JMBFS

Journal of Microbiology, Biotechnology and Food Sciences

International peer-reviewed scientific online journal

Published by Faculty of Biotechnology and Food Sciences

BIODIVERSITY OF FILAMENTOUS AND YEAST FUNGI IN CITRUS AND GRAPE FRUITS AND JUICES IN ASSIUT AREA, EGYPT

Abdel-Aal Hassan Moubasher[*1,2], *Mohamed Ahmed Abdel–Sater*[1,2], *Zeinab. Soliman*[2]

Address(es): Professor Abdel-Aal Hassan Moubasher,
1Assiut University, Faculty of Science, Department of Botany and Microbiology, P.O. Box 71516, Assiut, Egypt.
2Assiut University, Assiut Universiy Mycological Centre, P.O. Box 71516, Assiut, Egypt.

*Corresponding author: ahamaumc@yahoo.com

doi: 10.15414/jmbfs.2018.7.4.353-365

ARTICLE INFO

Received 18. 10. 2016
Revised 12. 10. 2017
Accepted 6. 12. 2017
Published 1. 2. 2018

Regular article

OPEN ACCESS

ABSTRACT

Mycobiota diversity associated with fruits and juices of citrus and grapevine plantations in Assuit Governorate, Egypt were evaluated during the period between April 2008 to February 2009. Identification of fungi was performed using the morphological and microscopical characteristics in addition to the biochemical in case of yeasts. In suspected isolates, molecular techniques were employed to confirm their identification. High counts of yeasts were recorded from the juice of both fruits (almost more than 95 % of total fungi), followed by citrus carposphere and carpoplane where they constituted about one-fifth to one-third of total fungi. High numbers of taxa were recorded from carposphere of both fruits than those recorded from carpoplanes or juices. The peak of total propagules of carposphere fungi was recorded in primordial fruit in citrus and in senescent fruit in grape, while the peaks of carpoplane fungi of both fruits and juices were recorded in mature fruits, while the troughs of all sources were regularly recorded in immature fruits. *Aspergillus* provided lower count in citrus than in grape carposhere and carpoplane while the reverse was recorded in juice. *A. niger* predominated in carposphere, carpoplane and juice of both plants, followed by *A. aculeatus* in all sources from grape and *A. brasiliensis* in citrus carposphere and carpoplane. *Penicillium* contributed small proportion of propagules in both plants. *P. oxalicum* was the most dominant species in all sources from grape but less common in citrus carposphere and carpoplane. *P. digitatum* and/or *P. italicum* were recorded in citrus only. *Cladosporium* contributed the highest counts (41.9 %-59.8 %) of all fungi in boh carpospheres, while contributing minor proportions in carpoplane and juice. It was recorded in high frequency in grape while less frequent in citrus for both carposphere and carpoplane but the reverse was recorded in juices. *C. cladosporioides* was the most dominant species in grape while *C. sphaerospermum* was the most dominant in citrus carposphere and carpoplane. The peak of yeast fungi was drawn in mature fruits of both citrus (December), grape carpospheres and carpoplanes; and juices of both fruits (Ocober). Of 22 yeast species recorded, only 2 were recovered from all sources of both plants (*Hanseniaspora occidentalis* and *Issachenkia orientalis*), 3 from carposphere, carpoplane and/or juice of citrus only (*Candida catenulata, Geotrichum citri-aurantii* and *Kodemaea ohmeri*) and 7 from grape only *(Candida prunicola, Rhodosporidium paludigenum, R. diobvatum, Rhodotorula glutinus, Sporidiobolus pararoseus, S. ruinenniae* and *Sporobolomyces roseus*). Ascomyceteous yeasts were dominant over basidiomyceteous ones in all subsrates. Since, mature fruits are succeptable to fungal attack, and almost all juice fungi, including yeasts and filamentous fungi, originated from fruit fungi, precautions during selecting fruits, transportation, handling and juice-making should be taken into accounts.

Keywords: mycobiota, juice, citrus, grape, fruits, biodiversity, rDNA sequencing

INTRODUCTION

Grape berries are common niches for yeasts. Nevertheless, the yeast flora of grapes is surprisingly poorly documented **(Loureiro and Malfeito-Ferreira, 2003; Ribereau-Gayon, 2005**). The grape microflora may change in response to various factors such as: the climate, grape variety and geographical region **(Sabate *et al.*, 2002; Combina *et al.*, 2005; Raspor *et al.*, 2006)**. *Botrytis* infection resulted in a larger population and greater diversity of yeasts enriched with fermentative or spoilage species **(Nisiotou and Nychas, 2007)**. Several studies of the occurrence of yeasts in grapes have already been published **(Goto and Yokotsuka, 1977; Goto, 1980; Haridy, 1994)**. *Sporobolomyces roseus, Cryptococcus albidus, Rhodotorula rubra* and *Candida* were part of the natural microbiota of certain varieties of grapes in southern Spain **(De la Torre *et al.*, 1999)**. In Egypt, **Haridy (1994)** found that the most common spoilage yeast species of soft sound and unsound fruits (apple, grapes, dates, figs, strawberries, peach, apricot, plum, and guava) was *Hanseniaspora valbyensis* followed by *H. vineae* and *Saccharomyces cereivisae. Metschnikowia pulcherrima, Torulaspora delbrueckii* and *Kluyveromyces marixianus* were represented by considerable numbers of strains. Also, *Hanseniaspora* species wer reported as common yeast constituents on grapes **(Phister *et al.*, 2007)**, and on grapes and musts in Europe **(Bioletti and Croiess, 1912).**

The most frequent filamentous fungi found in grapes were species of *Cladosporium, Penicillium, Botrytis, Alternaria* and *Aspergillus* **(Serra *et al.*, 2005; Melki Ben Fredj *et al.*, 2007)**. Several species of *Aspergillus* in section *Nigri* are common in vineyards and are often associated with bunch rots **(Amerine *et al.*, 1980)**. *A. niger* is reported to be the primary cause of *Aspergillus* rot in grapes before harvest **(Nair, 1985; Snowdon, 1990)**, while *A. aculeatus* **(Jarvis and Traquair, 1984)** and *A. carbonarius* **(Gupta, 1956)** have also been reported. **Melchers (1931)** and **Jones (1935**) reported *P. italicum* and *P. digitatum* as causal agents of citrus-rot in Egypt, however **Moubasher *et al.* (1971)** and **Elnaghy *et al.* (1973)** reported that *P. italicum* was the sole incitant of *Penicillum*-rot in the Assuit area. **Moubasher *et al.* (1971)** found also that *Cladosporium herbarum* followed by *A. niger* and *Alternaria* species were the basic components on citrus fruits. In Washington, the most frequently encountered moulds from citrus fruit were *Alternaria, Cladosporium, Penicillium* and *Fusarium*, while *Trichoderma, Geotrichum, Rhizopus* and *A. niger* were isolated less often **(Tournas and Katsoundas, 2005)**. Fungal spoilage of citrus fruit attributed to *Alternaria, Alternaria citri, Fusarium, Penicillium digitatum, Penicillium italicum, Aspergillus, Geotrichum* as well as to *Botrytis* was also reported **(Splittstoesser, 1987; Ritenour *et al.*, 2003)**. Studies have also been done on the processing of citrus fruits and juices from fruit concentrates **(Parish**

and Higgins, 1989, 1990; Deák and Beuchat, 1993). However, studies with yeasts in tropical environments have been rare.

Fruit juices are popular soft drinks with an important role in human nutrition. They are advertised as very healthy food supplements containing a variety of vitamins necessary for the good bodily function, and of the immune system in particular. Of freshly squeezed juices, citruses are the most popular **(Arias *et al.*, 2002)**. In general, the acidity (pH) of orange or grapefruit juices ranged between 3.5 and 3.9 and high sugar content **(Bibek and Bhunia, 2004)** creates favourable conditions for the growth of acidolactic bacteria, moulds, and yeasts. Sugar favours the development of a microbial biofilm. Before pasteurization, fruit juices contain a microbial load representative of the organisms normally found on fruits during harvest plus contaminants added post-harvest (during transport, storage and processing) that end up in the freshly squeezed juice offered in markets. Inadequate cleaning of fruit processors can pose a risk for consumers **(Hatcher *et al.*, 2001)**. Many reports have shown yeasts to be the predominant fungi involved in juice spoilage **(Parish and Higgins, 1989; Hatcher *et al.*, 2000)**. Yeast spoilage of fruit juice can result in formation of haze, production of CO_2 and off-odors, and changes in color **(Grinbaum *et al.*, 1994)**. *Candida* and *Saccharomyces* spp. have often been reported as spoilage-causing organisms in citrus juices **(Hays, 1951; Grawmlich *et al.*, 1986; Parish and Higgins, 1989; Teller and Parish, 1992)**. Many other yeast fungi such as *Candida, Rhodotorula, Kluyveromyces, Pichia, Trichosporon, Kloeckera, Zygosaccharomyces* have been also isolated from fruit juices, honey, milk and others **(Cook, 1958; Jay, 1970; Ivo, 1982; Magalhães and Queiroz, 1991)**.

Arias *et al.*, (2002) isolated 3 main species (*Hansenula uvarum*, followed by *H. occidentalis* and *P. kluyveri*) and 3 less common species (*C. stellata*, *P. fermentans*, and *Saccharomycopsis crataegensis*) from fresh-squeezed, unpasteurized orange juice. On the other hand, *Cryptococus neoformans, Candida guilliermondii*, *C. famata*, *C. sphaerica*, *C. krusei*, *C. colliculosa*, *C. albicans*, *Kloeckera* spp. and *Trichosporon mucoides* were the most common species identified in the orange juice from Zagreb, Croatia **(Uhitil *et al.*, 2009)**, however in the study of **Hatcher *et al.* (2000)** yeast species found in citrus juices were *Candida parapsilosis*, *C. stellata*, *Saccharomyces cerevisiae*, *Torulaspora delbrueckii*, and *Zygosaccharomyces rouxii*, although species from the genera *Rhodotorula*, *Pichia*, *Hanseniaspora* and *Metschnikowia* were also common. Differently, yeasts commonly found in fruit juices in grapefruit juice in Washington were *C. lambica*, *C. sake*, *Rhodotorula rubra*, *Geotrichum* spp. and low numbers of *Penicillium* and *Fusarium* spp. (**Tournas *et al.*, 2006)**.

This study aimed at evaluating the yeast and filamentous fungi found in carposhere, carpoplane and fruit juices of both citrus and grapevine plants in Sahel Saleem city, Assiut Governorate. Identification of fungi was performed using the morphological and microscopical characteristics in addition to the biochemical in case of yeasts. In suspected isolates, molecular techniques were employed to confirm their identification.

MATERIALS AND METHODS

Sampling location and collection of samples

This study was carried out in Sahel-Saleem city at approximately 25 km southeast of Assuit city. Sampling was conducted bimonthly over a twelve-month period from April 2008-February 2009. Three different plantations of citrus in the suburbs of Sahel-Saleem city and three of grapevine in El-Khawaled village (about 6 Km to the east border of the river Nile), in the northeast of Sahel-Saleem city were selected. A total of 31 fruit samples were collected from citrus (17) and grapevine trees (14) during the period from April 2008 to February 2009. Fruit samples were collected at random from different plants at each farm and put directly each into a clean plastic bag. Samples were brought into the laboratory and kept at 5°C till fungal analysis.

It should be mentioned that the dates of successive stages of development of fruit are as following: in citrus: primordial, in April; immature, in June and August; mature in October and December; senescent, in February (Figure 1), and in grape: primordial, in April; immature, in June and August; mature in October and; senescent, in December (Figure 2).

Isolation of carposphere fungi

In case of citrus, the fruits were peeled with a sterilized blade and a known weight of the peel was placed in 250 ml sterile Erlenmeyer flask containing 100 ml sterile distilled water. Flasks were shaken on an orbital shaker for 15 minutes. Ten ml aliquots of the suspension were transferred into sterile Erlenmeyer flasks containing each 90 ml sterile distilled water, then shaken for 5 minutes. In case of grapes a known weight of the fruits was mixed thoroughly as in the citrus fruits. The appropriate dilution which gave reasonable number of fungal colonies depends on the state of the fruits whether they were dusty or not was selected. One ml of the appropriate dilution was transferred into each sterile Petri-dish which was then poured with melted but cooled agar medium. Ten replicate plates were used for each sample (5 for each isolation medium type).

Figure 1 Developmental stages of citrus fruits.

