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## The Anti-effectiveness of the *Raphanus sativus* L. Extracts on the Some Fungal Growth Inhibition

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### Abstract

This study was carried to find out the inhibitory effectiveness of the aqueous, alcoholic and glycosides extracts of *Raphanus sativus* (red and white radish) using four different concentrations (10%, 20%, 40% and 100% mg/ml) on the growth of three fungal species (*Aspergillus niger*, *Fusarium oxysporium* and *Pencellium sp.*). The results showed that the different concentrations of the extracts an impact on inhibiting the growth of two fungal species (*Pencellium sp.* and *F. oxysporium*) variously, It was found the effectiveness of different concentrations of the aqueous extract of red radish in the inhibition of the studied fungi, and the ineffectiveness of the alcoholic and glycosides extracts in inhibition, as well as the different concentrations of aqueous extracts of white radish did not have any impact inhibitor on the fungal growth while the alcoholic and glycosides extracts an effect on inhibition of both mentioned fungi growth and the aqueous, alcohol and glycosides extracts of radish (red and white) did not affect to inhibit the growth of *A. niger*.

**Key words:** Chemotaxonomy; Anti- effectiveness; Extracts; *Raphanus sativus*.

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## 1. Introduction

Several plant extracts were used in the treatment of many ailments for thousands of years, as it mentioned 400 species of plants were used medically in the Greek civilization, and the most important reasons for the use of plants in the treatment is to contain plants on phytochemicals with biological effectiveness and used medically to treat a variety of ailments [12, 16], as well as the side effects of the traditional antibiotics and the development of microorganisms to their resistance [7]. *Raphanus sativus* (cultivated radish) belongs to the family Brassicaceae, annual or biennial brassicaceous crops grown for their swollen tap roots which can be globular, tapering, or cylindrical, leaves are arranged in a rosette. This family contains many important plants economically, medically, and that many of the therapeutic properties of compounds containing [18]. Radish roots and leaves contain many effective compounds including Coumarins, Alkaloids, Nitrogenous compounds, Glycosinolate, organic acids, Phenols, Pigments and Sulfur compounds such as Sulforaphane, Tannins, Glycosides [15], radish plant uses in the treatment of respiratory and liver diseases, and as a catalyst for a bowel movement, and as a remedy for the viral infections and antioxidant also in the killing of several types of cancer cells, roots succulent has effective against some bacterial species *Bacillus subtilis*, *Salmonella typhi*, *Pseudomonas aeruginosa* [6, 11, 19, 20], due to the importance this plant this plant biologically and medically therefore this study was carried out.

## 2. Materials and Methods

Plant specimens were collected in the field on the outskirts of the cities of Kirkuk and Sulaimani (northeast Iraq) and has been cleaned of dust and impurities and then rinsed with water and dried at room temperature away from light (to avoid oxidation). After drying the plant specimens has been grinding by using laboratory electric mill and then placed opaque plastic cans and stored refrigerated until extraction.

### Hot Aqueous Extraction:

Mixing 40 gm. of the plant specimens with 160 ml of distilled water twice (ratio of 1: 4 weight: size), which is heated to 95-100°, mixture moving then leave to cool, and put in the refrigerator for 24 hours, filtrated through several layers of medical gauze and was filtrated again funnel Buchner using whatmann papers No.1 to get rid of the uncrushed parts and fibers to obtain the liquid crude extract, put in the rotary evaporator at temperature of not more than 40° that it works on the basis of evaporation under rarefied pressure and the extract output was placed in the shaker incubator 30-35° after drying the extract was saved freeze in airtight containers and labeled until use [4].

### Ethanolic Extraction:

Ethanolic extraction was prepared by mixing 20 gm. of plant powder in 200 ml of alcohol absolute ethanol with shaking (rate 1:10 weight: size) and leave the mixture in the refrigerator for 24 hours to soak, the extract was filtered through several layers of gauze and filtered again by using whatman papers. No. 1 to get rid of the uncrushed parts and fibers, put in the rotary evaporator at 40°, after the evaporating of mixture alcohol the thick layer of extracted was obtained and then put in the incubator and temperature 25- 30° and after drought the

extract was saved freeze in airtight containers and labeled until use [9].

