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MYCOFLORA ASSOCIATED WITH SOME VEGETABLES FROM AD DARB MARKET, JIZAN, SAUDI ARABIA

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Infected and damaged vegetables (15) from local Ad Darh market of Jizan, Saudi Arabia were screened for mycoflora association during Jan 2015-Dec 2016. Altogether seven fungi have been found associated causing damage to the extent of 20-30%. Fungi have been found to be biotrophs as per Koch postulates. This is the first report from Jizan area of Saudi Arabia. detailed symptoms and casual organisms are mentioned.

Keywords: Ad darb, Jizan, Mycoflora, Vegetables

Vegetables are a good source of vitamins, minerals and other important derivates which are essential for human health and maintenance of our body. The health benefits of fruits and vegetables are significant and documented. Morever, increased fruit and vegetable consumption has been associated with reduction in the development of chronic diseases. Earlier Al-Rahman *et al.* (2001), Adebayo-Tayo *et al.* (2012), Firas *et al.* (2017), Marraiki *et al.* (2012), Moss, (2008), and Yao *et al.* (2014) have made preliminary reports on post-harvest mycoflora and their control in some vegetables of Saudi Arabia and other african countries. The present study is carried out from local markets. Some products are packed in modified atmospheres to provide extension of shelf life both in relation to the potential acceptables quality and safety of the product but still due to the hot desert climate in the area even though the vegetables are stored for sale in air conditioned counters but still the post harvest losses encountered are heavy. During growth, harvest, transportation, further processing and handling, the produce is contaminated with pathogen from human or animal sources. The freshness of stored vegetables is lost within 2-3 days and the Vegetables start post harvest rotting and decaying due to pthogens. The vegetable varieties under this study are subjected to a variety of mycoflora responsible for their rot and decay. The fungi on the vegetables can enter through wounds or cuts or directly through the epidermis. Once the infection is started it spreads to other produce by direct contact or by handling. The fungal growth is apparently visible on these products by a variety of colours on their surface which later on gets either mummified in dry conditions or forms a soft wet mass under moist conditions. The fungal damage is due to their putrefying and fermentative activity which breaks down the proteins and carbohydrates into acids, gas and produce mycotaxins. The mycotoxins from these decaying vegetables not only lead to economic losses but also are responsible for many human and animal diseases. In the present study data on post harvest mycoflora of some vegetables located in Ad darb market, Jizan, Saudi Arabia has been presented. The survey was conducted in 2015-2016 and this is the first report.

Study Area:

Ad Dar the study area is situated at 17º 73" North Latitude to 42º 25" East Longitude and 54 meters elevation above the sea level. Ad Darb is a small community of Jizan province in Saudi Arabia. The mean maximum temperatures ranging from 40ºC (104ºF) in July to 31ºC (88ºF) in January. It has not desert climate with extremely low rainfall between 75-85 (3-4 inches) annually.

MATERIALS AND METHODS

The damaged and infected vegetables were

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collected from (Jan, 2015-Dec, 2016) local markets of Ad Darb, Jizan and placed them in fresh polythene bags. The samples have been transported to the lab. The infected and damaged tissues of some vegetables were placed on to sterilized petridishes containing sterilized Potato dextrose Agar medium and Czapeks Dox Agar medium, respectively. Further some infected and damaged tissues were surface sterilized with 0.01% Sodium hyphochloride followed by several washings with sterilized distilled water. Finally samples were placed on sterilized petridishes containing PDA and CDA media, respectively. Triplicates were maintaned and plates were incubated at 28±2ºC for 5 days. The fungi were observed by prepairing slides in lactophenol. Single spore pure cultures were also raised on PDA slants and stored in refriegerator at 4ºC. The fungi have been identified upto species level using manual of Nagamani *et al.* (2006). All the fungi have been deposited at Dept of Botany. Science College, Ad Darb, Jizan University, Jizan, Saudi Arabia under Accession no FBJU. Further the pathogenecity of fungi as biotrophs has been established as per Koch postulates and pin prick method under aseptic conditions. Disease percentage is calculated as per formula-

$$\%\text{Disease} = \frac{\text{Infected number}}{\text{Total number}} \times 100$$