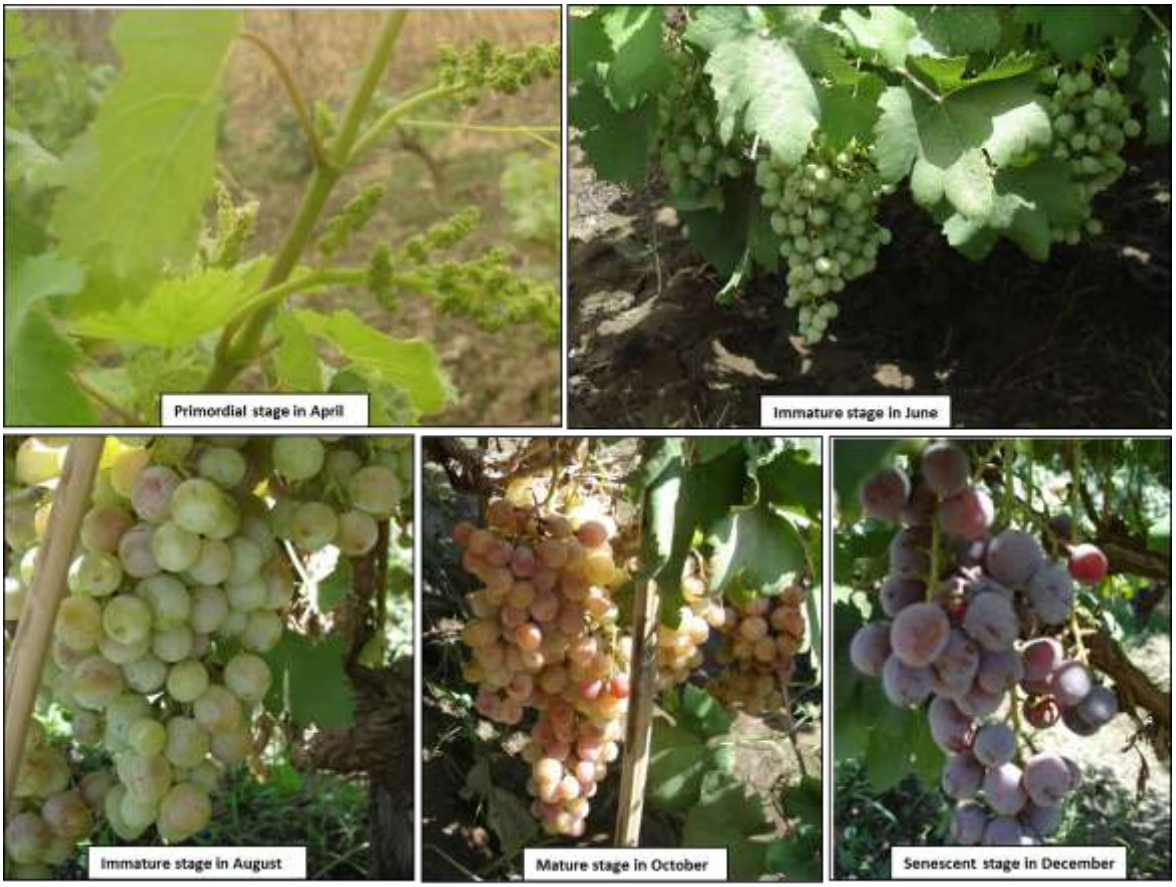

Figure 2 Different developmental stages of grapevine fruits

Isolation of carpoplane fungi

In case of citrus fruit, the peel after thorough washing with sterile distilled water and thorough drying was cut into small pieces of approximately 1 cm² and 4 pieces were thereafter placed on the surface of each agar plate.
In case of grapes, the whole fruits after thorough washing with sterile distilled water and drying were either inserted on the agar surface as a whole fruit when young or cut into two-halves when mature. Four parts were used in each of 5 replicate plates. Five replicate plates were used for each isolation medium type and for each plant type.

Isolation of juice fungi

Fruits were surface washed by placing the whole fruits in a beaker containing sterilized water several times. The oranges were then sliced by sterilized cutter under sterile conditions and squeezed by hand into sterile universal tubes. In case of grapes, the berries after washing were squeezed by sterile lemon squeezer and the juice was collected into sterile universal tubes under aseptic conditions. One ml of the juice was transferred into each sterile Petri-dish which was then pour plated with melted but cooled agar medium. Ten replicate plates were used for each sample (5 for each medium type).

Media used for isolation of fungi

a- Dichloran yeast extract malt extract agar (DYM) **(Moubasher *et al.*, 2016)**
Yeast extract malt extract agar **(Wickerham, 1951)** was modified by **Moubasher *et al.* (2016)** by addition of 1 ml/l of 2 mg of dichloran dissolved in 10 ml ethanol which restricts mucoraceous growth without affecting the other species.
b- Dichloran rose bengal chloramphenicol agar, DRBC (King *et al*. 1979) to which rose bengal (25 µg/ml) and chloramphenicol (100 µg/ml) were used as bacteriostatic agents **(Smith and Dawson, 1944; Al-Doory, 1980)**.

Identification of filamentous fungi

The identification of fungal taxa based on macroscopic and microscopic features **(Raper and Fennell, 1965; Rifai**, **1969; Ellis, 1971**, **1976; Pitt, 1979; Sivanesan, 1987; Moubasher, 1993; Gams and Bissett, 1998; Schroers, 2001**; **Zare and Gams, 2004; Leslie and Summerell, 2006; Crous *et al.* 2007; Domsch *et al.*, 2007; Samson and Varga, 2007; Seifert *et al.*, 2011)**.
Identification of fungal genera and species was performed using the morphological and microscopical characteristics in addition to the biochemical in case of yeasts. In suspected isolates, molecular techniques [Internal transcribed spacer (ITS) sequences of nuclear ribosomal DNA were amplified using primers ITS1, ITS4] were employed. Fungal diversity was observed in all the samples (Table 1).

Identification of yeasts

Morphological characters

Formation of pseudomycelium and true mycelium **(Wickerham. 1951)** and the ability to form ascospores on three sporulation media (corn meal agar, potato glucose agar and yeast extract malt extract agar, YMA, at 25°C) **(Barnett *et al.*, 2000)** were carried out.

Physiological characters

Fermentation of sugars and oxidative-utilization of carbon compounds were performed according to **Barnett *et al.* (2000)**. Assimilation of nine nitrogen compounds was determined **(Suh *et al.*, 2008)**. Test for hydrolysis of urea, growth at high osmotic pressure, growth at different temperatures, growth in the presence of cycloheximide, diazonium blue B (DBB) test and production of extracellular starch-like compounds were alo performed. Identification keys of **Barnett *et al.* (2000)** were followed to assign each isolate to its species level. Confirmations of these identifications were carried out using the molecular technique.

Molecular methods

The fungus was grown on CYA plates and incubated at 25° C for 7 days (for filamentous isolates) and on YMA plates and incubated at 25° C for 2 days (for yeast isolates). A small amount of fungal growth was scraped and suspended in 100 µl of distilled water and boiled at 100° C for 15 min and stored at -70° C. These preparations were sent to SolGent Company, Daejeon, South Korea, for PCR and rDNA sequencing.
Fungal DNA was extracted and isolated using SolGent purification beads in SolGent Company. Internal transcribed spacer (ITS) sequences of nuclear ribosomal DNA were amplified using the universal primers ITS 1 (5' - TCC GTA GGT GAA CCT GCG G - 3'), and ITS 4 (5'- TCC TCC GCT TAT TGA TAT GC -3'). Then ampilification was performed using the polymerase chain reaction (PCR) (ABI, 9700). The PCR reaction mixtures were prepared using Solgent EF-Taq as follows: 10X EF-Taq buffer 2.5 µl, 10 mMdNTP (T) 0.5 µl, primer (F-10p) 1.0 µl, primer (R-10p) 1.0 µl, EF-Taq (2.5U) 0.25µl, template1.0 µl, DW to 25 µl. Then the amplification was carried out using the following PCR reaction conditions: one round of amplification consisting of denaturation at 95 °C for 15 min followed by 30 cycles of denaturation at 95 °C for 20 s, annealing at

50 °C for 40 s and extension at 72 °C for 1 min, with a final extension step of 72 °C for 5 min.

The PCR products were then purified with the SolGent PCR Purification Kit-Ultra (SolGent, Daejeon, South Korea) prior to sequencing. Then the purified PCR products were reconfirmed (using size marker) by electrophoreses of the PCR products on 1% agarose gel. Then these bands were eluted and sequenced. Each sample was sequenced in the forward and backward direction.

Contigs were created from the sequence data using CLCBio Main Workbench program. The sequence obtained from each isolate was further analyzed using BLAST from the National Center of Biotechnology Information (NCBI) website. Sequences obtained together with those retrieved from GenBank database were subjected to Clustal W analysis using MegAlign (DNAStar) software version 5.05 for the phylogenetic analysis. Sequence data were deposited in GenBank and accession numbers are given for them.

RESULTS AND DISCUSSION

Higher numbers of taxa were recorded from carposphere of both citrus and grape fruits (54 genera, 120 species + 2 varieties) than those recorded from carpoplanes (48genera, 99 species + 1 variety) and juices of both plants (27 genera, 54 species).

The peak of total propagules of carposphere fungi was recorded in April (primordial fruit) in citrus and in December (senescent fruit) in grape, while their trough was recorded in August (immature fruit) in citrus and in June (immature fruit) in grape, while the peak of total fungi was recorded in December (mature fruit) in citrus carpoplane and in October (mature fruit) in grape carpoplane and in both citrus and grape juices, while their trough was regularly recorded in June (immature fruit) in both carpoplanes. Total counts of all fungi were higher in grape carpoplane and juices than their respectives in citrus, while the reverse was true with the carposphere.

The genus *Aspergillus* (25 species + 1 variety) was the most common fungus. Its peak was recorded in December on DYM and in December and February on DRBC in citrus carposphere and carpoplane and in October or August on both media in grape carposphere, carpoplane and juices of both plants. Its propagules were fewer in citrus than in grape carposphere. The highest percentage of *Aspergillus* propagules was recorded from grape carpoplane (42.31% and 40.11% of total fungi on DYM and DRBC respectively). Leachates exuding outside the fruit surface could be favourable for carposphere and carpoplane fungi in grape than their respectives in citrus fruits. In fresh citrus juice, *Aspergillus* propagules exceeded those in fresh grape juice, contributing 1.24 % - 4.54 % in citrus juice and 0.25 % - 0.82 % in grape juice of total fungi respectively and this is a contrary to that observed in the carposphere and carpoplane. Most common species isolated were related to section *Nigri* (*A. niger* followed by *A. aculeatus* from carposphere and carpoplane of grape and *A. niger* followed by *A. brasiliensis* from carposphere and carpoplane of citrus). Other species of *Aspergillus* were recorded from citrus carposphere and carpoplane only, while others were isolated from grape only. In the juice, *A. niger* was common in both citrus and grape juices, while *A. aculeatus* was common only in grape juice and missed in citrus juice. Three species of *Aspergillus* were recorded from grape juice only (Table 2-4).

Spores of black *Aspergillus* spp. are resistant to UV light **(Rotem and Aust, 1991)**, which may account for their persistence in vineyards and on grape berries even after drying **(King *et al*., 1981; Abdel-Sater and Saber, 1999; Abarca *et al*., 2003)**. *A. aculeatus* **(Jarvis and Traquair, 1984)** and *A. carbonarius* **(Gupta, 1956)** and several other species in this section have also been reported are in vineyards and are often associated with bunch rots **(Amerine *et al*., 1980; Nair, 1985; Snowdon, 1990)**. *A. niger* and *A. carbonarius* have been isolated from grapes in France **(Sage *et al*., 2002)**, Spain **(Cabañes *et al*., 2002)**, Italy **(Battilani *et al*., 2003; Tournas and Katsoundas, 2005)**, Portugal **(Serra *et al*., 2003, 2005)**, Greece **(Tjamos *et al*., 2004)**, South America **(Da Rocha Rosa *et al*., 2002),** and Chile **(Díaz *et al*., 2009)**. The main fungal species isolated from grapes in Tunisian vineyards were *Aspergillus* spp. as *A. niger* aggregate (77%), *Aspergillus carbonarius* (15%) and *Aspergillus flavus* (8%) **(Melki Ben Fredj *et al*., 2007)**. *A. niger* is the most common *Aspergillus* species responsible for postharvest decay of fresh fruit including grape **(Magnoli *et al*., 2003)** and *A. carbonarius, A. niger, A. niveus, A. paradoxus, A. versicolor, A. wentii,* and *A. westerdijkiae* were also identified on apparently healthy clusters of Chilean grapes **(Díaz *et al*., 2009)**. Toxigenic strains of *A. niger* aggregate and *A. carbonarius* and ochratoxin A **(Battilani *et al*., 2003; Serra *et al*., 2003)** were often found associated with black rot of grapes **(Logrieco *et al*., 2003).** Strains of other ochratoxin A-producing species have been isolated from grapes less frequently, such as *A. niger* and *A. ochraceus* **(Serra *et al*., 2005)**. *A. niger* was also isolated from citrus fruits **(Moubasher *et al*., 1971),** Sunkist lemon and grapes, USA **(Tournas and Katsoudas, 2005)**, and lemon in Argentina **(Maldonado *et al*., 2005)**. *Aspergillus* species were also frequently present in juice samples of Karachi, Pakistan **(Anaissie *et al*., 2002; Nazim *et al*., 2008)**, canned fruit juices and beverages, Egypt **(Abdel-Sater *et al*., 2001)**. *A. niger* was dominant in sugarcane juice with and without lemon in Karachi city **(Ahmed *et al*., 2010).** Unidentified *Aspergillus* species were also reported from fresh and pasteurized juices including orange juice, Bari, Italia **(De-Donno *et al*., 1998).**

Petromyces (*P. flavus* = anamorph: *Aspergillus flavus*) was isolated from fruits but was missed in both juices. Some strains of *P. flavus* are well known for the production of the naturally-occurring aflatoxins mainly B1 and B2 **(Logrieco *et al*., 2003)**.

