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The effect of some plant waste extracts on the growth of fungi *Alternaria alternata* and *Rhizoctonia* sp.

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Abstract \

This study aimed to evaluate the antifungal activity Extracts aquatic peel pomegranate, peel banana, peel peanut and peel Mandelina. The tested fungi two types of fungi *Alternaria alternata* and *Rhizoctonia* sp. Measurement growth longitudinal for two fungi *Alternaria alternata* and *Rhizoctonia* sp. developing on petri dishes with it The Subculture on potato Dextrose Agar (PDA) and Treatment with aqueous extract for peels Some the fruits. The radial growth inhibition method was used to measure the antifungal activity by placing plant Extracts in wells and measuring the inhibition zones. The results showed that the revealed a statistically significant difference between Treatment tested and appearance effect significant Extracts on fungi *Rhizoctonia* sp. comparison Growth diameter fungi developing on petri dishes. The Extracts aquatic peel pomegranate high effect where lower-level growth fungi average 1.43cm. effect Treatment IF% to % (52.4 ,61.9). appeared peel Mandelina effect significant average 2.6 cm The rest of Extracts aquatic she gave effect low significant. The pomegranate high effect Next Extracts peel Mandelina while Extracts banana and peanut effect low on growth. peel pomegranate high effect on fungi appeared Extracts

aquatic peel Mandelina more effect on *Alternaria alternata* where receipt Growth diameter longitudinal 4.10 cm The effects of the aqueous Extracts peel pomegranate and on both fungi. (51-53%) ranged mandelina

Keywords: plant extracts, Fungi, *Alternaria alternata*, *Rhizoctonia* sp.

Introduction \

Culture media and temperature significantly affect the growth, sporulation, and conidial discharge of any microflora. The colony diameter, cultural characteristics (texture, surface, and reverse pigmentation), and sporulation of fungi were greatly influenced by the type of growth medium used. The survival period of fungi about different temperature and pH conditions, media, and natural habitats differs from species to species. Variation in mycelial growth and fungal sporulation was observed with the media tested. Colony radial growth and sporulation of soil fungi were found to be excellent on Potato Dextrose Agar, followed by Malt Extract Agar, at optimal environmental conditions. Fungi grow in diverse habitats in nature and are cosmopolitan in distribution, requiring several specific elements for growth and reproduction. In the laboratory, these are isolated on a specific culture medium for cultivation, preservation, microscopical examination, and biochemical and physiological characterization. A wide range of media are used for isolation of different groups of fungi that influence the vegetative growth and colony morphology, pigmentation, and sporulation [20,15,16,25]. Culture media significantly affected the growth, sporulation, and conidial discharge of any microorganisms [26]. Plant extracts have great potential, as they are active, easy to prepare and apply, secure, easy to biodegrade, and have a stimulating effect on plant metabolism [12]. There has been evidence of different types of fruit by-products with antioxidant properties [21]. [13]. [10] reported that banana peel extract proved to have a strong scavenger of free radicals and an excellent inhibitor of lipid peroxidation [26]. reported the potential inhibitory effect of the aqueous extract of Musa paradisiaca fruit peel powder against strains of fungi. They suggested the possible application of fruit peel powder as an environmentally friendly herbal fungicide. Among the tested medicinal aqueous extracts, pomegranate extract showed considerable inhibitory activity against different *Aspergillus species* isolated from corn [23]. Pomegranate peel extracts showed antibacterial activity

against the bacteria *Staphylococcus aureus*, *Enterobacter aerogenes*, *Salmonella typhi* and *Klebsiella pneumonia* [17]. Application of high concentration of pomegranate peel extract (10ml) led to significant inhibition percentages against *A. flavus*, A. *ochraecus*, and *Fusarium graminearum* (58.5%, 54.4%, and 51.5%, respectively) [22]. Potential effects on various types of pathogenic microorganisms, including *Epidermophyton floccosum* and the bacteria *Proteus vulgaris* and *Micrococcus aureus* [2,28]. It was reported that the higher the concentration of egg plant extract, the greater was the inhibitory action of the tested plant extracts against the pathogen [2,11] reported that eggplant peel extracts contain organic acids like oxalate and a very potent glycoalkaloid (solanine), which is antimicrobial against many fungi and bacteria. [4]. The major active components detected in the tested plant extracts were p-allylphenol (20.78%) in pomegranate peels, valproic acid methyl β-D-ribopyranoside (13.44%) in banana peels, and alpha-kaurene (25.67%) in eggplant peels [14]. Pomegranate showed high inhibitory activities. The highest inhibition rates (more than 90%) were achieved by ethanol and acetone at a conc. of 25%. Obtained results showed that treatment with eggplant peels extracted by both 25% and 75% ethanol, in addition to 50% and 75% acetone, gave significantly high inhibition values (87.791%-91.181%). [14]

