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Antimicrobial Inhibition Activity of Some Plant Oil Extracts (Syzygium aromticum , Cinnamomum zeylanicum and Citrus limon)

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Abstract
The be done study impression concentrations different from of Extraction essential oils some of the plants clove (Syzygium aromticum L.), Cinnamon (Cinnamomum zeylanicum) and lemon (Citrus limon) against isolations bacterial and which included(Staphylococcus aureus, Escherichia coli, Micrococcus roseus, Serratia sp) and isolations fungals (Penicillium sp. Rhizopus sp. Fusarium sp., Aspergillus niger) where showed results if extract essential of clove got high inhibition against bacterial ,comparison with extract essential of lemon .Were rate inhibition extract oil of clove against bacterial at concentration 0.1, 8.98%, 10,67%, 9.48%, 11.54% mg/ml on respectively and against fungal 18.24%, 17,84%, 15.08%, 16.15% mg/ml on respectively while extract of lemon were rate inhibition low from inhibition extract of clove and got inhibition complete against bacterial and fungal extract essential of clove at concentration 1,2.5,5 mg/ml while got inhibition complete against bacterial and fungal extract essential of lemon at concentration 2.5,5 mg/ml while got inhibition complete against fungal extract oil Cinnamon at concentration 1,2.5,5 mg/ml . where showed results if extract oil Cinnamon got high inhibition against fungal ,comparison with extract oil clove and lemon.
Keywords: Extract oils, plant ,clove ,lemon, Cinnamon, antimicrobia

I. Introduction

Essential oils of herbs also celled mixture of volatile compounds or ethereal oils which products from secondary metabolites of aromatic plants as protect mechanism against microorganisms[9] .Major compounds of these Eos are terptene, aldehydes, hydrocarbons , alcohols, phenols, esters ,ketones and organic acids are terpene, hydrocarbons, alcohols, aldehydes, ketones, phenols, esters and organic acids with different concentrations. Many application in food, flavoring and preservation , the antimicrobial properties of food, EOs growth demand on antimicrobial for keeping on foods from . Eos is using in food industry as flavouring agents (Suganya *et al.,* 2012 ;Santurio *et al.,* 2014)

Several types and herbs extract antibacterial influences because to their EOs parts. EOs of antimicrobial activity some plants medicinal such clove, garlic, thyme, rosemary and oregano against both bacterial and molds. The structure ,composition, added for functional groups of the EOs play an major and important role in determining biological properties (Rasool,2013).The interesting of essential oils, as natural additives, and their application in food industry or food flavoring and keeping have received increasing attention. Require knowledge detailed about chemical composition in application and their antimicrobial effect against food borne pathogens (El-Shenawy *et al.,* 2015).

1.1 Clove (***Syzygium aromticum L.***) Myrtaceae family. Clove use in medicinal application by humans from more 2000 years, used widely of plants medicinal to disinfect root canals in temporary fillings like the oil of clove possess a large range of biological properties and therapeutic activity including antioxidant, antimicrobial , antifungal, antispasmodic, antiemetic , antiseptic, antiviral , aphrodisiac with stimulant properties and that characters other for oil clove which including using as insect repellent, expectorant, ingredient ,perfume, flavoring agent ,ingredient soap and massage.. The extract and EOs of clove that number of application to relieve to promote healing and pain ,anti-aging, arthritis ,cardiovascular disease, infections(bacterial, fungal and viral ,parasitic, hepatitis, skin) ,digestive problems(vomiting, diarrhea, nausea) skin cancer. Component the chemical major of structure clove which called Eugenol comprises 72-90% EOs (Javed *etal*,2012;Abd-el-Kader and Halawani, 2014;Al-Mahna and Abd-AlHussein ,2014).

2.1 cinnamon **(*Cinnamomum zeylanicum*)** Shaeffer is sometime called true cinnamon or Ceylon cinnamon belonging to the family Lauraceae . Its grow in east and south east of Asia to Australia .Cinnamon is an evergreen tree reaching about nine meters in high and it is covered with a smooth , pale bark. Cinnamon can be used as spice because of its sweet flavoring and spicy characteristics , and it also plays an important role in pharmacological effects such as :antiinflammation, antimicrobial , antioxidant ,antidiabetes type 2 antispasmodic , antiulcer, and cytotoxic properties (Shareef,2011) .Cinnamon is mainly used in the aroma and essenceindustries due to its fragrance, which can be incorporated into different varieties of foodstuffs, perfumes, andmedicinal products The most important constituents of cinnamon are cinnamaldehyde and *trans*-

cinnamaldehyde (Cin), which are present in the essential oil, thus contributing to the fragrance and to the various biological activities observed with cinnamon, The essential oils and some of the major compounds present in cinnamon, including (E)-cinnamaldehyde, eugenol, and linalool, were investigated in reference to peroxynitrite induced nitration and lipid peroxidation (Rao,2014). Antimicrobial activity of herbs which containing essential oils against foodborne pathogens, such as *Salmonella typhimurium*, *Escherichia coli*, *Listeria monocytogenes*, *Bacillus cereus* and *Staphylococcus aureus* (Klimešová,2015).