Neosartorya (*N. fumigata* = anamorph: *Aspergillus fumigatus*) was recovered from all sources in grapevine and missed in citrus. *A. fumigatus* was isolated from sugarcane juice with and without lemon in Karachi city, Pakistan **(Ahmed *et al*., 2010)**.

Cladosporium yielded more percentage counts in the carposphere than those recorded in the carpoplane, also from grapevine than those from citrus however its propagules in citrus juice exceeded those in grape juice. Its peak in citrus was recorded in April while in grape in December. In grape carposphere, *C. cladosporioides* was the most common, contributing high percentages of total fungi followed by *C. sphaerospermum*, while *C. sphaerospermum* was the leading species in citrus carposphere in its count, but *C. herbarum* was recorded from grape carposphere and citrus juice only while *C. spongiosum* was isolated from citrus carposphere and grape juice only. In citrus juice *C. cladosporioides, C. sphaerospermum* and *C. oxysporum* were recorded in moderate frequency on both media while in grape juice *C. cladosporioides* was recorded in moderate frequency and *C. sphaerospermum* in low frequency (Table 2-4).

Cladasporium was one of the most frequently isolated genera associated with grapes in Tunisia **(Melki Ben Fredj, 2007)**, in Argentina **(Magnoli *et al*., 2003)** and Spain **(Bellí *et al*., 2006)**, one of the most common fungi in citrus fruits, grapes, strawberry, blueberry, raspberry and blackberry **(Tournas and Katsoudas, 2005)** and one of the moulds that able to cause spoilage of fruit juices and soft drinks **(Stratford *et al*., 2000; Pitt and Hocking, 2009)**. *C. herbarum* was isolated from grapes and sun-dried grapes **(Valero *et al*., 2007)** and *C. cladosporioides* was one of the most dominant endogenous contaminant on the fruits of *Sorbus domestica* in Slovak Republic **(Labuda *et al*., 2005; Kačániová and Fikselová, 2007)**.

Alternaria (3 species) was more prevalent in the carposphere and carpoplane of grape than their respectives in citrus, while it was recorded in low frequency in both juices. Two species (*A. chlamydospora* and/or *A. alternata*) were recovered from all sources, while *A. citri* from citrus only. *Alternaria* was one of the main fungal genera isolated from Tunisian grape berries **(Melki Ben Fredj *et al*., 2007)**, Spanish grapes **(Bau *et al*., 2005; Medina *et al*., 2005),** citrus fruits **(Moubasher *et al*., 1971; Splittstoesser, 1987; Tournas and Katsoundas, 2005)**, and passion fruits in Uganda **(Ismail, 2006)**. *A. alternata* was also the most predominant species in grape samples in the south of Moravia, Czech Republic **(Ostry, *et al*., 2007)**. *A. citri* and *A. alternata* were the incitants of serious plant diseases e.g. black rot of citrus **(Whiteside, 1976; Logrieco *et al*., 2003)**.

Fusarium was infrequently isolated from the carposphere, carpoplane, and fruit juice of both plants. It contributed higher percentage counts in carposphere, and carpoplane of citrus than their respectives in grapevine. Of 8 *Fusarium* species recovered *F. semitectum* was the most frequent species in all sources of both plants. In fresh fruit juice, *F. solani* was recovered from the juice of both plants while *F. circinatum, F. chlamydosporum, F. semitectum* and *F. subglutinans* were isolated from grape juice only (Table 2-4). *Fusarium* was the most important fungus on wild fruits, Hong Kong **(Tang *et al*., 2003)** and grapefruit juice **(Tournas *et al*., 2006)**. *F. oxysporum* and *F. moniliforme* (*F. verticillioides*) were isolated from tomato fruits in Maiduguri, northeastern Nigeria **(Akinmusire, 2011),** *F. solani* and *F. moniliforme* from decayed papaya fruits **(Bagwan, 2011)**, *F. semitectum* and *F. sporotrichioides* from sugarcane juice in Karachi city **(Ahmed *et al*., 2010)**, and *F. chlamydosporum, F. moniliforme, F. acuminatum*, and *F. solani* from passion juice in Uganda **(Ismail, 2006)**.

The genus *Penicillium* was one of the most common fungi in all sources of the two plants giving higher total counts in citrus compared with those of grapevine. Its peak was recorded in April (both carpospheres), December/April (citrus carpoplane), August/June (grape carpoplane and juice). The highest percentage of *Penicillium* propagules was recorded in citrus carpoplane (12.53 % - 15.63 %) and the highest species number was recorded in citrus carposphere (20 species). *P. corylophilum, P. crustosum, P. duclauxii, P. P. citrinum, P. oxalicum, P. purpurogenum* and *P. roquefortii* were recovered from both carpospheres while thirteen species were recorded from citrus carposphere only and one species was isolated from grape carposphere only. Only *P. dauclauxii, P. griseofulvum, P. oxalicum*, were infrequently isolated both carpoplanes while eleven species were recorded from citrus carpoplane only from which *P. citrinum* (1.62 % - 6.21 % of total fungi), *P. digitatum* (4.04 % - 2.82 %), and *P. italicum* (3.03 % - 3.77 %) contributed relatively large numbers, and three species were isolated from grapevine only. In the fresh juice, *Penicillium* was recorded in both fruits in high or moderate frequency. In citrus juice, its propagules exceeded those in grape juice. In the juice of citrus fruits *P. digitatum, P. italicum,* and *P. purpurogenum, P. aurantiogriseum, P. glabrum,* and *P. viridicatum* were recorded in moderate or low frequency while they were missed in grape juice. On the other hand, *P. oxalicum, P. expansum* and *P. roquefortii* were recorded in grape juice in moderate or low frequency, while they were missed in citrus juice (Tabl 2-4).

Penicillium spp. were found in grapes in Spain **(Medina *et al*., 2005; Bellí *et al*., 2006)**, Tunisia **(Fredj *et al*., 2007)**, Portugal **(Serra *et al*., 2003, 2005),** Morocco **(Selouane *et al*., 2009)**, Argentin **(Magnoli *et al*., 2003)**, in wild fruits in Hong

Kong **(Tang *et al*., 2003)**, citrus fruits **(Tournas and Katsoudas, 2005)**, pineapple chunks **(Tournas *et al.*, 2006)**, passion fruits of pure origin in Uganda **(Ismail, 2006)**. *P. expansum* was isolated from grapes in Potugal **(Abrunhosa *et al*., 2001)**, *P. expansum, P. aurantiogriseum,* and *P. spinulosum* from grape samples in Czech Republic **(Ostry *et al*., 2007)**, *P. purpurogenum* from all samples of the white Garnacha grape variety **(Cabaňes *et al.* 2002)**, *P. brevicompactum* from rotting fruits of Madeira grapes, South America **(Serra *et al*., 2006)**, *P. brevicompactum, P. expansum, P. islandicum,* and *P. rugulosum* from Japanese Quince (*Chaenomeles japonica*) fruits **(Norin and Rumpunen, 2002)**, and *P. digitatum* and *Penicillium* sp, from lemon in Tucuman, Argentina **(Maldonado *et al*., 2005)**. *Penicillium* spp. were also isolated in 38% of fresh juices (apricot, pineapple, orange, blood orange, banana, strawberry, tropical fruits, tangerine, apple, pear, peach, grapefruit, and pink grapefruit) and in 17% of pasteurised juices, Bari, Italia **(De Donno *et al*., 1998)**, and from sugarcane juice in Karachi city **(Ahmed *et al*., 2010)**.

Other fungal taxa of less frequency were recovered from the sources in one or both plants but in variable frequencies. *Botryodiplodia theobromae* was recorded from all sources of both plants. *B. theobromae* was recorded as causal agent of mango and banana fruit-rot **(El-Helaly *et al*., 1966)**. *Setosphaeria rostrata* was isolated from all sources of both plants, except citrus carpoplane, while *Stemphylium* (*S. sarciniforme* and 2 unidentified) from all sources except citrus carposphere and *Quambalaria cyanescens* (=*Sporothrix cyanescens*) from all sources except citrus carposphere and carpoplane (Tab 2-4).

Cochliobolus (2 species), *Emericella* (5 species), *Nigrospora oryzae*, *Phoma epicoccina* and *Rhizopus oryzae* were isolated from carpospheres and carpoplanes but were missed in juices of both plants. The most prevalent species was *C. lunatus* followed by *C. australiensis* which was missed in citrus carposphere. *Emericella variecolor* was the most common species. *Rhizopus oryzae* was isolated from fresh Apricot, pineapple, orange, blood orange, banana, strawberry, tropical fruits, tangerine, apple, pear, peach, grapefruit pink grapefruit juices and pasteurized ones, Bari, Italia **(De Donno *et al*., 1998)**, sugarcane juice with and without lemon in Karachi city, Pakistan **(Ahmed *et al*., 2010)**.

Pleospora (*P. allii, P. herbarum,* and *P. tarda*, teleomorphs of *Stemphylium vesicarium, S. herbarum* and *S. botryosum* respectively) and *Trichoderma* (*T. harzianum, T. reesei T. paracemosum* and 1 unidentified) were isolated from all sources except grape juice. *P. tarda* was isolated from leaf and citrus fruit rind in Upper Egypt **(Moubasher *et al*., 1971)**. *T. harzianum* was isolated from grapes and sun-dried grapes **(Valero *et al*., 2007)**.

Acremonium potronii, Gibellulopsis nigrescens (=*Verticillium nigrescens*), *Microdochium dimerum* and *Neurospora crassa* were recorded in rare frequency from only grape carposphere, while *Ramichloridium biverticillatum* was recorded from grape carpoplane only, and *Gliocladium virens, Pleurodesmospora* sp. and *Sagenomella diversispora* were isolated only from grape carposphere and carpoplane.

Byssochlamyes spectabilis, Corynoascus sepedonium Drechslera biseptata, Memnoniella echinata, Pochonia sp., 2 *Preussia* species, *Sarcopodium araliae, Scopulariopsis brumptii, Scytalidium infestans* and *Ulocladium botrytis* were recorded in rare frequency from citrus carposphere only. *Dichocladosporium chlorocephalum* and *Microascus brevicaulis* were isolated infrequently recovered from citrus juice and carpopsphere only and *Myrothecium* (represented by *M. verrucaria, M. roridum,* and *Myrothecium* sp.) was recovered infrequently from citrus juice and carpoplane only. On he other hand, *Clonostachys rosea* and *Apiospora montagnei* were recovered in rare frequency from citrus carposphere and carpoplane while they were missed in grape fruits and juices from both fruits (Tab 2-4). *Arthrinium* sp. (anamorph of *Apiospora montagnei*) was recorded in dry leaves of Japanese quince plants in Sweden **(Norin and Rumpunen, 2002)**.

Mucor (4 species) and *Chaetomium globosum* were recovered in rare frequency from both carpospheres and citrus carpoplane but was missed in both juices. *M. circinelloides* was the most common species followed by *M. hiemalis* in both plants. *Stachybotrys* (*S. chartarum* and a synnematous species) was recorded infrequently from both carposheres and grape carpoplane only, while *Eurotium amstelodami* and *Fennellia nivea* were recovered in rare frequency from both carpoplanes and citrus carposphere but not from fruit juice. *Eurotium amstelodami* was isolated from grapes and sun-dried grapes **(Valero *et al*., 2007)**.

Yeasts were recovered in high frequency from both fruit juices while they were less common in carpospheres and carpoplanes. They contributed their highest percentage counts in grape juice (99.14 % - 99.39 % of total fungi) and citrus juice (91.60 % - 95.42 %). The peak of yeast fungi were drawn in citrus in December (mature fruit) and in grape in October (mature fruit) for both carposhere and carpoplane while in Ocober (mature fruit) in both juices. Only 3 genera were recovered from all sources (*Candida, Hanseniaspora* and *Issatchenkia*) (Tab 2-4). According to **Skinner *et al.* (1980)** and **Phaff (1990),** the natural microbiota of fruits is commonly composed of yeasts and yeast-like organisms such as *Aureobasidium, Rhodotorula, Sporobolomyces, Cryptococcus, Candida, Pichia, Kloeckera, Hanseniaspora*, more rarely *Saccharomyces* and *Schizosaccharomyces*, and also the terrestrial species of *Metschnikowia.*

The genus *Candida* was recovered infrequently from different sources of both plants. Its highest percentage count was recorded from grape juice (71.41 % - 80.22 % of total fungi). Three species were recorded; *C. catenulata* and *C. parapsilosis* were recovered from citrus sources only and *C. prunicola* from grape sources only. *Candida* was the genus most frequently found in certain varieties of grapes in southern Spain **(De la Torre *et al*., 1999)** and in different angiosperm fruits, Southeastern Brazil **(Prada and Pagnocca, 1997)**. *Candida* has also been reported as spoilage-causing organism in citrus juices **(Hays, 1951; Grawmlich *et al*., 1986; Parish and Higgins, 1989; Teller and Parish, 1992)** and in pasteurized fruit juices in Venezuela **(Mendoza *et al*., 1982)**. *C. parapsilosis* was the dominant species in citrus juices **(Hatcher *et al*., 2000)**, in fresh passion juice, Uganda **(Ismail, 2006)**, and pasteurized and subsequently recontaminated single-strength orange juice, Florida **(Arias *et al*., 2002)**.