RESULTS AND DISCUSSION

Post-harvest mycoflora associated with varied vegetable resulted in huge losses affecting the vegetable vendors. Possibly the storage conditions might have played an important role. The fungal inoculum might have arrived along with debris associated package matrials, soil particles, containers, contamination during transporting, hygiene, sanitation and other factors. Altogether seven fungal species have been isolated which have been proved as biotrophs as per koch postulates on respective

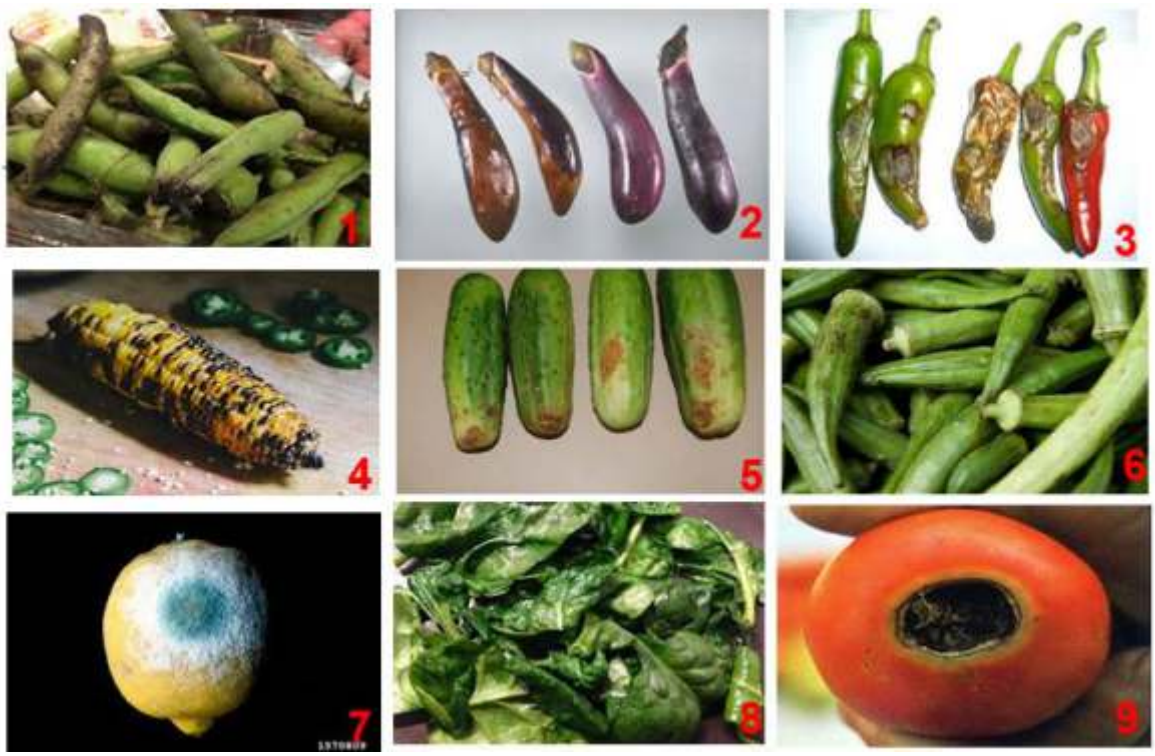

Figure-1(1-9): Infected fruits and vegetebles in Ad Darb market, Jizan **1**. Beans brown spot **2**. Brinjal rotting **3**. Chilli decay **4**. Baby corn Blackening **5.** Smooth gaurd rotting **6**. Lady finger Brown spot **7**. Lemon rotting **8**. Lettuce brown spot. **9**. Tomato black spot.