Aqueous, saline buffer, and acid extracts of different plant species were screened in vitro for their antifungal activity against Alternaria spp. Three solvents were assayed on different tissues of the plants, and among the 29 evaluated extracts, 31% of the extracts inhibited growth, similar to the effects of a chemical fungicide. [7]. Aqueous extracts from five wild traditional medicinal plants (*Achillea fragrantissima*, *Balanites aegyptiaca*, *Peganum harmala*, *Rumex vesicarius*, and *Urtica urens*) that were collected from different locations in Egypt were tested against the predominant fungal pathogens (*Alternaria alternata*, *A.* solani, *Fusarium oxysporum* f. sp. *lycopersici*, and *Rhizoctonia solani*) infested tomato seeds. All the aqueous plant extracts significantly inhibited the mycelial growth and spore germination of these fungi [3]. The use of biologically based compounds in plant extracts may be an alternative to currently used fungicides to control phytopathogenic fungi, because they virtually constitute a rich source of bioactive chemicals such as phenols, flavonoids, quinones, tannins, alkaloids, saponins, and sterols [5]. [29] The effectiveness of some medicinal plants, such as harmala, squill, and rabbit grass, in the form of crude aqueous extracts against the diagonal growth of the

fungus *Sclerotinia sclerotiorum*, was tested. All extracts showed a clear inhibitory effect. Studies have used plants as a bioresource because they contain many compounds that are effective in combating pathogens, in addition to being safe and non-polluting to the environment [24]. A study was conducted to evaluate the inhibitory activity of some medicinal plant extracts (water, methane, hexane) against *Aspergillus niger*, *Penicillium italicum*, and *Rhizopus stolonifer*, which showed antifungal activity. The results indicated that the water and methanol extracts were more efficient than the hexane extracts [8].

Materials and methods \

Plant materials: Plant materials (The peets of eeg plant ,banana, pomegranate Mandarin) They were washed with distilled water to remove all dust particles and allowed to dry 24h at 40-60 C in oven [19,8] grinded and saved for used.

Preparation of plant extracts: Aqueous extraction : 100 grams of each plant with 1000ml distilled water soaking with shakering for 24h at room temperature. Plant extracts were filtered through two pieces of cheese cloths and clarified by centrifuge at 3000rpm for 10min. Then filtering with filter bacterial what man NO.22mm paper by using vacuum pump [3]. stored at 4C in air tight bottles for subsequen [1,8].

Source of fungi: fungal isolates were previously identified in the Plant Protection Department/ Faculty of Agriculture/ Omar Al- Mukhtar University. (*Alternaria alternata*, *Rhizoctonia* sp.)

These isolates were subculture on Potato Dextrose Agar (PDA) at 25°_28°C Young pure cultures (5-10 days) of each isolate was used to conduct this study.

The inhibitory effect of plant extracts on growth fungi: Regarding the effect of extracts on linear growth, the method described by [8] was followed. The nutrient medium was prepared and divided into glass conical flasks at a rate of 45 ml/flask. After sterilization, when the temperature reached 45°C and before it solidified, 5 ml of the crude plant extract was added and shaken slightly to ensure it was well mixed with the medium before being poured into the dishes.

l dishes were inoculated with equal 5 mm diameter discs from the edges of a 7-day-old *Alternaria alternata* and *Rhizoctonia* sp. culture, placed upside down on the surface of the nutrient medium in the middle of the dish (disc/dish), with 4 replicates for each treatment. In the control dishes, the fungal disc was grown on plates free of plant extract.

The plates were incubated at 25 ± 2°C. The radial growth of the fungus was measured in two

perpendicular directions and the percentage of inhibition was calculated according to the equation [6]: %I = [(C – T)/C] × 100 where: - I: percentage of inhibition, C: radial growth of the pathogenic fungus in the control plates and T: radial growth of the pathogenic fungus in the treatment plates [6]

Result and discussion \

The inhibitory of plant extracts on grwth fungi *Alternaria alternata* : The study findings indicate that the tested treatments had a significant effect on the longitudinal growth of the fungus *Alternaria alternata* (figure 1). The aqueous extracts of both pomegranate peel and mandelina peel markedly reduced diameter, with highly significant inhibition: after eight days of incubation, the fungal diameter measured just 3.98 cm (pomegranate) and 4.10 cm (mandelina) on plates treated with these extracts These results are consistent with what was obtained by [3,21, 14] (table 1).