3.1 Lemon ***(Citrus limon)*** Lemon is family *Rutaceae* .Lemon name common in India and China. Lemon is a pale the yellow color . Citrus fruit components contain in general of vitamins , carbohydrates ,lipids, minerals, flavonoids, carotenoids ,bitter compounded chemical lemonoids and volatile compounds .Antimicrobial activity of the peel extract for lemon exhibit activity inhibition high against bacteria (Pandey *etal,*.2011).The Citrus peels contain high quantity of phenolic compounds including several flavonoid compounds and essential oils are known to exhibit various or of large range of biological activities such antimicrobial and antioxidant activities and peel of *Citrus* fruits rich source of compounds volatile oils , flaovnoid glycosides ,alkaloids and sitosterol glycisids (Dhanavade etal,.2011).The EOs ability on antimicrobial specially Citrus oils (lemon)showed good antibacterial activity and extract of lemon natural antimicrobials for food application and anti-oxidant, antifungal, antiviral, carminative and insect repellent (Roy *etal,*.2012).

2. Methods

2.1 Collection Of Fruit Peels

The Clove (***Syzygium aromticum L.***), cinnamon **(*Cinnamomum zeylanicum*)** and Lemon ***(Citrus Limon)*** were purchased from market in Amahara .Misan Governorate ,lraq

2.2 Microorganisms Uses In Studying

Uses in this study isolations Microorganisms different from isolations bacterial diseases *Staphylococcus aureus*, *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp. and use organisms testing Microorganisms detection activity inhibition of Extraction essential oils and source this isolations from Department Sciences Biology/College Sciences /University Misan. Uses in this study isolations Microorganisms different from isolations fungals and use organisms testing Microorganisms detection activity inhibition of Extraction essential oils and source this isolations *Penicillium sp. Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* from Department Sciences Biology/College Sciences /University Misan.

2.3 Preparation Of Extraction Essential Oils

The extraction of essential oils from peel lemon fresh , cinnamon bark and cloves bud flower dried and was performed by water Distillation or hydro-distillation in a Clevenger apparatus the weight of 50 g from peel clove and lemon flesh for dry after dried mill for powdered immersed with flask in 250 ml water 3-4 h, ,of the EOs in small opaque bottles(Ranjitha and Vijiyalkshmi,2014).

2.4 Evaluation of antimicrobial Activity

The antimicrobial of the clove, cinnamon and lemon extract essential oils were used the methods diffusion presence of antibacterial and antifungal activities (Perez etal,.1990).Effect EOs of clove, cinnamon and lemon by method diffusion plate .Preparation volumes different from extract of oils media N.B and PDA with concentration different .Prepared at 0.1 ,0.2 ,0.4 ,0.5 ,1 ,2.5 and 5 mg/ml concentration different from essential oils Inhibition bacterial and fungal discs were taken from the margins of 7 days old culture and placed on incubated at 28±2°C for 7 days .Calculated by formula given by Djordjevic *etal,*.(2013).
(Percent inhibition(%) $=gc - gt/\mathrm{gc}x100$)

2.5 Statistical Analysis:

Data regarding two parameters(concentration and medicinal plants) were analyzed statistically using SAS program with completely randomized design (CRD). Inhibition of radial of bacterial and fungal fungal growth was examined using analysis of variance(ANOVA) and means were compared by the test of least germination of bacterial and fungal.

