



DETECTION OF ACTIVE COMPOUNDS IN RADISH *RAPHANUS SATIVUS* L. AND THEIR VARIOUS BIOLOGICAL EFFECTS

Nidhal Abdulhadi Jaafar*, Abduljbar S. Ahmed and Dhulfiqar L. Al-Sandoq

Plant Protection Department, College of Engineering Agriculture Sciences, University of Baghdad, Al-Jadriyah, Baghdad, Iraq.

*Corresponding author Email: nidhalabdulhadi2016@gmail.com

Abstract

Radish contains many mineral elements important to human health such as calcium Ca, potassium K, iodine I, sulfur S and magnesium Mg, and active secondary compounds such as alkaloids, glycosides and glycosinolate (glycosinolate) and Phenolic compounds tannins sulforhane Compounds with multiple biological effects, which increased its importance, and the attention of researchers was drawn to study the effects of its various parts (roots, leaves and seeds) in various fields, including medication as a treatment for tuberculosis, a laxative to treat constipation, Fracture of kidney and bladder stones, weight loss, anti-cholesterol, antiradical, blood sugar and antibacterial and protect the human body from various cancerous diseases. Among the most effective compounds present in it are the phenols that protect the plant from infection with various pest pests. The alcoholic extract of radish leaves has an effective influence in inhibiting many types of bacteria, including: *Bacillus cereus*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Candida albicans*, and other bacterial species. The researchers found that the alcoholic extract of radish seed and leaves had a significant effect, as it gave high levels of mortality to the adult stage and inhibited egg hatching of the *Callosobruchus maculatus* F. insect. *Raphanus sativus* has a high ability to control nematodes present in the soil, such as *Meloidogyne hapla*. The radish is considered a plant for the biological synthesis of toxic compounds of nematodes, so it is preferable to include it in agricultural cycles in areas endemic to nematode to eliminate it and prevent its transmission to subsequent crops grown after it in the same soil.

Keywords : *Raphanus sativus* L., Radish, Active compounds, Secondary compounds, Brassicaceae.

Introduction

Raphanus sativus L. belongs to the Brassicaceae family. It is an annual or biennial plant. It is a winter crop that contains tap roots and contains many effective secondary compounds that have both therapeutic and pharmacological properties. All plants belonging to the same family and radish radish are rich in antioxidants (Akram *et al.*, 2015). The portion that is eaten from radish is root and leaves. The radish has a special pungent taste due to it containing mustard oil (Mastrad Oil). There are many varieties of radish, including white radish, red radish, radish black, and many others (Nakamura *et al.*, 2008).

Radish plant is rich in vitamin C and vitamin A and contains many mineral elements including iodine I, sulfur S, Ca, Mg and Potassium K. So radishes are plants of high nutritional value as well as being appetizing and digesting. Radish plants (roots, leaves and seeds) have many medical uses, including treatment of tuberculosis, whooping cough, asthma attacks, laxative to treat constipation, Fracture of kidney and bladder stones, thinner, cholesterol-lowering, antiradical and analgesic pain (joint medical problems affecting the joints) And textile) (Gutierrez and Perez, 2004; Jha, 2007). Radish plant is useful in treating diarrhea (AL.Thwani *et al.*, 2010). Radish root and leaves contain many active compounds, including coumarins, alkaloids, nitrogenous compounds, gibberellins, glycosinolate, organic acids, Phenolic compounds, and sulfur pigments. Sulforaphane (Perez and Rosalinda, 2004). It contains antioxidant compounds (Lugasi *et al.*, 2005). Radish root and leaf extracts are effective against antimicrobial microorganisms because of their effective secondary compounds.

Uses of radish medicinal plant:

Radish has been used in the treatment of many human diseases such as liver and respiratory diseases. When using radish root juice, it acts as a bacterial antibacterial against many bacterial species, including *Salmonella typhi*, *Bacillus subtilis*, and *Pseudomonas aeruginosa* (Caceres, 1987).