Hanseniaspora (represented by *H. occidentalis*) and *Issatchenkia* (exemplified by *I. orientalis*) were recorded infrequently from carposphere, carpoplane, and juice of both plants. The highest percentage count of *Hanseniaspora* was recorded from grapevine carposphere (6.87 % - 9.21 % of total fungi) followed by citrus carpoplane (3.39 % - 3.64 %). *Hanseniaspora* species (anamorph *Kloeckera*) were common yeast constituents on grapes **(Prakitchaiwattana *et al*., 2004; Phister *et al*., 2007)**, grapes and musts in Europe **(Bioletti and Cruess, 1912)**, and in different angiosperm fruits, Southeastern Brazil **(Prada and Pagnocca, 1997)**. *Hanseniaspora* was also commonly found in citrus juices **(Hatcher *et al*., 2000)**, with *H. occidentalis* and *H. uvarum* being isolated from orange juice, Florida **(Arias *et al*., 2002)**. *H. uvarum* is also associated with plants and fruits (Phaff and Starmer, 1987), on the pineapple fruit skins in Thailand and Australia **(Chanprasartsuk *et al.*, 2010)**.

Issatchenkia highest percentage count was recorded from grape juice (18.91 % - 71.41 % of total fungi) and citrus juice (26.60 % - 30.75 %) followed by citrus carposphere (23.01 % - 26.48 %). *I. orientalis* was the most frequent species recorded in *Parahancornia amapa* fruits in the Mocambo Forest, Salvaterra **(Morais *et al*., 1995)**, Thai fruits and vegetables, Thailand **(Chanchaichaovivat *et al*., 2007)**, and from pasteurized and subsequently recontaminated single-strength orange juice, Florida **(Arias *et al*., 2002)**.

Cryptococccus (4 species) was recovered infrequently from carpospheres of citrus and grape and grape juice (*C. albidus* and *C. laurentii*) or grape carposphere (*C. carnescens* and *C. magnus*), grape carpoplane and citrus juice (*C. laurentii*). *Cryptococcus* was prevalent in pineapple fruit in Rio de Janeiro, Brazil **(Robbs *et al*., 1989)**, angiosperm fruits, Southeastern Brazil **(Prada and Pagnocca, 1997)**. *C. albidus* and *C. laurentii* were isolated from soft grapes and peach, El-Minia city, Egypt **(Haridy, 1994)** and *C. albidus* was part of the natural microbiota of certain varieties of grapes in southern Spain **(De la Torre *et al*., 1999)**.

The genus *Debaryomyces* (2 species) was recovered infrequently from different sources of both plants, except grapevine carpoplane. Its highest percentage count was recorded from citrus carpoplane (4.65 % - 4.89 % of total fungi). Both *D. hansenii* and *D. pseudopolymorphus* were recovered from both citrus carposphere and carpoplane while only *D. pseudopolymorphus* was recovered from grape carposphere and boh fresh juices. *Debaryomyces polymorphus* was the most common yeast species found in fruit salads including cantaloupe, citrus fruits, honeydew, pineapple, cut strawberries and mixed fruit salads, Washington **(Tournas *et al*., 2006)**.

Geotrichum (represented by *G. citri-aurantii*) was recovered infrequently from only citrus carposphere, carpoplane and juice. Similar observation was made by **Tournas *et al.* (2006)** when they reported that *Geotrichum* spp. were common in grapefruit juice in Washington and *G. citri-aurantii* was isolated from pasteurized orange juice, Florida **(Arias *et al*., 2002)**.

Klyuveromyces marxianus was recorded in rare frequency from grape carposphere only, while *Pseudozyma* was recorded in rare frequency from citrus carposphere only, and *Kodemaea ohmeri* was isolated in rare frequency from citrus carposphere and carpoplane only. *K. marxianus* was isolated from soft apples, grapes, dates, and strawberries, El-Minia city, Egypt **(Haridy, 1994)**.

The genus *Pichia* was recovered infrequently from all sources of both plantations except grape carpoplane and juice. Its highest percentage count was recorded from citrus juice (56.42 % -57.01 % of total fungi) followed by citrus carpoplane (1.82 % - 4.52 %). Three species were collected of which *P. fermentans* was recovered from both carpospheres and citrus carpoplane and juice, *P. guilliermondii* (anamorph: *Candida guilliermondii*) from grape carposphere, and *P. caribaea* from citrus carposphere and juice. *Pichia* spp. were the most common yeasts found in fruit salads including cantaloupe, citrus fruits, honeydew, pineapple, cut strawberries and mixed fruit salads, Washington **(Tournas *et al*., 2006)**, different angiosperm fruits, southeastern Brazil **(Prada and Pagnocca, 1997)**, pasteurized fruit juices in Venezuela **(Mendoza *et al*., 1982)**, and from citrus juices **(Hatcher *et al*., 2000)**. *P. guilliermondii* was isolated from soft apricot fruits, El-Minia city, Egypt **(Haridy, 1994)**, fruits of *Anacardium giganteum* at the Mocambo Forest, Salvaterra **(Morais *et al*., 1995)**, Thai fruits **(Chanchaichaovivat *et al*., 2007)**, and pineapple fruit skins and fresh pineapple juice in Thailand and Australia **(Chanprasartsuk *et al*., 2010)** and the orange, apple, lemon, and grapefruit juices in Zagreb, Croatia **(Uhitil *et al*., 2009)**. *P. guilliermondii* and *P. fermentans* were the most common yeast species from the fresh sugarcane juice **(El-Tabey Shehata, 1960)**, and *P. fermentans* from fresh-squeezed single-strength orange juice, Florida **(Arias *et al*., 2002)**, and from orange fruit and juice in a spontaneous fermentation **(Las Heras-Vazquez *et al*., 2003)**.

Rhodotorula (2 species) was isolated infrequently from carposphere and carpoplane of both plants but in high frequency from grape juice. *R. glutinis* was recovered from grape carposphere and juice and *R. mucilaginosa* from both carpospheres and grape carpoplane and juice. In this respect, *Rhodotorula* spp. were the most common yeasts found in fruit salads including cantaloupe, citrus fruits, honeydew, pineapple, cut strawberries and mixed fruit salads, Washington **(Tournas *et al*., 2006)**, and pineapple fruit of in Rio de Janeiro, Brazil **(Robbs *et al*., 1989)** as well as from citrus juices **(Hatcher *et al*., 2000)** and pasteurized fruit juices in Venezuela **(Mendoza *et al*., 1982)**. *R. mucilaginosa* was isolated from orange fruit and juice in a spontaneous fermentation **(Las Heras-Vazquez *et al*., 2003)** and from pasteurized grapefruit juice, Florida **(Arias *et al*., 2002)**. *Sporidiobolus* (*S. ruineniae* and *S. pararoseus*) were isolated in low frequency from grape juice only, while a black yeast species from grape carpoplane and *Rhodosporidium* (*R. paludigenum* and *R. diobovatum*) and *Sporobolomyces* (*S. roseus*) was isolated infrequently from grape carposphere, carpoplane, and juice and was missing in all cirus sources. Black yeast isolates were prevalent in pineapple fruit in Rio de Janeiro, Brazil **(Robbs *et al*., 1989)**.

Table 1 Fungal diversity exhibited in types and number of isolates collected from different fruit substrates

AUMC number	Isolation source	Accession GenBank number	Length (bp)	Closest Genbank match # ITS	Sequencing similarity (%)	Species	References
Filamentous fungi (Basidiomycota, Ustilaginomycetes, Quambalariaceae)							
6294	Citrus juice	JQ425382	661	AJ535500 = IMI 298177 DQ317622 = CBS357.73^T	99	*Quambalaria cyanescens*	de Beer *et al.* 2006
Ascomyceteous yeast strains							
7754	Citrus fruit	JQ083433	374	EU131181 = GcaCC015 AF411060	99	*Geotrichum citri-auriantii*	Arias *et al.* 2002
7748	Citrus fruit	JQ425350	728	GU246263 = CBS 5367^T	98	*Kodamaea ohmeri*	Groenewald & Smith 2010
7765	Grape fruit	JQ083432	497	FM199972 = H7S6K11 FM199958 = H4S5K11	98	*Issatchenkia orientalis (=Pichia kudriavzevii*)	Daniel *et al.* 2009
7767	Grape fruit	JQ083434	432	EU343809 = CBS 8848 ^{T}	93	*Candida prunicola*	Kurtzman 2001
7766	Grape fruit	JQ425352	516	FJ515204 = UM5 AY939808 = CBS 5147^T	96 95	*Issatchenkia orientalis (=Pichia kudriavzevii*)	Leinberger *et al.* 2005
7769	Grape juice	JQ425351	487	FM199972 = H7S6K11 EU798698 = NN2573	100	*Issatchenkia orientalis (=Pichia kudriavzevii)*	Daniel *et al*. 2009
7768	Grape juice	JQ425355	437	EU343809 = CBS 8848^T	93	*Candida prunicola*	Kurtzman 2001
7764	Grape uice	JQ425401	416	EF199745 = szty2w GU246263 = CBS 5367^T	99 98	*Kodamaea ohmeri*	Groenewald & Smith 2010
Basidiomyceteous yeast strains							
7777	Grape juice	JQ425364	623	AF444635 = CBS 9070 AF444541 = CBS 316 ^{T}	99 98	*Rhodotorula mucilaginosa*	Scorzetti *et al*. 2002
7796	Grape juice	JQ425366	606	AF444635 = CBS 9070 AF444541 = CBS 316 ^{T}	99	*Rhodotorula mucilaginosa*	Scorzetti *et al*. 2002
7248	Citrus fruit	JQ425393	628	AF444635 = CBS 9070 AF444541= CBS 316^T	99	*Rhodotorula mucilaginosa*	Scorzetti *et al*. 2002
7246	Grape fruit	JQ425371	661	EU871517 = S22814 AF190008= CBS 140^T	99	*Cryptococcus magnus*	Fell *et al*. 2000

Table 2 Percentage counts calculated to total fungi and frequency of occurrence of carposphere fungi recovered bimonthly from the citrus and grape on DYM and DRBC agar media during the period from April 2008- February 2009 (counts of CFU calculated per g fresh fruit rind (citrus) or fresh fruit (grape) in each sample, collectively in 17 samples in case of citrus and 14 samples in grape).

Taxa	Citrus carposphere				Grape carposphere			
	DYM		DRBC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
Filamentous fungi	62.51	16H	74.31	17H	82.05	14 H	80.92	14 H
Acremonium potronii							0.03	1 R
Alternaria	4.29	4 L	2.01	4L	5.44	7 H	5.65	7 H
A. alternata	3.97	3L	1.97	4L	5.19	7 H	5.05	7 H
A. chlamydospora	0.14	2R	0.04	1R	0.06	1 R	0.17	3 L
A. citri	0.18	1R						
Alternaria sp.					0.17	1 R	0.44	2 R
Apiospora montagonii	0.03	1 R						
Aspergillus	0.73	11H	0.97	14H	18.29	13 H	17.25	14 H
A. aculeatinus							0.07	3 L
A. aculeatus	0.01	1R			3.58	5 M	4.26	7 H
A. brasiliensis	0.08	3 L	0.21	5M	5.29	4 L	4.92	3 L
A. campestris			0.01	1R				
A. clavatus			0.01	1R				
A. dimorphicus	0.01	1 R						
A. flavus var. *columnaris*	0.01	1 R	0.03	2R				
A. japonicus							0.03	1 R
A. lacticoffeatus	0.04	1 R	0.07	1R				
A. niger	0.44	6M	0.47	10H	9.07	10 H	6.90	9 H
A. ochraceus	0.04	3 L	0.06	3L	0.31	4 L	0.28	4 L
A. petrakii	0.02	1 R						
A. proliferans			0.03	1R	0.03	1 R		
A. speleneus	0.04	1 R	0.07	1R				
A. sydowii	0.02	1 R						
A. terreus	0.01	1 R			0.01	1 R	0.23	3 L
A. tubingensis							0.56	2 R
A. versicolor			0.03	1R				
Botryodiplodia theobromae	0.11	2 R	0.01	1R				
Byssochlamys spectabilis	0.09	1 R	0.06	2R				
Chaetomium globosum	0.16	2 R	0.03	1R			0.03	1 R