### **Glycosides Extraction**

Mixing 10 gm. of plant powder with 100 ml Ethyl alcohol 80% and leave the mixture for 24 hours in the refrigerator (4-7°) and was filtrated to get ethanolic extract, the extract concentrated to a third of its size by a rotary evaporator (Buchi company, Switzerland) and added 50 ml of Ether and 5 ml of lead acetate solution 0.3 Molarity in a separating funnel with the shaking withdrawn aquifer, this steps repeated three times and drought withdrawn aquifer at 30° until fully dry [17].

### **Detection of Alkaloids:**

Method of [8] Has followed by boiling 10 gm. plant powder with 50 ml of distilled water acidifying hydrochloric acid (HCl) 4%, after filtration the solution was cooled, 0.5 ml of them was examined in a test tube with each of the following detectors:

- 1- Meyer's detector (white precipitate)
- 2- Wagner's detector (brown precipitate)

### **Detection of Saponins:**

The aqueous solution of plant specimens shakes strongly in the test tube, evidenced by the presence of Saponin emergence of dense foam remain for a long time [1].

### **Detection of Resins:**

Mixing 10 ml of plant extract with 20 ml of distilled water acidifying hydrochloric acid HCl 4%, and inferred the existence of resins emergence of turbidity in it [12].

### **Detection of Phenol:**

The detection of Phenol was carried out by adding 3 ml of an aqueous plant extract to 2 ml of ferric chloride solution FeCl<sub>3</sub>, the appearance of a bluish-green color evidence of the presence of phenolic compounds [10].

### **Detection of Glycosides:**

Carried out by mixing two equal parts of the Fehling's reagent with aqueous plant extracts, then let the mixture in boiling water bath for 10 minutes, and evidenced by a positive test by the appearance of red sediment and is evidence of the presence of sugars .to insure of this result has been added 1 ml of water plant extracts to 5 ml of Benedict's reagent as it confirms the emergence of red sediment on the presence of sugars, while the blue color appearance indicates to absence of sugars [5].

### Detection of Tannins:

This process conducted by boiling 10 gm. of plant powder in 50 ml of distilled water, then filtrated the solution and leave to cool, the solution was divided into two equal parts, few drops of lead acetate 1% solution was added to one part, as evidenced by the presence of tannins the emergence of gelatinous precipitate and two drops of ferric chloride solution 1% was added to the other part, as it indicates the emergence of bluish green color to the presence of tannins [2].

### Effectiveness of Antifungal:

The effect of aqueous extracts , alcoholic and glycosides of the radish on the growth of three fungal species (*Pencillium sp.*, *A. nigar* and *F. oxysporium* ) was studied by using the culture media (Sabroud dextrose agar) that prepared according to the manufacturer instructions, the agar diffusion method was used to prepare the petri dishes of effectiveness testing by drilling to observe the effective of the extracts at the concentrations (10, 20, 40 and 100 mg/ml) on the growth of studied species, as it drilled by cork piercing sterile with diameter 3 mm, the dishes vaccinated by the fungal species, and then placed the same concentrations in the drilling triple, the dishes were incubated at a temperature of 25° for the 7 days, the results was recorded by measuring the diameter(mm) of inhibition area.

### 3. Results and Discussion

The results of the chemical detection of effective compounds (alkaloids, Glycosides, Saponins, Tannins, Phenols, Resins) are positive detection of both types as plant radish contains all the materials that have been detected, as shown in table (1). The results revealed that aqueous extracts of red radishes with concentration (10, 20, 40 and 100 mg /ml) seemed the varying inhibitory effectiveness against two fungi species *Pencillium sp.* and *F. oxysporium* compared to controls, table (2).

**Table 1:** the results of the chemical detection for effective material (+) positive detection

No.	Effective Material	detection results	
		Wight radish	Red radish
1	Alkaloids	+	+
2	Saponins	+	+
3	Tannins	+	+
4	Glycosides	+	+
5	Resins	+	+
6	Phenols	+	+

**Table 2:** Effectiveness inhibitory of *R. sativus* extracts against the studied fungal species

plant	extract	fungi concentration mg/ml	Diameter of inhibition area		
			<i>Pencillium sp</i>	<i>A. nigar</i>	<i>F. oxysporium</i>
Red radish	aqueous	10	2	0	5
		20	0	0	1.33
		40	2	0	0
		100	6	0	2
		control	0	0	0
	alcoholic	10	0	0	0
		20	0	0	0
		40	0	0	0
		100	0	0	0
		control	0	0	0
	glycosides	10	0	0	0
		20	0	0	0
		40	0	0	0
		100	0	0	0
		control	0	0	0
Wight radish	aqueous	10	0	0	0
		20	0	0	0
		40	0	0	0
		100	0	0	0
		control	0	0	0
	alcoholic	10	0	0	0
		20	0	0	0
		40	0	0	2.33
		100	0	0	3
		control	0	0	0
	glycosides	10	0	0	0
		20	0	0	1.33
		40	0	0	1.66
		100	0	0	0
		control	0	0	0

