Microbiological studies on the microorganisms contaminating tomato fruits and methods of control and elongating keeping quality

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summaryTomato (Lycopersicon esculentum L.) is one of the most importantvegetable crops in Egypt.Tomato fruit rot,mainly due to micro-organisms contaminating fruitsurface is the essential obstacle facing the nowadays projects planning ofthe yield production and exportation . The present investigation wasplanned to study the micro-organisms contaminating tomato fruits surfaceand to determine the organisms of tomato fruit rot during storage and thefactors affecting the spread of the rot and the possible means of tomatofruit rot control especially during handling.transit and/or storage.The results of this investigation can be summarized in the following:1- The total microbial count and fungi count increased by increasing thestage of fruit maturity with the minimum values in case of green fruits andmaximum values in the red picking stage of fruits maturity.2~ Washing tomato fruits with water caused a great reduction in the totalmicrobial count. This reduction was enhanced by sterilizing fruit surfacewith alcohol (95%).3~ 128 fungal isolates belonging to different genera were isolated fromtomato fruit surface. The most important genera were Alternariasp.,Fusarium sp.,Geotrichum sp.,Penicillium sp.Aspergillus sp.,Rhizopussp. and Yeast.Also 32 bacterial isolates were obtained referring to genera Bacillussp.,Erwinia sp.Sarcina and streptomyces:4- Morphological studies of the micro-organisms were done. Pathogenicitytests were determined to the fungal and bacterial isolates.5- All the highly pathogenic micro-organisms were able to utilize pectin asa sole source of carbon. However Fusarium sp. gave the best lineargrowth on both normal and pectin media followed by Alternariasp.•Geotrichum sp. and the lowest one was Penicillium sp .. As for thebacterial isolates, Erwinia sp. gave the best growth followed by Bacillussp.(3),Baci/lus sp.(4),Bacillus sp.(l) and finally Bacillus sp.(2).6- The highest percentage ofloss of weight of filter paper (as a source ofcellulose) was recorded by Alternaria sp.(l), followed byAlternariasp.(2),Fusarium sp.~enicillium sp.,Hrwinia sp,Geotrichum sp.,Bacillussp.(2),Bacil/us sp.(3),Bacillus sp.(l) and Bacillus sp. (4), resectively.7- The highest rate of reduction in viscosity (production of pectolyticenzymes was recorded by Alternaria sp. (1) [96.0780/0], followed byErwinia sp. [94.413%] ,Alternaria sp. (2) [93.855%] , Fusarium sp. [92.830°,101.Geotrichum sp. [92/5240/0], Bacillus sp.(3) [88.782%], Bacillussp.(l)[84.849%j,BaciJlus sp.(2)l81.818%J,Penicillium sp.[70.082%J andBacillus sp.(4)[63.1320/o] after seven hours.8- The highest rate of reduction in viscosity of carboxymethyl celluloseliquid medium (production of cellulase enzyme) was recorded byAlternaria sp.(2) [95.074%], followed by Bacillus sp.(3) (89.6550/0],Alternaria sp.(l)[82.962°IOJ Erwinia sp. [82.2700/0J,Fusariumsp.l78.641 %],Bacil/us sp.(4)(72.995%],Bacillussp.(1)[69.7670/o],BaciJlussp.(2)[66.4440loj,Geotrichum sp.[59.4060/oJ and finally Penicillium sp.[32.995 J.9- Storing tomato fruits at 5°C and 15°C delayed the rot and reduced thepercentage and rate of tomato fruit infection. But at 25-30°C the fruit rotwas early and rapid.10- Coating tomato fruits with food oil caused a reduction in the rate andpercentage of infection . This was true for control (un-infected) andinfected tomato fruits.11- Balady tomato fruits were more susceptible to infection by thedifferent micro-organisms causing tomato fruit rot under the study thanBetu 86 tomato fruits.12- The highest rate of infection was recorded in wounded with theelimination of pedicel of tomato fruits in the red picking stage of fruitmaturity after 10 days of