3. Results and Discussion

3.1 Inhibition Bacterial Extraction Oil Clove

Showed Table(1)and fig (1) ability oil clove on Inhibition bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp and got Inhibition low at concentration 0.1mg/ml against bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus* , *Serratia* sp of rate Inhibition reach 8. 98% , 10.67%, 9.48% , 11.54% on respectively. too got Inhibition complete rate 100% at concentrations 1, 2.5, 5

mg/ml against bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp was low of rate Inhibition against bacteria *Staphylococcus aureus* rate 8. 98% , 30.66% , 64. 89% , 75. 79% , at concentrations 0.1,0.2,04,0.5 mg/ml on respectively. was high of rate Inhibition against bacteria *Serratia* sp rate 11.54% , 35.09% , 72. 03% , 86.67% , at concentrations 0.1,0.2,04,0.5 mg/ml on respectively were found significant ($p<0.05$) between concentration. The inhibitory activity of clove extract can be explained because to the present of several constituents or compound active mainly which include eugenol, terpenes, flavones, glycosides of phenolic among other elements , the components with phenolic structure such as eugenol are highly active against the test microorganisms(Nzeako etal,.2006).Extract oil clove to possess compound active used in antimicrobial and preparation types food as flavor enhancers and in plant medicine also extract oil clove showed activity against *streptococcus mutans mutans* (Al-Mohana and Abd-AlHussein,2014; Salih *et al* ,2014).Was approximate this result of the (Rasool, 2013) at this study the effect the extract plants medicinal for antibacterial . Compared the efficacy of types against between bacteria gram positive and negative. Shown extract of types for plants medicinal such (cloves, lemon) highest inhibition against bacteria gram negative while were more sensitive bacteria gram positive of extract for plan medicinal of types than gram negative due the components and organization for differences of the structure cell wall (Shihabudeen *et al*., 2010).

3.2 Inhibition Fungal Extraction Oil Clove

Showed Table(2)and fig (2) ability oil clove on Inhibition fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* and got Inhibition low at concentration 0.1mg/ml against fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* of rate Inhibition reach 18.24%15.08%, 17.84% , 16.15% on respectively. too got Inhibition complete rate 100% at concentrations 1, 2.5, 5 mg/ml against fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* .was low of rate Inhibition against fungal *Fusarium* sp. rate 15.08%, 32.10% , 80.45% , 82.3% at concentrations 0.1,0.2,04,0.5 mg/ml on respectively. was high of rate Inhibition against fungal *Penicillium* sp. rate 18.24% , 55.33% , 90.40% , 92.68% , at concentrations 0.1,0.2,04,0.5 mg/ml on respectively were found significant ($p<0.05$) between concentration. Oil clove constituent of Chemical compound is (eugenol) is effect of kill , damage the cells, vegetative cell of bacteria and spores by causing membrane , denaturation protein and inhibition of enzyme activities .(Thirach et al., 2003).His the result approximate (Pinto *et al.,* 2009) at this study the extract oil clove and exhibited wide range antifungal activity .

3.3 Inhibition Bacterial Extraction Oil cinnamon

Showed Table(3)and fig (3) ability oil cinnamon on Inhibition bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp and got Inhibition low at concentration 0.1mg/ml against bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp of rate Inhibition reach 11.12% , 13.63%, 12.84% , 15.67% on respectively. too got Inhibition complete rate 100% at concentrations 2.5, 5 mg/ml against bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp was low of rate Inhibition against bacteria *Staphylococcus aureus* rate 11.12% , 38.34%, 67.19% ,79.41%, at concentrations 0.1,0.2,04,0.5 mg/ml on respectively were found significant ($p<0.05$) between concentration. The antimicrobial activity of the EO of *Cinnamomum zeylanicum* has been related to its cinnamaldehyde content , though cinnamaldehyde-containing oils (non-phenolic) showed lower antimicrobial activities than eugenol oils Most of the antimicrobial activity in EOs is found in the oxygenated terpenoids (e.g., alcohols and phenolic terpenes), while some hydrocarbons also exhibit antimicrobial effects . Interactions between these components may lead to antagonistic, additive or synergistic effects. Some studies have demonstrated that whole EOs usually have higher antibacterial activity than the mixtures of their major components In recent years, there has been an increased interest in the use of natural antimicrobial agents thus the use of these combinations are strategies to control food-borne bacteria and other pathogenic microorganisms(Bassolé,2012).

EO with a potent antimicrobial activity Although the oil from different parts of the world has shown great diversity in chemical composition, it comprises mainly of trans-cinnamaldehyde as the major component (47-71%). The strong antibacterial and antifungal activity of the dominant constituents were trans-cinnamaldehyde (79.73%), linalool (4.08%), cinnamaldehyde para-methoxy (2.66%), eugenol (2.37%) and trans-caryophyllene (2.05%). Phenylpropanoids were the major class of compounds in the essential oil (81.7%) Cinnamon oil exhibited antibacterial effect against contaminating microorganisms (Vazirian,2015).