The concentrations 10 and 40 mg/ml showed the same inhibitory action against *Pencillium sp.* also the

concentrations 10, 20 and 100 mg/ml showed varying inhibitory effectiveness against the species *F. oxysporium* and the concentration 10 mg/ml is the most effective in the inhibition of the species with diameter of 5 mm. While the aqueous extracts of red radishes with different concentrations did not show inhibitory activity against *A. nigar* as in figure (1).

As well as appeared that the alcoholic and glycosides extracts of red radish with no inhibitory efficacy against studied fungal species compared to control, and the results also showed the ineffectiveness of the various concentrations of white radish aqueous extract in the inhibition of fungi compared to the control, while the different concentrations of alcoholic extracts has inhibitory effective against *F. oxysporium* compared to the controls. and the concentrations of 40 and 100 mg/ml has effectiveness in the inhibition of *F. oxysporium* which the concentration of 100 mg/ml is the most effective in the inhibition with diameter of 3 mm., as it turned out the ineffectiveness of the various concentrations of alcoholic extracts of White radish in the inhibition of two species *Pencillium sp* and *A. nigar* than controls. See figure (2)

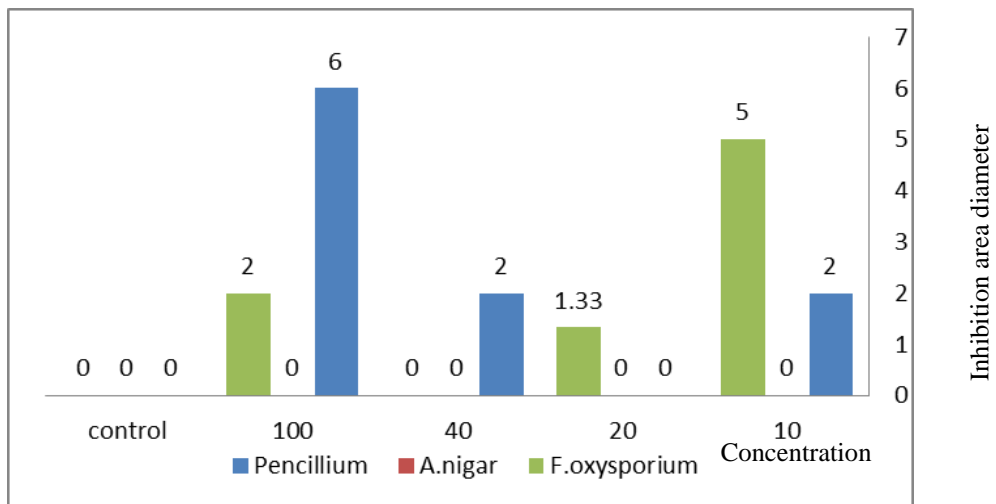


Figure 1: inhibitory effectiveness of aqueous extracts of the red radish against studied fungal species