storage. the highest rate and percentage ofinfection of both varieties were recorded in the fruits which were pickedin the red picking stage of maturity.13- The presence ofpedicels in the two tomato varieties,i.e., Malady andBetu 86, seemed to reduce both the rate and percentage of tomato fruitinfection by the different studied mlcro-organisms.14- The presence of wounds on tomato fruits was found to increase thewidespread of tomato fruit rot. The effect was pronounced in case ofBalady variety tomato fruits.15- Tomato fruit infection reduced the total soluble solids content oftomato fruits. The highest rate of reduction was recorded by Bacillussp.,Allernaria sp.(2),Fusarium sp.,Erwinia sp. and Alternaria sp. (1).16- Ascorbic acid content of tomato fruit was reduced by increasing thestorage period of both healthy and infected tomato fruits. Fruit rot causedgreater reduction in the ascorbic acid content of tomato fruits and thehighest rate of reduction was recorded by Alternaria sp.(l).17- The pH value of tomato fruit juice of the infected fruits increased overthe control (healthy fruits) level during different periods of storagereaching their maximum values after four weeks of storage.18- The different sugar fractions (total soluble sugars,reducing sugars andnon-reducing sugars) content of tomato fruits were found to decrease byincreasing the storage period for both healthy and infected tomato fruitsand the rate of reduction was more pronounced in the infected fruits anddiffered according to the type of micro-organism used and the period ofstorage.19- Total nitrogen content of both healthy and tomato infected fruits wasfound to be reduced during the different periods of storage and the rate ofreduction in the infected tomato fruits was more than that of the healthyfruits.20- Boric acid delayed tomato fruit rot for two weeks when used in aconcentration of 0.6°,/0..21- Ascorbic acid when used in 0.30% concentration prevented theappearance of tomato fruit rot during the first two weeks of storage.22- Acetic acid reduced tomato fruit rot more than citric acid and sodiumcitrate. Also sodium acetate was effective in decreasing tomato fruit rotduring storage.23- Sandofan M8 reduced tomato fruit rot and prolonged the storageperiod till three weeks storage period. B~ Tri-Miltox forte was found to23- Sandofan M8 reduced tomato fruit rot and prolonged the storageperiod till three weeks storage period. But,Tri-Miltox forte was found tobe effective than Sndofan M8 and reduced the tomato fruit rot duringstorage for about four weeks.24- Tetracycline in the concentration of 1000-1500 mg/L prevented theappearance of tomato fruit rot during two weeks of storage for the controltreatment,and only for one week in case of tomato fruits infected with thedifferent micro-organisms causing tomato fruit rot under the study.25- The highest concentration of turnip extract (1: 1)[volume by volumewith water] reduced greatly the percentage and rate of infection of tomatofruits caused by the different micro-organisms under the study.At the end of this study the author introduces the followingrecommendations to prolong the keeping quality of tomato fruits inthe local markets and during exportation:1- The author recommends the cultivation of tomato varieties wbichare more resistant to pathegens such as Betu 86 variety.2- Pickin= tomato fruits at the =reenish-red stage of maturity.3- Washing tomato fruits will decrease the microbial load on thesurface of tbe fruits.4- The most suitable temperature for tomato fruit storage is 5-15CO.5- Tomato fruits must be barvested with their pedicels.6- Avoid wounding of tomato fruits is·of great importance to preventrot and prolong keeping quclity.7- Tomato fruits must be wrapped in paper immerssed in somecbemicals sucb as acetic acid to be more suitable for exportation.Andturnip extract 1:1 (vlvl could be used for the same purpose.8- The author recommends further studies in future on natunl edibleplant extracts to be used for dipping tomato fruits or immenioD ~f thepaper to be used in rapiD~ to.ato fruits to prolong the keepingquality in the local markets and during eIportation.