Radish plant extract is used to treat viral diseases, including those caused by the Herps virus (Weilan *et al.*, 1987) which are caused by mononucleosis, chickenpox (Varicella, chickenpox), skin rash in infants. Radish contains antioxidants that protect the human body from anti-cancer and these include cytokinins and other antioxidants Harborne (and Baxter, 1993). That is, horseradish protects the body from cancer (Kim *et al.*, 2011). Radish plant extract inhibits cell division (Beevi *et al.*, 2009; Papi *et al.*, 2008; Yamasaki *et al.*, 2009) for containing antioxidants. People with diabetes are advised to eat radish because of its effect in lowering blood sugar levels (Shukla *et al.*, 2011). Radish plant extract is used to treat constipation because it contains some of the compounds that stimulate bowel activity (Yong *et al.*, 2000). Evaluating the efficacy of radish extract in controlling insects and inhibiting germination of seeds of some plants :

Phenols are one of the most common active compounds in the cruciferous plants of Brassicaceae, including radish and are defensive compounds, which play a key role in preserving plants from pasture animals, and protecting plants from microbiological injuries (Jahangir *et al.*, 2009).

The results of a study by (Daoud *et al.*, 2010) on the effect of alcoholic extract of radish seed and leaves in the life of Southern Cowpea Beetle *Callosobruchus maculatus* F. showed that the alcoholic extract of radish seed and leaves separately had a significant effect on the number of eggs between the three consecutive generations. Since the number

of eggs for the third generation was lower than that in the first and second generation and the effect of the extracts increases with increasing concentration, this indicates that the extract of radish seeds and leaves affects the laying of eggs due to the presence of the turbine compounds that have a toxic effect in the larval phase and adults of the insect. Turbines are considered bitter. The same effect is anti-feeding for the insects, is also anti-bacterial Sam.

There was a significant effect of the radish seed and leaves extract on the percentage of egg hatching between the three generations, as the rate of hatching eggs decreased in the second and third generation from that of the first generation and for both extracts.

The alcoholic extract of the radish plant achieved the highest mortality rate for the adult insects of the red flour beetle insect. The ratio was 83.3%. The mortality rates differed significantly between the three generations and increased with the increase in the concentration of the extract.

The compounds of isothiocyanate produced by the cruciferous family plants, including radish, have beneficial effects in preventing the growth of a large number of plants, as they prevent the germination of their seeds, i.e. the process of inhibiting the germination of the seeds of these plants, namely: *Amaranthus hybrids*, *Triticum aestivum*, *Matricaria inodora*, *Alopecurus myosuroides*, *Echinochloa crus-galli*, (Peterson *et al.*, 2001).

In a study by (Tabbache *et al.*, 2008) on the effect of the aqueous extract of the vegetative growth of radish plants on the germination of the dandelion seeds, it was found that the extract had an inhibitory effect of seed germination, as the two concentrations were 2.5) and 5)% , the germination rate of dandelion seeds was (50 and 52.5) % Respectively.

Effect of radish plant extract on some bacteria

In a study by (Chiad *et al.*, 2018) to evaluate the effect of the watery and alcoholic extract of radish leaves and the antibiotic (Gentamycin) on the inhibition of bacteria causing gingivitis and tooth decay) the study demonstrated the superiority of the watery extract of leaves Radish plant over alcohol and antibiotic extract in inhibition of *Streptococcus mutans*, while alcoholic extract outperformed watery extract in inhibition of *Staphylococcus aureus*, and compounds in aqueous and alcoholic extract of radish leaf were detected According to Jawad method (1997): Tannins, Carbohydries, Glycosieds, Resins, Flavonoids, Alkloids and Saponin, found only two compounds in the watery extract are Coumarins and Terpinies that are not present in the alcoholic extract. The radish plant extract has inhibitory efficacy against many bacteria (Al-Thwani *et al.*, 2010; Shukla *et al.*, 2011; Janjua *et al.*, 2013).