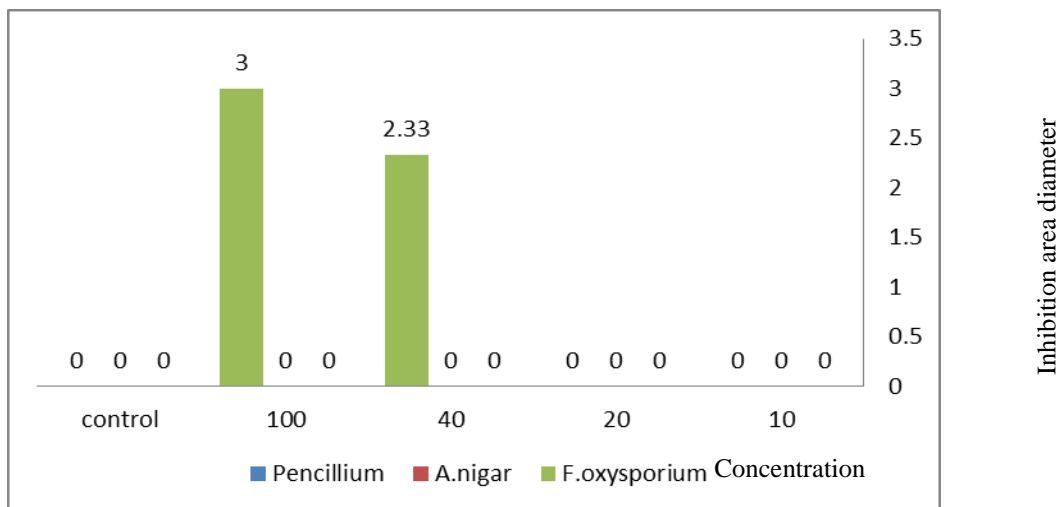
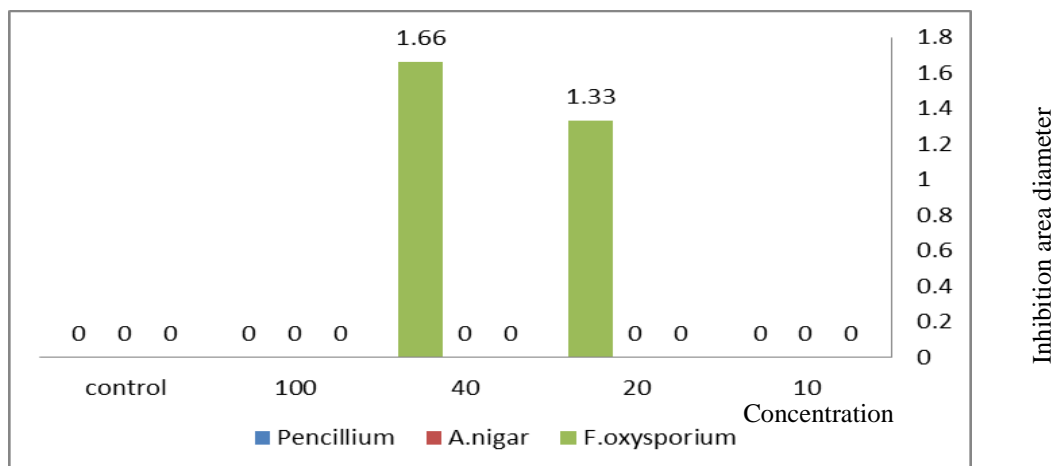


Figure 2: inhibitory effectiveness of the alcoholic extracts of weight radish against studied fungal species



**Figure 3:** inhibitory effectiveness of the glycosides extracts of weight radish against studied fungal species

As such the two concentration 20 and 40 mg/ml of glycosides seemed effectiveness in inhibiting *F. oxysporium* compared to control equally and the different concentration of glycosides extracts were not effective in the inhibition of two fungi species *Pencillium sp* and *A .nigar* than controls figure (3). The study of [13] indicated that the aerial parts of radish has inhibitory activity against certain species of Bacteria includes glycosides it is substances consisting of sugary part and a non-sugary part and are classified based on the type of the non-sugary is the most important groups of these compounds glycosides, phenols, alcohol, flavonoid, anthracunone, steroids, saponins and coumarins [14].

#### 4. Conclusion

This study concluded that the concentrations of 10 and 40 mg/ml of *Raphanus sativus* (red radishes) aqueous extracts showed the same inhibitory action against *Pencillium sp*. also the concentrations 10, 20 and 100 mg/ml seemed varying inhibitory effectiveness against the species *F. oxysporium* and the concentration 10 mg/ml is the most effective but the different concentrations did not show inhibitory activity against *A. nigar* as well as the alcoholic and glycosides extracts of red radish seemed no inhibitory efficacy against fungal species. The various concentrations of white radish aqueous extracts hasn't effectiveness in the inhibition of fungi, while the different concentrations of alcoholic extracts has inhibitory effective against *F. oxysporium* and the concentration of 100 mg/ml is the most effective however the different concentrations of the white radish alcoholic extracts has no effective in the inhibition of two species *Pencillium sp* and *A .nigar*. Therefore, such studies need to scrutinize the concentrations and testing further extracts qualitatively and quantitatively to take advantage of them later medically.

#### 5. Recommendations

This study recommends additional researches include other investigations of plant extracts and detection of further plant chemical compounds that can be used in the future to combating pathogenic bacteria and fungi.

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