3.4 Inhibition Fungal Extraction Oil cinnamon

Showed Table(4)and fig (4) ability oil cinnamon on Inhibition fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* and got Inhibition low at concentration 0.1mg/ml against fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* of rate Inhibition reach 22. 78% , 17.21%, 20.56% , 19.21% on respectively. too got Inhibition complete rate 100% at concentrations 1, 2.5, 5 mg/ml against fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* .was low of rate Inhibition against fungal *Fusarium* sp. rate 17.21%, 58.54% , 87.25% , 90.42% at concentrations 0.1,0.2,04,0.5 mg/ml on respectively. was high of rate Inhibition against

fungal *Penicillium* sp. rate 22.78% , 68.11% , 92.45% , 97.62% , at concentrations 0.1,0.2,04,0.5 mg/ml on respectively were found significant ($p<0.05$) between concentration. Showed oil cinnamon rate Inhibition high against fungals more from oils Clove and lemon against fungals .Antimicrobial activity Although the oil from different parts of the world has shown great diversity in chemical composition, it comprises mainly of trans-cinnamaldehyde as the major component (47-71%). The strong antibacterial and antifungal activity of the dominant constituents were trans-cinnamaldehyde (79.73%), linalool (4.08%), cinnamaldehyde para-methoxy (2.66%), eugenol (2.37%) and trans-caryophyllene (2.05%). Phenylpropanoids were the major class of compounds in the essential oil (81.7%) Cinnamon oil exhibited antibacterial effect against contaminating microorganisms (Vazirian,2015).

3.5 Inhibition Bacterial Extraction Oil Lemon

Inhibition Bacterial Extraction Oil Lemon

Showed Table(5)and fig (5) ability oil lemon on Inhibition bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp and got Inhibition low at concentrations 0.1,0.2 mg/ml against bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp of rate Inhibition reach 5.66% , 7.13%, 6.44% , 8.79% on respectively. Too got Inhibition complete rate 100% at concentrations 2.5, 5 mg/ml against bacteria *Staphylococcus aureus* , *Escherichia coli* , *Micrococcus roseus*, *Serratia* sp was low of rate Inhibition against bacteria *Staphylococcus aureus* rate 5.66% , 24.12% , 43.48% , 52.61% , 80.89% at concentrations 0.1,0.2,04,0.5,1 mg/ml on respectively. Was high of rate Inhibition against bacteria *Serratia* sp rate 8.79% , 30.54% , 49.33% , 65.73% , 89.88% , at concentrations 0.1,0.2,04,0.5,1 mg/ml on respectively were found significant ($p<0.05$) between concentration. The study show that extract oil lemon good antibacterial and fungal against , the extract lemon contain on compounds active such flavonoids (Dhanavade et al., 2011).Showed extract lemon activity inhibition against all the test microorganism(G-,G+) , that number the reason for the deferent sensitivity bacterial(G-,G+) and compound active this structure in extract of lemon (Samarakoon et al., 2012; Hasija et al., 2015**).**

Inhibition Fungal Extraction Oils Lemon

Showed Table(6)and fig (6) ability oil lemon on Inhibition fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* and got Inhibition low at concentrations 0.1,0.2 mg/ml against fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* of rate Inhibition reach 15.00% , 13.66%, 14.04% , 12.88% on respectively. too got Inhibition complete rate 100% at concentrations 2.5, 5 mg/ml against fungal *Penicillium* sp. *Fusarium* sp. *Rhizopus* sp. *Aspergillus niger* .was low of rate Inhibition against fungal *Aspergillus niger.* rate 12.88%, 39.78% , 73.77% , 87.88 %,91.53 % at concentrations 0.1,0.2,04,0.5,1 mg/ml on respectively. was high of rate Inhibition against fungal *Penicillium* sp. rate 15.00% , 51.77% , 78.48% , 93.45% , 99.62% at concentrations 0.1,0.2,04,0.5,1 mg/ml on respectively were found significant ($p<0.05$) between concentration. Lemon rich source of flavanoed , caumarins , glycosides and volatile . Many polymethoxylated flavones have several important bioactivities, which are very rare in other pants. EOs contains are the complex mixture of hydrocarbons and terpenic and oxygenated derivatives such alcohols, aldehydes , ketones, organic acid and esters with can be found from extract peel lemon(Ahmed *etal,*.2006). Compounds is important due of their poly application in fields different from food. Extract peel oils is directly concerning which contain on compounded antimicrobial activity. Showed the study about extract oils plants medicinal that contain on compounded active toward various bacteria such alkaloids, protopine , lactons, peseudohypericin sesquiterprnes and polyacetylene. Antimicrobial activity . The Citrus peel are rich nutrients and contain many phytochemicals or compounds active in used in drugs or food supplements too (Ajithkumar, and Panneerselvam,2012).Lemon possesses properties antimicrobial high against *Staph, E.coli* due found bioactive compounds such tannins and carotenoids (Kumari et al., 2014).

