was carried out in the study area. The diseases of fruits like Citrus, Mango ,Banana and Papaya were studied The fruits were found affected with blue mold, green mold brown mold, Anthracnose, crown rot and black rot (Table 2). The symptoms and causal organism were studied as follows.

1) Anthracnose disease

It is a post harvest disease caused by fungal pathogen *Colletotrichum gloeosporioides.* The disease is developed on leaves, stems, young flowers and fruits. Initially the sunken black spits appear on the surface of the fruit during ripening. The disease is developed during the wet and cold weather. The carbon and nitrogen are responsible for the growth and sporulation of fungus.

2) Green and blue mold disease

The disease is developed on the fruit of lemon. It is caused by a fungal pathogen *Penicillium digitatum.* The diseased fruit shows soft and damaged tissues. Initially white fungal growth appears on the fruit which later becomes blue or green. The disease is developed on damaged part of the fruit The temperatures affects on the disease infection and development. The *Penicillium digitatum* is an important postharvest pathogen of citrus which is brings significant loss.[5]

3) Anthracnose disease

The disease is caused by a fungal pathogen *Colletotrichum musarum*. The disease symptoms appears on the ripen fruits of banana The fruit shows black rotten pustules or spots. The spots may become irregular or circular specks on the skin These spots become sunken and coalesce to form large spots. The severely infected fruits become dark due to blemishes. The conidial mass appears on the infected area The light brown depressed lesion coalesces and covers the whole fruit.

4) Anthracnose disease

It is a post harvest disease caused by a fungal pathogen *Colletotrichum* .The disease occurs on the papaya fruit at field and storage conditions. The symptoms of the disease show discoloration of the skin. There develop circular and sunken areas. The conidial mass is developed on the infected lesions.

The surrounding environment affects on the initiation and development of fungal disease. The Storage temperature is crucial in postharvest disease development. The high temperature and high humidity favour the decay of vegetables and fruits .During higher temperatures, pathogens become active and infect the host plant. The relative humidity in storage condition is also important. The high humidity promotes disease development. The decay of vegetables and fruits takes place from spore propagaules deposited on the surface .The fungal spore infect vegetable and fruit by invading through wounds, cuts , punctures, abrasions formed at the time of harvest and handling. The injury to produce may be formed during hostile weather, insects bite, bird's damage, human handling, rodents and farm implements. The overstocking of bulk produce in store houses causes fungal disease development.

CONCLUSION

The post harvest diseases of vegetables and fruits are mainly caused by pathogens of fungal category. The disease infection and development brings about physiological malfunctioning in the plant body. The mechanical injury favours the fungal infection. The fungal disease affects on the quality and quantity of vegetables and fruits The careless handling of vegetable and fruits during harvesting, storage, packing and transportation affects on the quality of produce.The fungal infection may takes place before harvesting or after harvesting .The environmental factors such as temperature, humidity, and pollution also promotes the disease infection and development. The fungal pathogen causes destruction of living tissues and promotes decay and degradation. The infection of vegetables and fruits can be traced at the time plant growth flowering, harvesting and in storage.

Future Perspective

The loss of vegetables and fruits takes place due to lack of knowledge related to harvesting, handling, packaging, transportation and storage .The exposure of plant produce to direct sunlight, high temperature condition, lack of low-temperature storage facilities plays a key role in yield loss.The random and rough handling of produce during marketing affects on the quality and quantity of vegetables and fruits. The plant growers must know about the disease infection, appearance, identification and control. The temperature management is required to control the post harvest diseases. The cooling methods like hydro cooling, ice packaging, top icing, evaporative cooling, room cooling may be beneficial to control the loss of produce. The management strategies would be helpful in prevention and eradication of disease .The management strategy may be in terms of cultural, physical, chemical, biological practices. The use of disease resistant varieties may be helpful to avoid loss of produce .The postharvest technology would be helpful in meeting global demands of vegetables and fruits.

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