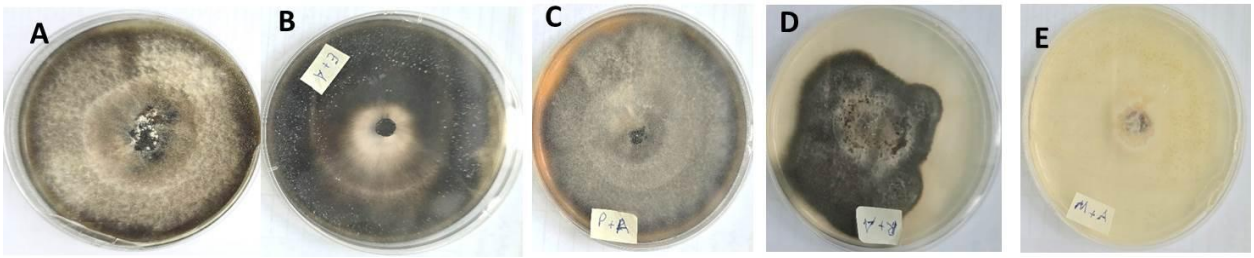

Figure (1): growth longitudinal for fungi *Alternaria alternata* developing on petri dishes with it.
The Subculture on potato Dextrose Agar (PDA) and Treatment with aqueous extract for peels Some the fruits.(A: Control B: Peanut peels C: banana peels D: Pomegranate peels E: Mandelina peels)

Table (1): Effect of different Aqueous extracts on the growth longitudinal of *Alternaria alternata.*

Treatment	Two days		Four days		Six days		Eight days	
	Growth diameter (cm)	Ratio Effect (%)	Growth diameter (cm)	Ratio Effect (%)	Growth Diameter (cm)	Ratio Effect (%)	Growth Diameter (cm)	Ratio Effect (%)
Control	1.80ijk		3.50 f-h		5.90 cde		a8.5	
Peel peanut	1.65k	34.00abc	3.40gh	15.00c	4.95cd	17.50c	7.20b	15.29c
Peel banana	1.71jk	31.60abc	3.13gh	21.75c	5 4.63c-f	22.83c	5.64c	33.65abc
Peel pomegranate	1.56k	37.60abc	2.88hij	28.00abc	3.70e-h	38.33abc	3.98d-h	53.18a
Peel Mandelina	1.57k	37.20abc	2.95ghi	26.25bc	3.70e-h	38.33abc	4.10d-g	51.77b

The inhibitory of plant extracts on grwth fungi *Rhizoctonia* sp.: Significant differences were observed among the various Treatments. A similarly significant inhibitory effect was seen against *Rhizoctonia* sp. compared to the untreated control (sterile distilled water). The aqueous extract of pomegranate peel was the most potent, reducing the average fungal diameter to 1.43 cm on treated plates and achieving inhibition percentages of 52.4% and 61.9% in the first and second measurements, respectively. Mandelina peel extract showed a moderate effect, reducing growth by an average of 2.6 cm, while the other extracts produced smaller, though still statistically significant, reductions in fungal growth, This applies to what the researchers obtained [8, 3 14,29] (table 2).

Table (2): Effect of different aqueous extracts on the growth longitudinal of *Rhizoctonia* sp.

Treatment	Two Days		Four Days	
	Growth diameter (cm)	Ratio Effect (%)	Growth diameter (cm)	Ratio Effect (%)
Control	2.90de		8.50a	
Peanut peels	2.55 ef	32.00 cd	6.45b	24.12 d
Banana peels	2.45ef	34.67bcd	6.65b	21.76 d
Pomegranate peels	1.43f	61.87a	4.05cd	52.35 ab
Mandelina peels	2.60e	30.67cd	4.55c	46.47abc

When Fungal growth was measured after both species had fully matured on the control plates, no consistent difference was found between them in their overall response to the Treatments: both showed reduced longitudinal growth on plates containing each peel extract. However, the magnitude of inhibition varied by extract. Pomegranate peel extract again proved most effective –average fungal (Figure 2)