4. Conclusion

The results of the present study The essential oil of clove, cinnamon and lemon has antibacterial activity against both Gram-positive and Gram-negative bacteria and fungals .These results point to the possibility with respect to the essential oil of clove, cinnamon and lemon as alternative sources of antibacterial compound to be applied in food preservation systems.

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Table 1 EO of clove effect on the some growth bacteria

Concentrations of essential oil clove	Bacteria isolates			
	***Serratia* sp**	***Micrococcus roseus***	***Escherichia coli***	***Staphylococcus aureus***
0.1 mg/ml	11.54%	9.48%	10.67%	8.98%
0.2 mg/ml	35.09%	32.10%	39.46%	30.66%
0.4 mg/ml	64.89%	70.54%	67.9%	72.03%
0.5 mg/ml	86.67%	77.3%	83.11%	75.69%
1 mg/ml	100%	100%	100%	100%
2.5 mg/ml	100%	100%	100%	100%
5 mg/ml	100%	100%	100%	100%

Table 2 EO of clove effect on the some growth Fungal

Concentrations of essential oil clove	Fungal isolates			
	Penicillium sp.	***Fusarium sp.***	***Rhizopus sp.***	***Aspergillus niger***
0.1 mg/ml	18.24%	15.08%	17.83%	16.15%
0.2 mg/ml	51.09%	42.10%	55.33%	48.22%
0.4 mg/ml	90.40%	80.45%	87.24%	83.77%
0.5 mg/ml	82.30%	92.68%	88.12%	86.66%
1 mg/ml	100%	100%	100%	100%
2.5 mg/ml	100%	100%	100%	100%
5 mg/ml	100%	100%	100%	100%

Table 3 EO of cinnamon effect on the some growth bacteria

Concentrations of essential oil cinnamon	Fungal isolates			
	Penicillium sp.	***Fusarium sp.***	***Rhizopus sp.***	***Aspergillus niger***
0.1 mg/ml	22.78%	17.21%	20.56%	19.21%
0.2 mg/ml	68.11%	58.54%	66.79%	52.87%
0.4 mg/ml	92.45%	87.25%	92.24%	90.43%
0.5 mg/ml	97.62%	90.54%	95.54%	93.23%
1 mg/ml	100%	100%	100%	100%
2.5 mg/ml	100%	100%	100%	100%
5 mg/ml	100%	100%	100%	100%

Table 4EO of cinnamon effect on the some growth Fungal

Concentrations of essential oil cinnamon	bacteria isolates			
	Serratia sp	*Micrococcus roseus*	*Escherichia coli*	*Staphylococcus aureus*
0.1 mg/ml	15.67%	12.84%	13.63%	11.12%
0.2 mg/ml	45.18%	40.31%	42.78%	38.34%
0.4 mg/ml	78.98%	75.45%	77.89%	67.19%
0.5 mg/ml	89.42%	80.90%	85.46%	79.41%
1 mg/ml	97.66%	90.83%	95.12%	88.31%
2.5 mg/ml	100%	100%	100%	100%
5 mg/ml	100%	100%	100%	100%

Table 5 EO of lemon effect on the some growth bacteria

Concentrations of essential oil lemon	Fungal isolates			
	Penicillium sp.	*Fusarium sp.*	*Rhizopus sp.*	*Aspergillus niger*
0.1 mg/ml	15.00%	13.66%	14.04%	12.88%
0.2 mg/ml	51.77%	45.56%	48.33%	39.78%
0.4 mg/ml	78.48%	70.45%	75.24%	73.77%
0.5 mg/ml	93.45%	89.19%	90.22%	87.88%
1 mg/ml	95.59%	99.62%	97.61%	91.53%
2.5 mg/ml	100%	100%	100%	100%
5 mg/ml	100%	100%	100%	100%

Table 6 EO of lemon effect on the some growth Fungal

Concentrations of essential oil lemon	Bacteria isolates			
	Serratia sp	*Micrococcus roseus*	*Escherichia coli*	*Staphylococcus aureus*
0.1 mg/ml	8.79%	6.44%	7.13%	5.66%
0.2 mg/ml	30.54%	26.10%	29.46%	24.12%
0.4 mg/ml	49.33%	47.90%	45.54%	43.48%
0.5 mg/ml	65.73%	59.35%	54.39%	52.61%
1 mg/ml	89.88%	83.45%	87.56%	80.89%
2.5 mg/ml	100%	100%	100%	100%
5 mg/ml	100%	100%	100%	100%