Taxa	Citrus carposphere				Grape carposphere			
	DYM		DRBC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
Cladosporium	41.89	8 M	59.82	8M	52.31	9 H	53.65	7 H
C. cladosporioides	4.95	6 M	8.63	8M	41.50	8 H	41.59	7 H
C. herbarum					0.02	1 R		
C. oxysporum	0.41	2 R	0.33	3L	2.59	4 L	3.09	3 L
C. sphaerospermum	36.49	7 M	50.69	7M	8.19	6 M	8.97	5 M
C. spongiosum	0.04	1 R	0.16	2R				
Clonostachys rosea	0.02	1 R	0.01	1R				
Cochliobolus			0.03	1R	0.76	4 L	0.04	2 R
C. australiensis					0.75	3 L	0.02	1 R
C. lunatus			0.03	1R	0.01	1 R	0.02	1 R
Dreschlera biseptata	0.02	1 R						
Dichocladosporium chlorocephalum	0.07	1 R	0.03	1R				
Emericella	0.01	1 R	0.01	1R	0.41	3 L	0.27	3 L
E. heterothallica					0.06	1 R		
E. nidulans					0.08	1 R	0.10	1 R
E. quadrilineata							0.06	1 R
E. variecolor	0.01	1 R	0.01	1R	0.27	3 L	0.10	2 R
Eurotium amstelodami	0.04	1 R	0.06	2R				
Fennellia nivea	0.01	1 R						
Fusarium	10.99	3 L	5.12	3L	1.05	6 M	0.86	6 M
F. chlamydosporum					0.02	1 R		
F. proliferatum							0.02	1 R
F. semitectum	10.32	3 L	5.09	2R	0.84	5 M	0.64	3 L
F. solani	0.53	1 R						
F. verticillioides	0.14	1 R	0.03	1R	0.19	2 R	0.19	3 L
Gibellulopsis nigrescens					0.02	1 R	0.10	1 R
Gliocladium virens					0.04	1 R		
Microascus brevicaulis	0.04	1 R						
Michrodochium dimerum					0.01	1 R		
Mucor	0.05	1 R	0.01	1R	0.04	1 R		
M. circinelloides	0.02	1 R	0.01	1R	0.04	1 R		
M. hiemalis var. *luteus*	0.04	1 R						
Neosartorya fumigata					0.03	1 R	0.03	1 R
Neurospora crassa					0.02	1 R	0.02	1 R
Nigrospora oryzae	0.09	2 R	0.07	3L	0.01	1 R	0.01	1 R
Penicillium	1.57	11 H	5.19	11H	0.45	9 H	1.05	8 H
P. aurantiogriseum	0.04	1 R	1.47	3L				
P. brevicompactum	0.02	1 R	0.03	1R				
P. citrinum	0.58	3 L	2.97	2R	0.01	1 R	0.06	2 R
P. corylophilum	0.04	1 R	0.01	1R	0.04	1 R		
P. crustosum			0.03	1R	0.04	1 R	0.02	1 R
P. digitatum	0.19	2 R	0.25	3L				
P. duclauxii	0.14	4 L					0.02	1 R
P. expansum	0.04	1 R						
P. fellutanum			0.01	1R				
P. glabrum			0.03	1R				
P. hirsutum			0.05	1R				
P. implicatum	0.01	1 R						
P. italicum	0.12	2 R	0.15	3L				
P. olsonii	0.02	1 R	0.07	3L				
P. oxalicum	0.09	2 R	0.05	2R	0.25	8 H	0.64	7 H
P. puberulum	0.19	2 R	0.04	2R				
P. purpurogenum			0.01	1R	0.11	5 M	0.19	3 L
P. raistrickii	0.02	1 R						
P. roquefortii			0.04	1R			0.05	1 R
P. viridicatum	0.07	1 R						
P. waksmanii							0.06	1 R
Petromyces flavus	0.19	5 M	0.15	6M	0.06	3 L	0.06	2 R
Phoma epicoccina	1.85	5 M	0.64	4L	1.32	6 M	0.75	4 L
Pleospora	0.16	3 L	0.01	1R	0.90	5 M	0.39	3 L
P. herbarum	0.02	1 R			0.11	1 R		
P. tarda	0.14	2 R	0.01	1R	0.79	5 M	0.39	3 L
Pleurodesmospora sp.					0.02	1 R		
Preussia	0.04	2 R						
P. minima	0.04	1 R						
Preussia sp.	0.01	1 R						
Pseudonectria pachysandricola			0.01	1R				
Quambalaria cyanescens					0.45	2 R	0.48	3 L
Rhizopus oryzae	0.04	1 R			0.26	5 M	0.02	1 R
Sagenomella diversispora							0.05	2 R
Scopulariopsis brumptii			0.03	1R				
Scytalidium infestans			0.01	1R				
Setosphearia rostrata	0.01	1 R			0.05	2 R		

Taxa	Citrus carposphere				Grape carposphere			
	DYM		DRBC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
Stachybotrys	0.02	1 R			0.04	1 R	0.03	1 R
S. chartarum	0.02	1 R						
Stachybotrys sp.					0.04	1 R	0.03	1 R
Stemphylium					0.03	2 R	0.12	2 R
S. sarciniforme					0.03	2 R	0.06	1 R
Stemphylium sp. 157							0.06	1 R
Trichoderma			0.01	1R			0.04	1 R
T. reesei			0.01	1R				
Trichoderma sp.							0.04	1 R
Ulocladium botrytis			0.01	1R				
Yeasts	37.49	5 M	25.69	8M	17.95	9 H	19.08	8 H
Candida	7.40	3 L	0.68	3 L	5.35	2 R	6.72	3 L
C. catenulata	7.40	3 L	0.67	2 R				
C. parapsilosis			0.01	1 R				
C. prunicola					5.35	2 R	6.72	3 L
Cryprococcus	0.02	1 R	0.08	4 L	0.13	2 R	1.56	4 L
C. albidus			0.04	2 R	0.21	3 L	0.92	4 L
C. carnescens					0.02	1 R	0.17	3 L
C. laurentii	0.02	1 R	0.04	3 L	0.06	2 R	0.46	3 L
C. magnus							0.02	1 R
Debaryomyces	0.60	2 R	0.09	1 R	0.02	1 R		
D. hansenii	0.60	2 R	0.05	1 R				
D. pseudopolymorphus			0.04	1 R	0.02	1 R		
Geotrichum citri-aurantii	0.09	1 R	0.04	2 R				
Hanseniaspora occidentalis	2.33	2 R	1.18	2 R	9.21	4 L	6.87	3 L
Issachenkia orientalis	26.48	3 L	23.01	3 L	2.29	4 L	2.94	3 L
Kluyveromyces marixianus					0.06	2 R	0.01	1 R
Kodemaea ohmeri	0.02	1 R	0.01	1 R				
Pichia	0.53	3 L	0.57	2 R	0.05	2 R	0.39	3 L
P. caribaea	0.01	1 R	0.01	1 R				
P. fermentans	0.52	3 L	0.56	2 R	0.01	1 R		
P. guillieromondii					0.04	1 R	0.39	3 L
Pseudozyma sp.	0.02	1 R						
Rhodosporidium					0.12	2 R	0.11	3 L
R. diobovatum					0.11	1 R	0.06	1 R
R. paludigenum					0.01	1 R	0.05	2 R
Rhodotorula			0.01	1 R	0.34	5 M	0.16	5 M
R. glutinis					0.06	2 R	0.02	1 R
R. muclaginosa			0.01	1 R	0.28	4 L	0.13	4 L
Sporobolomyces roseus					0.19	3 L	0.31	3 L
Total CFUs (%)	22568 (100)	17 H	30296 (100)	17H	18616 (100)	14 H	19299 (100)	14 H
No. of genera (54)	34		32		33		31	
No. of species (120 + 2)	67+1		64+1		58		59	

*F = Frequency of occurrence out of 17 samples of citrus fruits or 14 of grapevine fruits.
*OR = Occurrence remarks: for citrus samples; H = high, 9 - 17; M = moderate, 5-8; L = Low, 3 - 4; R = rare, 1 or 2 samples, and for grapevine: H, 7-14; M, 5-6; L, 3-4; R = 1-2 samples.

Table 3 Percentage counts calculated to total fungi and frequency of occurrence of carpoplane fungi recovered from citrus and grape on DYM and DRBC agar media bimonthly during the period from April 2008- February 2009 (counts of CFU calculated per 20 fresh fruit rind pieces (citrus) or fresh fruit pieces (grape) in each sample, collectively in 17 samples in case of citrus and 14 samples in grape).

Taxa	Citrus carpoplane				Grape carpoplane			
	DYM		DRBC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
Filamentous fungi	69.29	17 H	64.78	17 H	79.44	14 H	76.92	13 H
Alternaria	8.08	3 L	6.78	3 L	7.84	7 H	13.87	8 H
A. alternata	7.07	2 R	5.84	2 R	7.25	7 H	13.05	8 H
A. chlamydospora	1.01	2 R	0.75	3 L	0.59	2 R	0.82	2 R
A. citri			0.19	1 R				
Apiospora montagonii	0.20	1 R						
Aspergillus	21.41	14 H	21.66	16 H	42.31	14 H	40.11	13 H
A. aculeatinus					1.92	5 M	0.69	2 R
A. aculeatus					14.35	9 H	7.42	7 M
A. auricomus							0.14	1 R
A. brasiliensis	11.31	7 M	6.59	6 M	0.74	2 R		
A. carneus			0.19	1 R				
A. dimorphicus			0.19	1 R				
A. flavus var. *columnaris*			1.32	4 L				
A. lacticoffeatus			0.38	1 R				
A. niger	8.69	12 H	10.92	13 H	25.0	11 H	30.77	11 H
A. ochraceus	0.20	1 R	0.75	4 L	0.15	1 R	0.41	2 R
A. oryzae			0.19	1 R				
A. ostianus	0.20	1 R						
A. robustus	0.20	1 R						
A. sclerotiorum	0.20	1 R	0.19	1 R				

Taxa	Citrus carpoplane				Grape carpoplane			
	DYM		DRBC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
A. speleneus			0.56	1 R				
A. sulphureus	0.40	2 R						
A. sydowii	0.20	1 R						
A. terreus					0.15	1 R		
A. tubingensis			0.38	1 R			0.69	2 R
Botryodiplodia theobromae	2.02	3 L	1.51	4 L	0.59	1 R	0.27	1 R
Cladosporium	2.63	3 L	2.64	5 M	6.66	5 M	6.59	6 M
C. cladosporioides	1.21	2 R	0.38	1 R	6.21	5 M	6.59	6 M
C. oxysporum	0.20	1 R	0.19	1 R				
C. sphaerospermum	1.21	2 R	2.07	4 L	0.44	1 R		
Chaetomium globosum	0.20	1 R						
Clonostachys rosea			0.19	1 R				
Cochliobolus	0.81	3 L	0.38	2 R	0.15	1 R	0.14	1 R
C. australiensis	0.20	1 R					0.14	1 R
C. lunatus	0.61	2 R	0.38	2 R	0.15	1 R		
Corynoascus sepedonium	0.20	1 R	0.38	1 R				
Emericella	0.40	2 R	0.38	2 R				
E. dentata	0.20	1 R						
E. nidulans	0.20	1 R						
E. quadrilineata			0.19	1 R				
E. variecolor			0.19	1 R				
Eurotium amstelodami	0.20	1 R	0.38	2 R			0.14	1 R
Fennellia nivea			0.19	1 R	0.29	1 R		
Fusarium	9.89	5 M	8.47	3 L	0.44	2 R	1.37	5 M
F. lactis	0.61	1 R	1.13	1 R				
F. proliferatum	0.61	1 R	0.56	1 R				
F. semitectum	8.48	4 L	6.78	3 L	0.29	2 R	1.37	5 M
F. solani	0.20	1 R						
F. verticillioides					0.15	1 R		
Gliocladium virens					0.15	1 R		
Haptocillium sp.							0.14	1 R
Memmnoniella echinata			0.19	1 R				
Mucor circinelloides	0.20	1 R						
Myrothecium sp.			0.38	1 R				
Neosartorya fumigata					0.15	1 R		
Neurospora crassa					0.29	1 R	0.14	1 R
Nigrospora oryzae	0.20	1 R					1.09	1 R
Penicillium	12.53	9 H	15.63	10 H	1.18	5 M	1.51	8 H
P. aurantiogriseum	1.01	2 R	2.07	2 R				
P. bilaii	0.20	1 R						
P. brevicompactum	0.40	1 R						
P. citrinum	1.62	1 R	6.21	4 L				
P. corylophilum	0.20	1 R						
P. crustosum	0.20	1 R	0.38	1 R				
P. digitatum	4.04	2 R	2.82	4 L				
P. duclauxii			0.19	1 R	0.15	1 R	0.14	1 R
P. griseofulvum	0.20	1 R					0.27	1 R
P. humuli					0.15	1 R		
P. italicum	3.03	3 L	3.77	3 L				
P. oxalicum	0.61	1 R	0.19	1 R			0.96	6 M
P. pinophilum					0.15	1 R		
P. purpurogenum					0.44	2 R	0.14	1 R
P. restrictum	0.40	1 R						
P. roquefortii	0.20	1 R						
P. viridicatum	0.40	1 R						
Petromyces flavus	2.63	6 M	1.88	5 M	0.74	5 M	0.96	3 L
Phoma epicoccina	4.85	2 R	1.88	1 R	7.99	5 M	5.08	5 M
Pleospora	0.20	1 R	0.38	2 R	0.44	3 L	0.55	4 L
P. allii					0.15	1 R		
P. tarda	0.20	1 R	0.38	2 R	0.29	2 R	0.55	4 L
Pleurodesmospora sp.					0.15	1 R		
Pochonia sp.	0.40	1 R						
Quambalaria cyanescens							0.96	2 R
Ramichloridium biverticillatum					0.15	1 R		
Rhizopus oryzae	1.82	3 L	0.75	2 R	7.25	6 M	2.88	7 H
Sagenomella diversispora							0.27	1 R
Sarcopodium araliae			0.19	1 R				
Setosphaeria rosrata					2.07	4 L	0.41	3 L
Stachybotrys sp.							0.14	1 R
Stemphylium			0.19	1 R			0.27	2 R
S. sarciniforme							0.14	1 R
Stemphylium sp. 533			0.19	1 R				
Stemphylium sp. 157							0.14	1 R