The alcoholic extract of radish leaves of radish plant) had an effective influence in inhibiting many types of bacteria, including: *Bacillus cereus*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*, *Candida albicans* and the degree of inhibition increased with increasing the concentration of the extract, and the highest effect of radish leaf extract against For the Cram pigment (*Staphylococcus aureus*), the effect of the extract is minimal in *Escherichia coli*, and the extract had a high inhibitory action against yeast (*Candida albicans*) (Al-mossawei *et al.*, 2014).

The glycosides were extracted from the vegetative part of the radish plant according to the method (Ukida *et al.*, 2006) and tannins were also extracted according to the method described by (Ahmad and Nazil, 1989). positive Gram (*Bacillus subtilis*) and *Staphylococcus aureus*, and two negative Gram bacteria (*Escherichia coli*) and *Pseudomonas aeruginosa*.

The study showed that the percentage of Glycosieds (Radish) in radish increased successively by shearing vegetative growth of the plant and recorded its highest percentage at the third date of shearing, which amounted to 6.3%. Cyclosides have an effective influence in inhibiting the growth of all types of bacteria included in the study. Inhibition of the bacteria included in the study but less than the efficiency of the cyclosides (Alhadithi *et al.*, 2013).

Radish effect on Nematodes

Infection with nematodes is widespread in most regions of the world, and most plants are infected with it except for some plants that are resistant to infection and immunity to their propagation and spread as radish.

In the last days, the process of limiting the spread of nematodes and controlling them is difficult, and the use of chemical pesticides in combating them and the pollution caused by the environment has become an unwanted and harmful measure to the environment and the general health of man, so people resorted to choosing an environmentally friendly alternative such as using plants with high effectiveness to reduce the spread of soil pests. Including nematodes as plants Including nematodes as the plants of the Brassicaceae (especially radish plants) (Daneel *et al.*, 2017; Monfort *et al.*, 2007)

Due to the rapid growth of the cruciferous plants, it is considered one of the plants of great benefit for stabilizing soil nitrogen and *Raphanus sativus* L. has a high ability to control soil-based nematodes such as *Meloidogyne hapla*, as it is a biosynthesis plant for toxic compounds of nematodes (Haramoto and Gallandt, 2004; Melakeberhan *et al.*, 2008).

Most of the plants belonging to the Brassicaceae produce toxic compounds for the types of pests found in the soil, such as fungi, nematodes and weeds (Trudgill, 2001).

The cultivation of the radish *R. sativus* in the winter season in greenhouses showed a high effectiveness for this plant to reduce the incidence of nematodes and that the number of nodes containing nematodes was almost non-existent as the presence of nematodes in the soil decreased significantly and the radish roots were not affected by the radish plant and the carrots and did not allow With more nematodes on their roots, which led to a decrease in soil presence.

After the radish planting season and the rest of the experimental plants in the winter cycle ended, the tomato plants sensitive to nematodes were cultivated. The results were that the tomato plants planted in the same place where the radish *E. sativa* plants were not infected with nematodes and gave a good fruit yield on a regular basis and continued to give the quotient Throughout the natural planting season for it and for a period of five months while infected nematodes planted tomato plants in the place of plants compared to the winter season, which led to the early death of plants

Radish have the highest effect on resisting infection with nematodes, limiting their reproduction and spread in the soil and determining their transmission to the subsequent season plants grown in the same soil, so radishes are highly efficient in disinfection field soil from nematodes (Aydinli and Sevilhan, 2018).

Brassicaceae plants in general and radish plants in particular are very important green fertilizers, and their importance is due to the following reasons: The remains of non-volatile plants decompose to the primary elements and organic compounds that increase soil fertility and improve their qualities and beneficial for plant growth, (Ngouajio and Mutch, 2004; Riga *et al.*, 2004) The other reason is that a plant because radish produces isothiocyanate that works to break down isothiocyanate and this helps eliminate pathogens in the soil including fungi (Insects and Insect Nematodes) (McSorley *et al.*, 1997; Melakeberhan *et al.*, 2008).

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