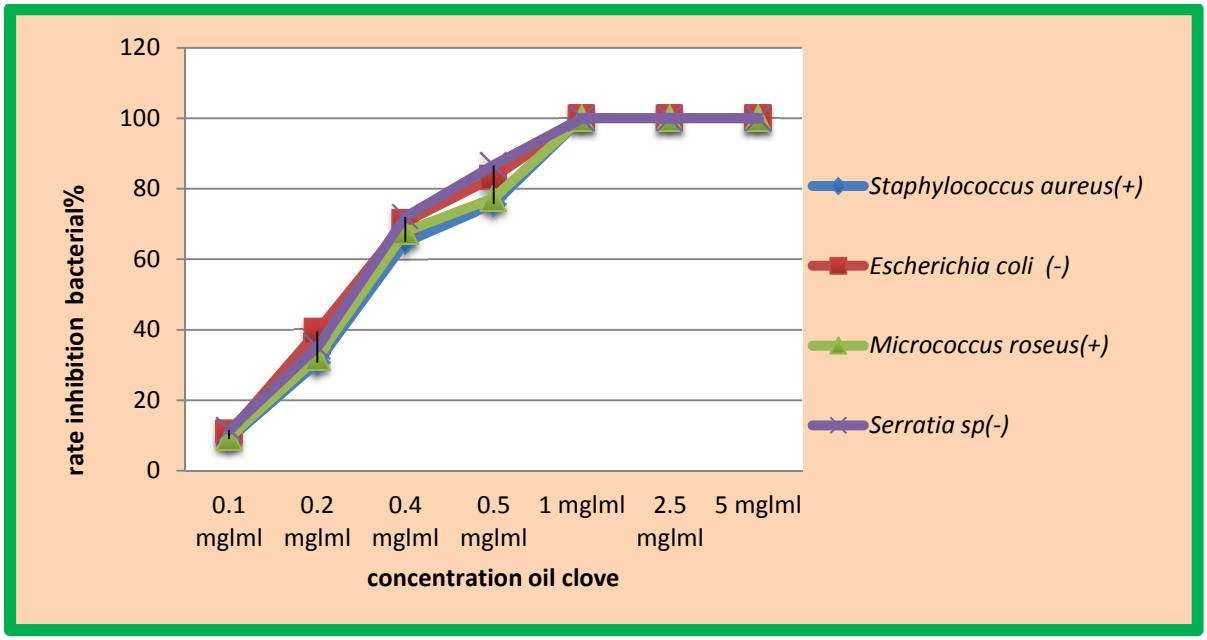

Fig.1 Effect addition concentration different from oil clove on growth some bacterial