Taxa	Citrus carpoplane				Grape carpoplane			
	DYM		DRBC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
Trichoderma	0.40	1 R	0.38	1 R	0.15	1 R		
T. paraceramosum					0.15	1 R		
T. reesei	0.40	1 R	0.38	1 R				
Yeasts	30.71	5 M	35.22	6 M	20.56	4 L	23.08	7 H
Candida	10.30	2 R	11.68	2 R	6.51	1 R	7.97	2 R
C. catenulata	10.30	2 R	11.68	2 R				
C. prunicola					6.51	1 R	7.97	2 R
Cryptococcus laurentii							0.14	1 R
Debaryomyces	4.65	3 L	4.89	3 L				
D. hansenii	0.61	2 R	0.38	2 R				
D. pseudopolymorphus	4.04	3 L	4.52	1 R				
Geotrichum citri-aurantii	0.61	1 R	0.94	2 R				
Hanseniaspora occidentalis	3.64	1 R	3.39	1 R	2.07	1 R	1.10	2 R
Issachenkia orientalis	9.49	3 L	9.42	3 L	10.95	2 R	12.23	3 L
Kodemaea ohmeri	0.20	1 R	0.38	1 R				
Pichia fermentans	1.82	1 R	4.52	1 R				
Rhodosporidium paludigenum					0.29	1 R		
Rhodotorula muclaginosa							0.69	2 R
Sporobolomyces roseus					0.29	1 R	0.69	2 R
Yeast sp. (black)					0.44	1 R	0.27	1 R
Total CFUs (%)	495 (100)	17 H	531 (100)	17 H	676 (100)	14 H	728 (100)	14 H
No. of genera (48)	27		28		26		27	
No. of species (99 + 1)	55		51+1		39		37	

*F = Frequency of occurrence out of 17 samples of citrus and 14 of grapevine.
*O = Occurrence remarks for citrus: H = high, 9-17; M = moderate, 5-8; L = Low, 3-4; R = rare, 1-2 samples; = For grapevine: H, 7-14; M, 5-6; L, 3-4; R = 1-2 samples.

Table 4 Percentage counts calculated to total fungi and frequency of occurrence of fungi recovered from citrus and grapevine juices on DYM and DRBC agar media bimonthly during the period from April 2008- February 2009 (counts of CFU calculated per ml juice in each sample, collectively in 8 samples in case of citrus and 6 samples in grapevine).

Taxa	Citrus juice				Grape juice			
	DYM		DRC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
Filamentous fungi	4.58	7 H	8.40	7 H	0.61	6 H	0.86	6 H
Alternaria alternata	0.05	1 L	0.13	1 L	0.0004	1 L		
Aspergillus	1.24	6 H	4.54	5 H	0.25	5 H	0.82	6 H
A. aculeatinus					0.12	2 M	0.24	2 M
A. aculeatus					0.005	3 H	0.01	1 L
A. brasiliensis	0.18	1 L	0.34	1 L	0.06	1 L	0.19	2 M
A. japonicus					0.002	1 L		
A. niger	1.01	5 H	4.12	4 H	0.07	2 M	0.38	5 H
A. ochraceus	0.05	1 L	0.08	2 M	0.0004	1 L	0.001	1 L
Botryodiplodia theobromae	0.14	2 M	0.04	1 L				
Cladosporium	2.25	4 H	2.89	3 M	0.33	2 M	0.03	1 L
C. cladosporioides	1.05	2 M	1.23	2 M	0.32	2 M	0.03	1 L
C. herbarum	0.18	2 M	0.08	2 M				
C. oxysporum			1.53	2 M				
C. sphaerospermum	1.01	3 M	0.04	1 L	0.01	1 L	0.002	1 L
C. spongiosum					0.001	1 L		
Dichocladosporium chlorocephalum	0.09	1 L						
Fusarium			0.04	1 L	0.002	2 M	0.002	1 L
F. circinatum					0.001	1 L	0.001	1 L
F. chlamydosporum					0.0004	1 L		
F. semitectum					0.0004	1 L		
F. solani			0.04	1 L	0.0004	1 L		
F. subglutinans							0.001	1 L
Microascus brevicaulis	0.05	1 L						
Myrothecium roridum			0.04	1 L				
Neosartorya fumigata							0.001	1 L
Penicillium	0.73	5 H	0.51	3 M	0.002	3 H	0.004	2 M
P. aurantiogriseum			0.08	1 L				
P. digitatum	0.32	2 M	0.17	1 L				
P. expansum					0.0004	1 L		
P. glabrum	0.05	1 L						
P. italicum	0.09	2 M	0.13	2 M				
P. oxalicum					0.002	2 M	0.003	2 M
P. purpurogenum	0.23	1 L	0.13	1 L				
P. roquefortii							0.001	1 L
P. viridicatum	0.05	1 L						
Pleospora herbarum			0.04	1 L				
Quambalaria cyanescens	0.05	1 L			0.02	2 M	0.01	2 M
Setosphearia rostrata			0.04	1 L	0.001	2 M		
Stemphylium			0.04	1 L	0.0004	1 L		

Taxa	Citrus juice				Grape juice			
	DYM		DRC		DYM		DRBC	
	%CFU	F&O	%CFU	F&O	%CFU	F&O	%CFU	F&O
S. sarciniforme			0.04	1 L				
Stemphylium sp.157					0.0004	1 L		
Trichoderma harzianum			0.08	1 L				
Yeasts	95.42	5 H	91.60	5 H	99.39	6 H	99.14	6 H
Candida	3.44	2 M	4.16	2 M	80.22	3 H	71.41	2 M
C. cateulata	3.44	2 M	4.16	2 M				
C. prunicola					80.22	3 H	71.41	2 M
Cryprococcus	0.046	1 L			0.001	1 L	0.001	1 L
C. albidus							0.001	1 L
C. laurentii	0.046	1 L			0.001	1 L		
Debaryomyces pseudopolymorphus	2.29	2 M	0.76	2 M	0.001	1 L		
Geotrichum citri-aurantii	0.46	1 L	0.93	2 M				
Hanseniaspora occidentalis	1.42	2 M	0.64	2 M	0.23	2 M	0.49	2 M
Issachenkia orientalis	30.75	2 M	26.60	2 M	18.91	3 H	27.21	2 M
Pichia	57.01	3 M	56.42	4 H				
P. caribaea			0.13	1 R				
P. fermentans	57.01	3 M	56.26	4 H				
Rhodosporidium paludigenum					0.0004	1 L	0.001	1 L
Rhodotorula					0.03	3 H	0.01	3 H
R. glutinis					0.001	1 L		
R. muclaginosa					0.03	3 H	0.01	3 H
Sporidiobolus					0.0004	1 L	0.003	2 M
S. pararoseus							0.001	1 L
S. ruineniae					0.0004	1 L	0.002	1 L
Sporobolomyces roseus					0.002	1 L	0.01	1 L
Total CFUs (%)	436.4 (100)	8 H	471.4 (100)	8 H	50283.4 (100)	6 H	21931.2 (100)	6 H
No. of genera (27)	15		17		17		14	
No. of species (54)	23		26		29		22	

*F = Frequency of occurrence out of 8 samples for citrus juice and 6 samples for grapevine juice.
*O = Occurrence remarks for citrus juice: H = high, 4-8; M = moderate, 2-3; L = Low, 1 samples = For grapevine juice: H, 3-6; M, 2; L = 1 sample.

CONCLUSION

The present study reveals a positive correlation between abundance of certain groups of fungi and the substrates. Yeasts were dominant in both fruit juices with the leading species are *Pichia fermentans* in citrus juice, *Candida prunicola* in grape juice and *Issachenkia orientalis* in both. However, filamentous fungi predominated in both carposhere and carpoplane with *Cladosporium* predominating in both carposphere and *Aspergillus* section *Nigri* species in grape fruit carpoplane. This observation could be attributed to presence of sugars or sugar metabolites in the substrates that favours their establishment. Maure stage was more prone to fungal attack in both fruits, where the peaks of many probably pathogenic carpoplane fungi of both fruits were recorded, e. g. species of *Alternaria*, *Aspergillus* secion *Nigri*, *Fusarium*, *Phoma*, *Penicillium* and *yeasts*.

REFERENCES

Abarca, M. L., Accensi, F., Bragulat, M. R., Castellà, G., & Cabañes, F. J. (2003) *Aspergillus carbonarius* as the main source of ochratoxin A contamination in dried vine fruits from the Spanish market. *Journal of Food Protection, 66*, 504-506.

Abdel-Sater, M. A., & Saber, S. M. (1999) Mycoflora and mycotoxins of some Egyptian dried fruits. *Bulletin of the Faculty of Science Assiut University*, *28*, 91-107.

Abdel-Sater, M. A., Zohri, A. A., & Ismail, M. A. (2001) Natural contamination of some Egyptian fruit juices and beverages by mycoflora and mycotoxins. *Journal of Food Science &Technology*, 38(4), 407- 411.

Abrunhosa, L., Paterson, R. R. M., Kozakiewicz, Z., Lima, N., & Venâncio, A. (2001) Mycotoxin production from fungi isolated from grapes. *Letters in Applied Microbiology*, *32*, 240–242.

Ahmed, A., Dawar, S., & Tariq, M. (2010) Mycoflora associated with sugar cane juice in Karachi city. *Pakistan Journal of Botany*, *42*(4): 2955-2962.

Akinmusire, O. O. (2011) Fungal species associated with the spoilage of some edible fruits in Maiduguri Northern Eastern Nigeria. *Advances in Environmental Biology*, *5*(1), 157-161.

Al-Doory, Y. (1980) *Laboratory medical mycology*, pp. 240: 357-367 Lea Febiger Philadelphia Kimpton Publishers, London.

Amerine, M. A., Berg, H.W., Kunkee, R. E., Ough, C. S., Singleton, V. L., & Webb, A. D., (1980): The Technology of Wine Making, AVI Publishing Company,Westport, CT, pp. 154-185.

Arias, C. R., Burns, J. K., Friedrich, L. M., Goodrich, R. M., & Parish, M. E. (2002) Yeast species associated with orange juice: Evaluation of different identification methods. *Applied & Environmental Microbiology*, *68*, 1955–1961. http://dx.doi.org/doi:10.1128/AEM.68.4.1955-1961.2002

Bagwan, N. B. (2011) Aflatoxin B1 contamination in papaya fruits (*Carica papaya* L.) during postharvest pathogenesis. *Indian Phytopathology*, *64*(1), 48-50.

Barnett, J. A., Payne, R. W., & Yarrow, D. (2000) *Yeasts: characteristics and identification*, 3rd ed. Cambridge University Press, Cambridge, England.

Battilani, P., Pietri, A., Bertuzzi, T., Languasco, L., Giorni, P., & Kozakiewicz, Z. (2003) Occurrence of ochratoxin A-producing fungi in grapes grown in Italy. *Journal of Food Protection*, *66*, 633-636.

Bau, M., Bragulata, M. R., Abarcaa, M. L., Minguezb, S., & Cabañesa, F. J. (2005) Ochratoxigenic species from Spanish wine grapes. *International Journal of Food Microbiology*, *98*, 125-130. http://dx.doi.org/10.1016/j.ijfoodmicro.2004.05.015

Bellí, N., Bau, M., Marín, S., Abarca, M. L., Ramos, A. J., & Bragulat, M. R. (2006) Mycobiota and ochratoxin A producing fungi from Spanish wine grapes. *International Journal of Food Microbiology*, *111*, S40–S45.

Bibek, R., & Bhunia, A. (2004) Normal microbiological quality of foods and its significance. In: Ray B, Bhunia A, editors. *Fundamental food microbiology*. 4th ed. Boca Raton (FL): CRC Press; pp. 43-55.

Bioleti, F. T. & Croiess, W. V. (1912) Enological investigations. *California Agricultural Experiment Station Bulletins*, *230*, 1-118.

Cabañes, F. J., Accensi, F., Bragulat, M. R., Abarca, M. L., Castellá, G., Minguez, S., & Pons, A. (2002): What is the source of ochratoxin A in wine?. *International Journal of Food Microbiology*, *79*, 213-215.