Table-1: Mycoflora associated with market samples of Vegetables

Sl. No	Name of the Food sample	Symptoms	*Rhizopus nigricans*	*Aspergillus niger*	*Alternaria alternata*	*Fusarium oxysporum*	*Penicillium citrinum*	*Curvularia lunata*	*Saccharomyces sp.*	%Disease Incidence
1	Beans	Brown spot	+	+	+	+	-	+	+	20
2	Bitter Gourd	Black rot	+	+	+	+	-	+	-	20
3	Brinjal	Rotting	-	+	+	-	-	+	-	25
4	Chilli	Decay, Rotting	+	+	+	+	-	-	+	26
5	Baby Corn cob	Blackening	-	+	+	+	-	+	+	20
6	Cucumber	Necrosis, Rotting	+	+	+	+	+	-	+	28
7	Lady's finger	Brown spot	+	-	+	-	+	+	-	20
8	Lemon	Rotting	+	+	-	+	+	+	+	24
9	Lettuce	Brown spot	-	-	+	+	-	-	-	20
10	Mint leaves	Rotting, Browning	-	-	+	+	+	+	-	28
11	Smooth Gourd	Rotting	+	+	+	+	+	-	-	30
12	Spinach	Rotting	+	-	-	+	-	+	-	30
13	Squash Gourd	Rotting	+	+	+	+	+	+	-	30
14	Tamarind	Rotting	+	+	-	+	+	-	-	20
15	Tomato	Brown spot, Black spot	+	+	+	-	+	+	+	30

hosts. *Rhizophus nigricans, Aspergillus niger, Alternaria alternata, Fusarium oxysporum, Penicillium citrinum, Curvularia lunata* and *Sacchaaromyces* sp. are the fungi associatedwith vegetable spoilage. The percentage of spoilage ranged from 20-30 % . This is the first report of mycoflora associated with vegetables Ad-Darh market, Jizan, Saudi Arabia.

The following is the detailed account of samples studied.

1. Pale brown spots appear initially, tissue damage takes place, spots turn into brown in later stage and increase their number. Causal organism- *Curvularia lunata.*

2. Early spots appear as specks, they turn into brown due to necrosis. Spots coalesce and become bigger .Causal organism- *Alternaia alternata.*

3. Yellowish spots appear which coalesce and become bigger, water droplets ooze out of damaged tissue resulting in rotting, tissue become brown. Causal organism- *Fusarium oxysporum.*

4. Small spots appear followed by exudation of watery substances. Necrosis results in browning which spreads whole fruit resulting in rotting. Causal organism-*Fusarium oxysporum.*

5. Cob seeds produce brown specks, milky substances ooze out. Tissue becomes dark brown. Many grains turn black. Causal organism-*Curvularia lunata.*

6. Brown spots appear tissue damage takes place fungus grows and spots turn black. Fruits loose weight. Causal organism- *Fusarium oxysporum.*

7. Yellow spots appear early and they turn into brown due to necrosis. Causal organism-*Alternaria alternata.*

8. Tissue damage leads to rotting and browning of the region resulting in rotting. Causal organism-*Fusarium oxysporum.*

9. Small yellow spots appear initially and they turn brown. Causal organism- *Fusarium oxysporum.*

10. Leaves become water soaked, develop

rotting and emit bad smell. Causal organism-*Alternaria alternata.*

11. Necrotic spots appear, tissue breaks down, rotted tissue become brown. First fungus responsible is *Curvularia lunata.*

12. Leaves ooze out yellow droplets, undergoes decomposition and become rotted. Causal organism-*Fusarium oxysporum.*

13. Tiny brown spots appear, small water droplets ooze out indicating tissue damage, spots become bigger and brown. Causal organism-*Aspergillus niger.*

14. Spots appear superficially and turn black with age. Causal organism -*Alternaria alternata.*

15. Water soaked lesions appear they turn into yellow. Necrosis takes place, spots become bigger and brown, later become black. Causal organism- *Curvularia lunata.*

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