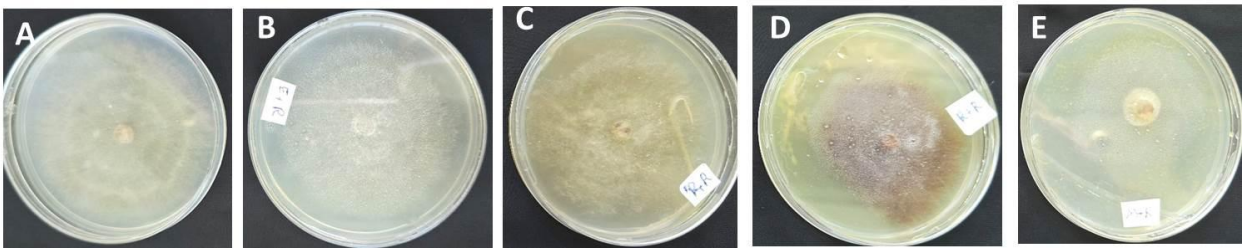

Figure (2): growth longitudinal For fungi *Rhizoctonia* sp. developing on petri dishes with it The Subculture on potato Dextrose Agar (PDA) and Treatment with aqueous extract For peels Some the fruits.(A: Control B: Peanut peels C: banana peels D: Pomegranate peels E: Mandelina peels)

Diameter decreased by about 0.015cm-while mandelina peel extract produced an average reduction of approximately 0.226 cm; the other peel extract had lesser inhibitory effects. When Fungal growth was measured after both species had fully developing on the control plates, the study recorded on difference between the two fungi in their response to the Treatment: in very case their growth longitudinal was reduced on plates amended with each of the tested aqueous peel extracts. The study also found that these extracts differed in their efficacy against the fungi. The aqueous extract of pomegranate peel proved the most potent: as shown in the figure, fungal diameter decreased by an average of 0.015 cm with the mandelina-peel Treatment and by 4.325 cm with the pomegranate peel Treatment, whereas the banana-and eggplant-peel extracts had a smaller inhibitory effect on growth. The table shows that all Treatments suppressed both fungi, but pomegranate peel was the strongest inhibitor for both species. The mandelina-peel extract showed the greatest effect on *Alternaria alternata*, yielding longitudinal growth of diameter of 4.10 cm, and the inhibition percentages of the Pomegranate- and mandelina-peel extracts ranged between 51% and 53% for both fungi. These results are consistent with both [8, 14]

Table (3): Effect extracts Aquatic Treatment different on growth fungi *Alternaria alternata* and *Rhizoctonia* sp.

Treatment	*Alternaria alternata*		*Rhizoctonia* sp.	
	Growth diameter (cm)	Ratio Effect (%)	Growth diameter (cm)	Ratio Effect (%)
Control	8.5 a		8.5 a	
Peanut peels	7.30ab	15.29 d	6.45bc	24.12 cd
Banana peels	5.64cd	33.65 bc	6.65bc	21.77 cd
Pomegranate peels	3.98e	53.18 a	4.05e	52.35a
Mandelina peels	4.10e	51.77 a	4.55 de	46.47ab

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تأثير بعض مستخلصات المخلفات النباتية على نمو فطريات *Alternaria alternata , Rhizoctonia* sp.

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الملخص /

هدفت هذه الدراسة الي تقييم النشاط المضاد للفطريات باستخدام المستخلص المائي لقشور الرمان والمندالينا والموز والباذنجان ضد نوعين من الفطريات *Alternaria alternata , Rhizoctonia* sp. . تم قياس النمو الطولي للفطرين الناميين علي اطباق بتري بها الوسط الغذائي بطاطس دكستروز اجار والمعامله بالمستخلصات المائية لقشور بعض الثمار. سجلت نتائج الدراسة وجود فروق معنوية بين المعاملات للمستخلصات علي فطر الريزوكتونيا. كان المستخلص المائي لقشور الرمان الأعلى تأثيرا حيث خفض نمو الفطريات بمتوسط 1.43سم. بلغ تاثير المعاملة IF% الي(61.9 و52)% خلال القراءتين علي التوالي كما ظهرت قشور المندالينا تأثيرا معنوي بمتوسط 2.6 سم في حين باقي المستخلصات المائية أعطت تأثير اقل معنوية. الرمان الأعلى تأثير يليه مستخلص قشور المندالينا بينما كانت مستخلصات الموز والباذنجان لهما تأثير أقل علي النمو. قشور الرمان كانت الأعلى تأثير علي كل الفطر وظهرت المستخلصات المائية لقشور المندالينا الأكثر تأثيرا علي *Alternaria alternata* حيث وصل قطر النمو الطولي 4.10 سم وتراوحت معدلات النمو تأثير علي المستخلصات المائية لكل من قشور الرمان والمندلينا (51-53%) علي كلا الفطرين.

الكلمات الدالة: مستخلصات نباتية، فطريات، *Alternaria alternata* ، *Rhizoctonia* sp.