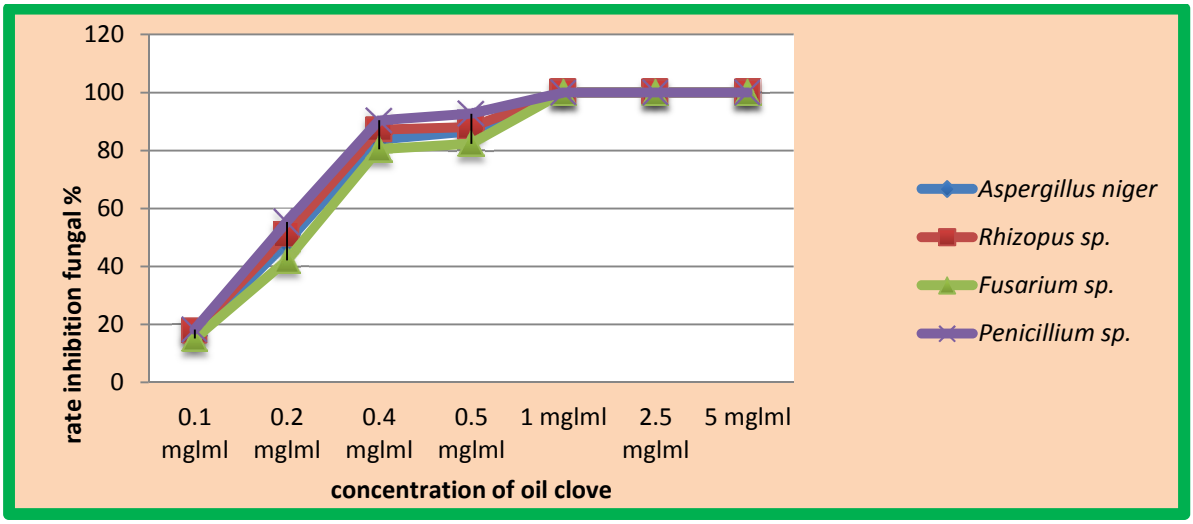

Fig.2 Effect addition concentration different from oil clove on growth fungal

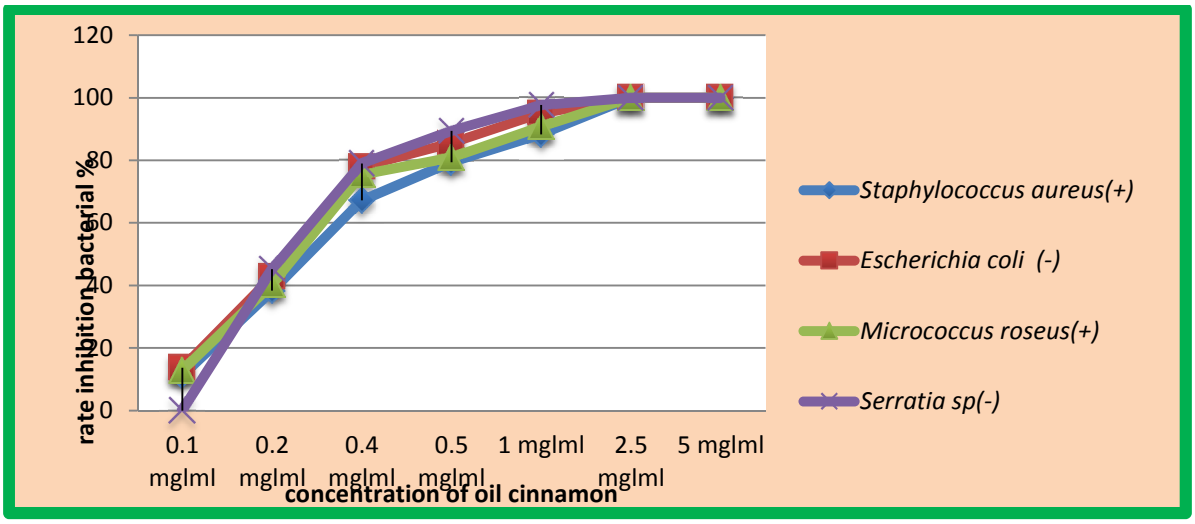

Fig.3 Effect addition concentration different from oil cinnamon growth bacteria

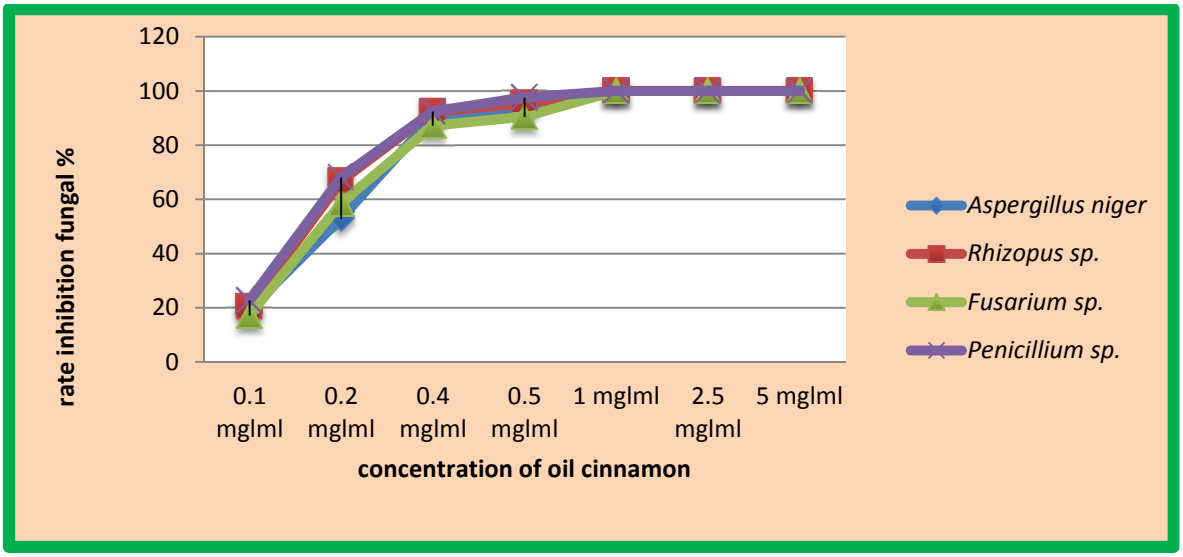

Fig.4 Effect addition concentration different from oil cinnamon on growth some fungal.