Chanchaichaovivat, A., Ruenwongsa, P., & Panijpan, B. (2007) Screening and identification of yeast strains from fruits and vegetables: Potential for biological control of postharvest chilli anthracnose (*Colletotrichum capsici*). *Biological Control*, *42*, 326-335. http://dx.doi.org/10.1016/j.biocontrol.2007.05.016

Chanprasartsuk, O.-O., Prakitchaiwattana, C., Sanguandeekul, R., & Fleet, G. H. (2010) Autochthonous yeasts associated with mature pineapple fruits, freshly crushed juice and their ferments; and the chemical changes during natural fermentation. *Bioresource Technology*, *101*, 7500-7509. http://dx.doi.org/10.1016/j.biortech.2010.04.047

Combina, M., Mercado, L., Borgo, P., Elia, A., Jofre´, V., Ganga, A., Martinez, C., & Catanis, C. (2005) Yeasts associated to Malbec grape berries from Mendoza, Argentina. *Journal of Applied Microbiology*, 98, 1055–1061. http://dx.doi.org/10.1111/j.1365-2672.2005.02540.x

Cook, A.H. (1958): The chemistry and biology of yeasts. New York.

Crous, P. W., Braun, U., Schubert, K., & Groenewald, J. Z. (2007) The genus *Cladosporium* and similar dematiaceous hyphomycetes. *Studies in Mycology*, *58*, 1-253. http://studiesinmycology.org/content/58/1.toc

Daniel, H. M., Vrancken, G., Takrama, J. F., Camu, N., De Vos, P., & De Vuyst, L. (2009) Yeast diversity of Ghanaian cocoa bean heap fermentations. *FEMS Yeast Research*, *9*(5), 774-83. http://dx.doi.org/10.1111/j.1567-1364.2009.00520.x

Da Rocha Rosa, C. A., Palacios, V., Combina, M., Fraga, M. E., De Oliveira Rekson, A., Magnoli, C. E., & Dalcero, A. M. (2002) Potential ochratoxin A producers from wine grapes in Argentina and Brazil. *Food Additives & Contaminants*, *19*, 408-414. http://dx.doi.org/10.1080/02652030110092748

Deak, T., & Beuchat, L.R. (1993) Yeasts associated with fruit juice concentrates. *Journal of Food Protectection*, *56*, 777-782.

De Beer, Z. W., Begerow, D., Bauer, R., Pegg, G. S., Crous, P. W., & Wingfield, M. J. (2006) Phylogeny of the *Quambalariaceae* fam. nov., including important *Eucalyptus* pathogens in South Africa and Australia. *Studies in Mycology*, *55*, 289–298.

De Donno, A., Montagna, M. T., Erroi, R., Liaci, D., Sanapo, S., & Caggiano, G. (1998) Food products and fungal contamination. Note II. Study on moulds presence in pasteurized and fresh fruit juices. *Journal of Preventive Medicine & Hygiene*, *39*, 71-73.

De La Torre, M. J., Millan, M.C., Perez-Juan, Morales, J., & Ortega, J. M. (1999) Indigenous yeasts associated with *Vitis vinifera* grape varieties cultured in southern Spain. *Microbios*, *100*, 27-40.

Díaz, G. A., Torres, R., Vega, M., & Latorre, B. A. (2009) Ochratoxigenic *Aspergillus* species on grapes from Chilean vineyards and *Aspergillus* threshold levels on grapes. *International Journal of Food Microbiology*, *133*, 195–199. http://dx.doi.org/10.1016/j.ijfoodmicro.2009.04.018

Domsch, K. H., Gams, W., & Anderson, T.-H. (2007) *Compendium of soil fungi*. 2nd edition, IHW-Verlag, Eching.

El-Helaly, A. F., Ibrahim, I. A., Assawah, M. W., Elarosi, H. M., Abo-El-Dahab, M. K., Michail, S. H., Abd-El-Rehim, M. A., Wasfy, E. H., & El-Goorany, M. A. (1966) General survey of plant diseases and pathogenic organisms in the U. A. E. (Egypt) until 1965. *Alexandria Journal of Agricultural Research*, Alexanderia University Press, Alexanderia.

Ellis, M. B. (1971) *Dematiaceous hyphomycetes*. Commonwealth Mycological Institute, Kew, Surrey, England, 608 pp.

Ellis, M. B. (1976) *More dematiaceous hyphomycetes*. Commonwealth Mycological Institute, Kew, Surrey, England, 481 pp.

Elnaghy, M. A., Moubasher A. H., & Abdel-Fatah H. M. (1973) Pathogenisity of *Penicillium italicum* Wehmer and other fungi of Egyptian citrus fruits. *Assuit University Bulletin of Science & Technology*, *2*, 39-53.

El-Tabey Shehata, A. M. (1960) Yeasts isolated from sugar cane and its juice during the production of Aguardente de Cana. *Applied Microbiology*, 8, 73–75.

Fell, J. W., Boekhout, T., Fonseca, A., Scorzetti, G., & Statzell-Tallman, A. (2000) Biodiversity and systematics of basidiomycetous yeasts as determined by large-subunit rDNA D1/D2 domain sequence analysis. *International Journal of Systematic & Evolutionary Microbiology*, *50*(3), 1351-1371. http://dx.doi.org/10.1099/00207713-50-3-1351

Fredj, M. B., Chebil, S., Lebrihi, A., Lasram, S., Ghorbel, A., & Mliki, A., (2007) Occurrence of pathogenic fungal species in Tunisian vineyards. *International Journal of Food Microbioloy*, *113*, 245–250. http://dx.doi.org/10.1016/j.ijfoodmicro.2006.07.022

Gams, W., & Bissett, J. (1998) Morphology and identification of *Trichoderma* pp: 3- 34. In: *Trichoderma* and *Gliocladium* Vol. 1: Basic biology (eds. Kubicek C. P. and Harman G. E.).

Goto, S. (1980) Changes in the wild yeast flora of sulfited grape musts. *Journal of the Institute of Enology &Viticulture, Yamanashi University*, *15*, 29-32.

Goto, S., & Yokotsuka, I. (1977) Wild yeast populations in fresh grape musts of different harvest times. *Journal of Fermentation Technology*, *55*, 417- 422.

Grawmlich, T. R., Marcy, J. E., & Adams, J. P. (1986) Aseptically packaged orange juice and concentrate: a review of the influence of processing and packaging conditions on quality. *Journal of Agricultural & Food Chemistry*, *34*, 402–405. http://dx.doi.org/10.1021/jf00069a004

Grinbaum, A., Ashkenazi, I., Treister, G., Goldschmied-Requven, A., & Block, C. S. (1994) Exploding bottles: eye injury due to yeast fermentation of an uncarbonated soft drink. *British Journal of Ophthalmology*, *78*(11), 883.

Groenewald, M., & Smith, M. T. (2010) Re-examination of strains formerly assigned to *Hyphopichia burtonii*, the phylogeny of the genus *Hyphopichia*, and the description of *Hyphopichia pseudoburtonii* sp. nov. *International Journal of Systematic & Evolutionary Microbiology*, *60*(11), 2675-2680. http://dx.doi.org/10.1099/ijs.0.018580-0

Gupta, S. L. (1956) Occurrence of *Aspergillus carbonarius* (Bainier) Thom causing grape rot in India. *Scientific Culture*, 22, 167-168.

Haridy, M. S. A. (1994). Yeast spoilage of some soft fruits in El-Minia city, Egypt. *Bulletin of the Faculty of Science Assiut University*, *23*(1-D), 1329.

Hatcher, Jr., W. S., Parish, M. E., Weih, J. L., Splittstoesser, D. F., & Woodward, B. B. (2000) Fruit beverages. In: Downes, F.P., Ito, K. (Eds.), *Methods for the microbiological fxamination of foods.* American Public Health Association, Washington, DC, pp. 565–568.

Hatcher, W. J., Parish, M. E., Weihe, J., Splittstoesser, D., & Woodward, B. B. (2001) Fruit beverages. In: Downes FP, Ito K, eds. *Compendium of methods for the microbiological examination*. 4th ed. Washington (DC): American Public Health Association, pp. 565-568.

Hays, G. L. (1951) The isolation, cultivation and identification of organisms which have caused spoilage in frozen concentrated orange juice. *Proceedings of the Florida State Horticultural Society*, *64*, 135–137.

Ismail, M. A. (2006) Inhibitory effects of Na-hypochlorite and heating on the mycobiota associated with fruits or juice of passion (*Passiflora edulis* Sims) in Uganda. *Mycobiology*, *34*(2), 92–98. http://dx.doi.org/10.4489/MYCO.2006.34.2.092

Jarvis, W. R. & Traquair, J. A. (1984) Bunch rot of grapes caused by *Aspergillus aculeatus*, *Plant Disease*, *68*, 718-719.

Jay, J. N. (1970): *Modern food microbiology*. New York, van Nostrand Reinbold.

Jones, G. H. (1935) Egyptian plant diseases: A summary of research and control methods. Bulletin, Ministry of agriculture, Egypt, Technical and scientific surface, No. 146.

Kačániová, M. & Fikselová, M. (2007) Mycological flora on tree fruits, crust, leaves and pollen *Sorbus domestica* L. *Annals of Agricultural & Environmental Medicine*, *14*, 229-232. *http://www.aaem.pl/pdf/14229.pdf*

King, D. A., Hocking, A. D., & Pitt, J. I. (1979) Dichloran-rose bengal medium for enumeration and isolation of molds from foods. *Applied & Environmental Microbiology*, *37*, 959-964.

King, A. D., Hocking, A. D., & Pitt, J. I., (1981) The mycoflora of some Australian foods. *Food technology in Australia*, *33*:55-60.

Kurtzman, C. P. (2001). Six new anamorphic ascomycetous yeasts near *Candida tanzawaensis*. *FEMS Yeast Research*, *1*, 177-185. http://dx.doi.org/10.1111/j.1567-1364.2001.tb00032.x

Labuda, R., Krivánek, L. L., Tancinová, D., Mátéová, S., & Hrubcová, S. (2005) Mycological survey of ripped service tree fruits (*Sorbus domestica* L.) with an emphasis on toxinogenic fungi. *International Journal of Food Microbiology*, *99*, 215-223. http://dx.doi.org/10.1016/j.ijfoodmicro.2004.09.002

Las Heras-Vazquez, F. J., Mingorance-Cazorla, L., Clemente-Jimenez, J. M., & Rodriguez-Vico, F. (2003) Identinfication of yeast species from orange fruit and juice by RELP and sequence analysis of the 5.8S rRNA gene and the two internal transcribed spacers. *FEMS Yeast Research*, *3*, 3-9. http://dx.doi.org/10.1111/j.1567-1364.2003.tb00132.x

Leinberger, D. M., Schumacher, U., Autenrieth, I. B., & Bachmann, T. T. (2005) Development of a DNA microarray for detection and identification of fungal pathogens involved in invasive mycoses. *Journal of Clinical Microbiology*, *43*(10), 4943-4953. http://dx.doi.org/10.1128/JCM.43.10.4943-4953.2005

Leslie, J. F., & Summerell, B. A. (2006) *The Fusarium* laboratory manual. Blackwell Publishing: Iowa, USA. http://dx.doi.org/:10.1002/9780470278376

Logrieco, A., Bottalico, A., Mule, G., Morreti, A., & Perrone, G. (2003) Epidemiology of toxigenic fungi and their associated mycotoxins for some Mediterranean crops. – In: Xu X., Bailey J. A. & Cooke B. M. (eds.), *Epidemiology of mycotoxin producing fungi*, Dordrecht, pp. 654–667.

Loureiro, V., & Malfeito-Ferreira, M. (2003) Spoilage yeasts in the wine industry. *International Journal of Food Microbiology*, *86*, 23–50. http://dx.doi.org/10.1016/S0168-1605(03)00246-0

Magnoli, C., Violante, M., Combina, M., Palacio, G., & Dalcero, A. (2003) Mycoflora and ochratoxin-producing strains of *Aspergillus* section *Nigri* in wine grapes in Argentina. *Letters in Applied Microbiology*, *37*, 179–184. http://dx.doi.org/10.1046/j.1472-765X.2003.01376.x

Maldonado, M. C., Runco, R. S., & Navarro, A. R. (2005) Isolation, identification and antifungal susceptibility of lemon pathogenic and non pathogenic fungi. *Revista Iberoamericana de Micologia*, *22*, 57-59.

Medina, A., Mateo, R., Lopez-Ocana, L., Valle-Algarra, F. M., & Jimenez, M. (2005) Study of Spanish Grape Mycobiota and Ochratoxin A Production by Isolates of *Aspergillus tubingensis* and Other Members of *Aspergillus* Section Nigri. *Applied & Environmental Microbiology*, *71*(8), 4696–4702. http://dx.doi.org/10.1128/AEM.71.8.4696-4702.2005

Melchers, L. E. (1931) A check list of plant diseases and fungi occurring in Egypt. *Transaction of the Kansas academe of science*, *34*, 41-106.