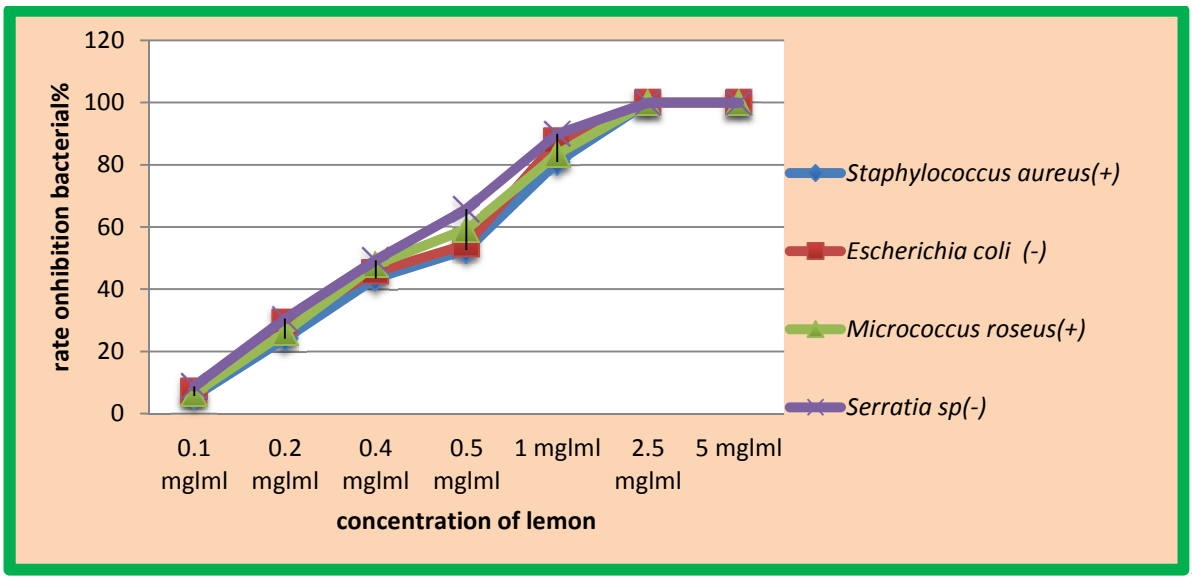

Fig.5 Effect addition concentration different from oil lemon on growth bacteria.

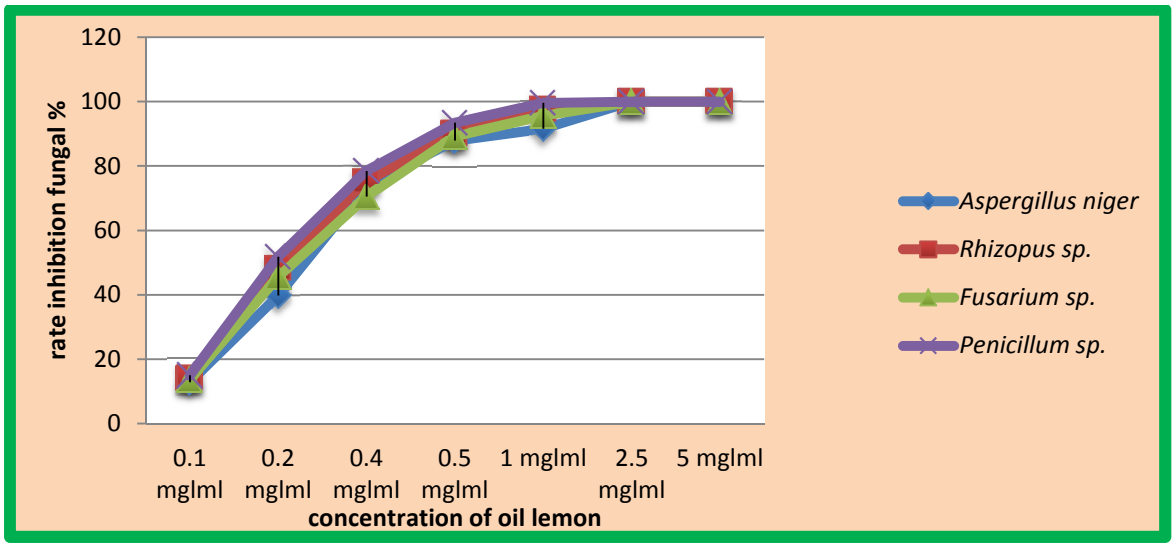

Fig.6 Effect addition concentration different from oil lemon on growth Fungal.