Melki Ben Fredj, S., Chebil, S., Lebrihi, A., Lasram, S., Ghorbel, A., & Mliki, A. (2007) Occurrence of pathogenic fungal species in Tunisian vineyards. *Interational Journal of Food Microbiology*, *113*, 245-250. http://dx.doi.org/10.1016/j.ijfoodmicro.2006.07.022

Mendoza, S., Montemayor, L., Boscan, L. A., & Barreiro, J. A. (1982) Microflora in pasteurized fruit juices in Venezuela. *Archivos latinoamericanos de nutrición, 32* (3), 617–629.

Morais, P. B., Martins, M. B., Klaczko, L. B., Mendonca-Hagler, L. C., & Hagler, A. N. (1995) Yeast Succession in the Amazon Fruit *Parahancornia amapa* as Resource Partitioning among *Drosophila* spp. *Applied & Environmental Microbiology 61*(12): 4251–4257.

Moubasher, A. H. (1993) *Soil fungi in Qatar and other Arab countries*. The Scientific and Applied Research Center, University of Qatar, Doha, pp. 566.

Moubasher, A. H., Elnaghy, M. A., & Abdel-Fatah, H. M. (1971) Citrus plantation fungi in Upper Egypt. *Transactions of the British Mycological Society*, *57*(2), 289-294. http://dx.doi.org/10.1016/S0007-1536(71)80011-6

Moubasher, A. H., Abdel-Sater, M. A., & Zeinab Soliman (2016) Biodiversity and molecular characterization of yeast and filamentous fungi in the air of citrus and grapevine plantations in Assiut area, Egypt. *Mycosphere*, *7*(3), 236-261. http://dx.doi.org/10.5943/mycosphere/7/3/1

Nair, N. G. (1985) Fungi associated with bunch rot of grapes in the Hunter Valley. *Australian Journal of Agricultural Research*, *36*, 435-442. http://dx.doi.org/10.1071/AR9850435

Nazim, S., Dawar, S., Tariq, M., & Zaki, M. J. (2008) Quantitative estimation of mycoflora in drinking water and fruit juices of Karachi. *Pakistan Journal of Botany*, *40*(3): 1263-1268.
Nisiotou, A. A. & Nychas, G-J. E. (2007) Yeast populations residing on healthy or *Botrytis*-infected grapes from a vineyard in Attica, Greece. *Applied & Environmental Microbiology*, *73*(8), 2765–2768. http://dx.doi.org/10.1128/AEM.01864-06
Norin, I., & Rumpunen, K. (2003) Pathogens on Japanese Quince (*Chaenomeles japonica*) Plants. In: Rumpunen K. (Ed.) Japanese Quince. Potencial. Fruit Crop for Northern Europe, Kristianstad, Sweden, pp. 37-58.
Ostry, V., Škarkova, J., Prochazkova, I., Kubatova, A., Malir, F., & Ruprich, J. (2007) Mycobiota of Czech wine grapes and occurrence of ochratoxin A and *Alternaria* mycotoxins in fresh grape juice, must and wine. *Czech Mycology*, *59*(2), 241–254.
Parish, M. E., & Higgins, D. P. (1989) Yeasts and molds isolated from spoiling citrus products and by-products. *Journal of Food Protection*, *52*, 261-263.
Parish, M. E., & Higgins, D. P. (1990) Investigation of the microbial ecology of commercial grapefruit sections. *Journal of Food Protection*, *53*, 685-688.
Phaff, H. J. (1990) Specific habitats of yeasts and their isolation. *USFCC Newsletter*, *18*(4), 11-12.
Phaff, H. J. & Starmer, W. T. (1987) Yeasts associated with plants, insects and soil. In: Rose A. H. and Harrison J. S. (eds.), *The yeasts, biology of the yeasts* (Vol. 1), New York: Academic Press, pp 123–180.
Phister, T. G., Rawsthorne, H., Lucy Joseph, C.M., & Mills. D. A. (2007) Real-Time PCR assay for detection and enumeration of *Hanseniaspora* species from wine and juice. *American Journal of Enology & Viticulture*, *58*, 229-233.
Pitt. J. I. (1979) The Genus *Penicillium* and its Teleomorphic States *Eupenicillium and Talaromyces*. Academic Press, London, 635 pp. http://dx.doi.org/10.1002/jobm.19810210822
Pitt. J. I., & Hocking. A. D., (2009) *Fungi and food spoilage*, 3rd edition, Blackie Academic and Professional, London. http://dx.doi.org/10.1007/978-0-387-92207-2
Prada, G. M., & Pagnocca, F. C. (1997) Ascomycetous yeasts associated with naturally occurring fruits in a tropical rain forest. *Folia Microbiologica*, *42*(1), 39-46. http://dx.doi.org/10.1007/BF02898644
Prakitchaiwattana, C. J., Fleet, G. H., & Heard, G. M. (2004) Application and evaluation of denaturing gradient gel electrophoresis to analyse the yeast ecology of wine grapes. *FEMS Yeast Research*, *4*, 865–877. http://dx.doi.org/10.1016/j.femsyr.2004.05.004
Raper, K. B., & Fennell, D. I. (1965) *The genus Aspergillus*. Williams & Wilkins Co., Baltimore, pp. 686.
Raspor, P., Milek, D. M., Polanc, J., Mozina, S. S., & Cadez, N. (2006) Yeasts isolated from three varieties of grapes cultivated in different locations of the Dolenjska vine-growing region, Slovenia. *International Journal of Food Microbiology*, *109*, 97–102. http://dx.doi.org/10.1016/j.ijfoodmicro.2006.01.017
Ribereau-Gayon, P., Dubourdieu, D., Doneche, B., & Lonvaud, A. (2005) Cytology, taxonomy and ecology of grape and wine yeasts, p. 40–43. In *Handbook of enology* (vol. 1), *The microbiology of wine and vinifications*. John Wiley & Sons, New York, NY.
Rifai, M. (1969). A revision of the genus *Trichoderma*. *Mycological Papers*, *116*, 1-56.
Ritenour, M. A., Zhang, J., Wardowski, W. F., & Brown, G. E. (2003) Postharvest decay control recommendation for Florida citrus fruit. Internet report, Florida State Univeresity/IFAS Extension, *http://edis.ifas.ufl.edu/CH081*
Robbs, P. G., Hagler, A. N., & Mendonça-Hagler, L. C. (1989) Yeasts associated with pineapple plantation in Rio de Janeiro, Brazil. *Yeast*, *5*, 485–489.
Rotem, J., & Aust, H. J. (1991) The effect of ultraviolet and solar radiation and temperature on survival of fungal propagules. *Journal of Phytopathology*, *133*, 76-84. http://dx.doi.org/10.1111/j.1439-0434.1991.tb00139.x
Sabate, J., Cano, J., Esteve-Zarzoso, B., & Guillamon, J. M. (2002) Isolation and identification of yeasts associated with vineyard and winery by RFLP analysis of ribosomal genes and mitochondrial DNA. *Microbiological Research*, *157*, 267–274. http://dx.doi.org/10.1078/0944-5013-00163
Sage, L., Krivobok, S., Delbos, É., Seigle-Murandi, F., & Creppy, E. E. (2002) Fungal flora and ochratoxin A production in grapes and musts from France. *Journal of Agricultural & Food Chemistry*, *50*, 1306-1311. http://dx.doi.org/10.1021/jf011015z
Samson, R. A., & Varga, J. (2007) *Aspergillus* systematics in the genomic era. *Studies in Mycology*, *59*, 1-206.
Schroers, H.-J. (2001) A monograph of *Bionecteria* (Ascomycota, Hypocreales, Bionecteriaceae) and its *Clonostachys* anamorphs. *Studies in Mycology*, *46*, 1-214.
http://www.cbs.knaw.nl/publications/CBSPublicationDetails.aspx?Rec=1046
Scorzetti, G., Fell, J. W., Fonseca, A., & Statzell-Tallman, A. (2002) Systematics of basidiomycetous yeasts: a comparison of large subunit D1/D2 and internal transcribed spacer rDNA regions. *FEMS Yeast Research*, *2*(4), 495-517. http://dx.doi.org/10.1111/j.1567-1364.2002.tb00117.x
Seifert, K., Morgan-Jones, G., Gams, W., & Kendrick, B. (2011) *The genera of hyphomycetes*. CBS-KNAW Fungal Biodiversity Centre, Utrecht, The Netherlands, pp. 997.
Selouane, A., Zouhair, S., Bouya, D., Lebrihi, A., & Bouseta, A. (2009) Natural occurrence of ochratoxigenic *Aspergillus* species and ochratoxin A in Moroccan grapes. *World Applied Sciences Journal*, *7*(3), 297-305.
Serra, R., Abrunhosa, L., Kozakiewicz, Z., & Venâncio, A. (2003) Black *Aspergillus* species as ochratoxin A producers in Portuguese wine grapes. *International Journal of Food Microbiology*, *88*, 63-68. http://dx.doi.org/10.1016/S0168-1605(03)00085-0
Serra, R., Braga, A., & Venâncio, A. (2005) Mycotoxin-producing and other fungi isolated from grapes for wine production, with particular emphasis on ochratoxin A. *Research in Microbiology*, *156*, 515–521. http://dx.doi.org/10.1016/j.resmic.2004.12.005
Serra, R., Mendonc¸A. C., & Venañcio, A. (2006) Fungi and ochratoxin A detected in healthy grapes for wine production. *Letters in Applied Microbiology*, *42*, 42–47. http://dx.doi.org/10.1111/j.1472-765X.2005.01805.x
Sivanesan, A. (1987) Graminicolus species of *Bipolars*, *Curvularia*, *Drecshlera*, *Exserohilum* and their teleomorphs. International Mycological Institute, Kew. *Mycological Papers*, *158*, 1-26.
Skinner, F.A., Passmore, S.M., & Davenport, R. R. (1980) *Biology and activities of yeasts*. Academic Press, London.
Smith, N. I., & Dawson, V. T. (1944) The bacteriostatic action of rose Bengal in media used for the plate counts of fungi. *Soil Science*, *58*, 467-471.
Snowdon, A. L. (1990) *A colour atlas of post-harvest diseases and disorders of fruit and vegetables. I. General Introduction and Fruits*. Wolfe Scientific, London, pp. 256.
Splittstoesser, D. F. (1987) Fruits and fruit products. In: Beuchat, L. (Ed), *Food and beverage mycology*. Van Nostrand Reinhold, New York, pp. 101-128.
Stratford, M., Hofman, P. D., & Cole, M. B. (2000) Fruit juices, fruit drinks and soft drinks. In T*he Microbiological Safety and Quality of Food*, pp. 836-69. Edited by Lund, B. M., Baird-Parker, A. C., & Gould, G. W., Gaithersburg, MD: Aspen Publishers.
Suh, S.-O., Zhang, N., Nguyen, N., Gross, S., & Blackwell, M. (2008) *Lab manual for yeast study.* Mycology Lab. Louisiana State University pp. 3-38.
Tang, A. M. C., Hyde, K. D., & Corlett, R. T. (2003) Diversity of fungi on wild fruits in Hong Kong. Fungal Diversity 14: 165-185.
Teller K. H. and Parish M. H. (1992) Microbially produced off flavors in orange juice. *Proceedings of the Florida State Horticultural Society*, *105*, 144–146.
Tjamos, S. E., Antoniou, P. P., Kazantzidou, A., Antonopoulos, D. F., Papageorgiou, I., & Tjamos, E. C. (2004) *Aspergillus niger* and *Aspergillus carbonarius* in Corinth raisin and wine-producing vineyards in Greece: population composition, ochratoxin A production and chemical control. *Journal of Phytopatholoy*, *152*, 250-255. http://dx.doi.org/10.1111/j.1439-0434.2004.00838.x
Tournas, V. H., & Katsoudas, E. (2005) Mould and yeast flora in fresh berries, grapes and citrus fruits. *International Journal of Food* Microbiology, *105*, 11-17. http://dx.doi.org/10.1016/j.ijfoodmicro.2005.05.002
Tournas, V.H., Heeres, J., & Burgess, L. (2006) Moulds and yeasts in fruit salads and fruit juices. *Food Microbiology*, *23*: 684-688. http://dx.doi.org/10.1016/j.fm.2006.01.003
Uhitil, S., Hadina, S., Granic, K., & Jaksic, S. (2009) Prevalence of *Candida* species in the fresh fruit juices. *Arhiv za Higijenu Rada i Toksikologiju*, *60*, 443-447. http://dx.doi.org/10.2478/10004-1254-60-2009-1991
Valero, A., Sanchis, V., Ramos, A. J., & Marín, S. (2007) Studies on the interaction between grape-associated filamentous fungi on a synthetic medium. *International Journal of Food Microbiology*, *113*(3), 271-276. http://dx.doi.org/10.1016/j.ijfoodmicro.2006.08.001
Whiteside, J. O. (1976) A newly recorded *Alternaria*-induced brown spot disease on Dancy tangerines in Florida. *Plant Disease Reporter*, *60*, 326–329.
Wickerham, L. J. (1951) Taxonomy of yeasts. Tech. Bull. Nr. 1029 Dep. Agr., Washington D.C.
Zare, R., & Gams, W. (2004) A monograph of *Verticillium* section *Prostrata*, *Rostaniha* (*Botanical Journal of Iran*), *3*, 1-180.