# Ecological Study and Peroxidase Activity of Some Medical Plant (Asteraceae) Growth Wildly in Anbar Governorate – Iraq

# Ecological Study and Peroxidase Activity of Some Medical Plant (Asteraceae) Growth Wildly in Anbar Governorate – Iraq

**[1]Ashwaq Talib Hameed [2]Shaimaa Mohe Dawd [3]Dr Zina Kh AL Bahadly**

[1,2]College of Education for women, University of Anbar, Iraq

College of Science AL Mustansriyah University , Iraq

Corresponding Email: Ashwaq.Talib@uoanbar.edu.iq

Emails: edw.sh-m-bio.2009@uoanbar.edu.iq

Drzinakhalil@gmail.com

**Abstract.** Seventeen genera of Asteraceae family were studied in the western regions of Iraq - Al-Anbar governorate in terms of environment and their spread in them, which was characterized by species that were more widespread and invasive in different environments such as Sonchus oleraceus, Taraxucum officinale and Lactuca serriole, and the species were widespread in dry areas far from residential areas. Which was characterized by dry clay or gravel soils such as Artemisia herba-alba and Achellia fragrantissima, and the peroxidase enzyme was extracted by phosphate buffer from the seeds of the studied plants, which gave a variation in the enzymatic activity values. Aizoon hispanicum plant, as it was 0.0023 units / ml. The values have a relationship with the plant environment, as the desert areas plants gave higher enzyme values.

**Keywords**: Ecological, peroxidase activity, Asteraceae, Iraq

## 1. Introduction

Despite the importance of wild species at the global level, as a result of the benefits that they can provide to humankind. Field studies related to wildlife in western Iraq are very few Preserving known and recorded species is essential Because the loss resulting from its loss may exceed our expectations by far, as new sources of scientific information will be lost, and an enormous biological wealth will be destroyed .(1) Ecological factors are among the important effects that cannot be overlooked, because they are reflected in the morphological characteristics of the plant individual.

The Taxonomist must know the different environmental factors such as soil quality, altitude, light intensity and humidity extent to which these factors are related to the morphological

characteristics of the plant, and in its description of taxa [2] The Asteraceae is one of the largest vascular plant families in the world, including 1600-1700 genera and about 24000-30000 species, and 15 tribes, classified depending on the morphological and chemical characteristics, pollen grains and plastid DNA [3] Asteraceae are often characterized as evergreen shrubs or under-shrub plants, or as annual or biennial herbs. [4] and may contain vegetable milk Latex , resins, essential oil, vitamins, foodstuffs, and other active chemical ingredients [5] and it is rich in phenols and flavonoids, especially the species in western Iraq [6] Guest in 1966 divided the surface of Iraq on four main natural areas:

1 - Mountain Region (M)

2 - Upper Plains and Foothills Region (F)

3 - Desert Plateau Region (D)

4 - Lower Mesopotamain Region (L)

The seeds are part of the plant and source of many active ingredients and enzymes, one of them is peroxidase, which is an important enzyme in the biological systems of aerobic organisms .[7] and one of the oxidation and reduction enzymes that It stimulates the conversion of hydrogen peroxide to water, relieving the organism's cells of its damage, as the survival of hydrogen peroxide in cells means the possibility of attacking the vital Asteraceae inside the cell and disrupting many vital activities in it being a source of free radicals, and some plants are characterized by the high effectiveness of the peroxidase enzyme in them, which makes them good sources . [8] No previous study has dealt with the environment of the Asteraceae family species, and specifically the medicinal ones in the western of Iraq, except for reference to it in some specialized journals and botanical encyclopedias of neighboring countries, or mention scattered in university thesis, so the study aimed to identify some environmental aspects of the spread of these species growing wild in the west Iraq, which has medicinal uses, and the study of peroxide enzyme in seed, a comparative study and its link with the environment in which the plant lives.

## 2. Materials and methods

### *2.1. Ecological study*

Environmental observations were recorded from the field directly during the many field trips to their areas of spread, and the notes included a description of the habitat, Soil texture, altitude, and other relevant information that was mentioned in advance, and recorded the time of flowering of plant (sociability) [9].

### *2.2. Enzyme study*

Plant seeds were collected through field tours in 2018-2019 and cleaned of soil and the remaining parts of the plant and stored in airtight containers until they were used. High-purity materials were used in the research, represented by dihydrogen potassium phosphate, ammonium sulfate, pigment G250 blue dye, hydrogen peroxide from Fluka company, sodium acetate, tris-hydrochloric acid, Hydrochloric and NaOH from BDH, albumin, bovine serum from Sigma, prepared in the laboratory at required concentrations [10] a phosphate buffer solution of 1.0 molar and pH 7 (pH 7) was added to the seeds in a ratio of 3: 0 (weight: volume) and crushed using an electric mixer to shred Cellular tissues with stopping mixing from time to time to avoid high temperature due to the mixing process, then transferred to a beaker and put the model in an ice bath for an hour with continuous stirring, separating the form using a central centrifuge, cooled at 5°C at a speed of 11 rpm and for a period of 30

minutes to separate particles and residues The tissue was filtered and kept in the refrigerator until it will be used. The effectiveness of the peroxidase was estimated according to the method of wiping. In [11] the active ingredient solution was prepared by mixing one proportion of sodium acetate buffer 1.0 M and the pH 3.3 and the hydrogen peroxide solution 1.10 molar with 7 proportions of distilled water. The reading was recorded at a wavelength of 571 nm, 1.0 ml of the enzyme extract was added to the active substance solution in the cell and quickly mixed well every second for three minutes. The relationship between absorbance, time, and including it according to the amount of slope. The following relationship was applied to find the enzyme activity for each extract

Enzymatic activity total = volume of extract ( unit / ml) x cell width x molar absorbance x slope

## 3. Result and Dissociation

**Table 1.** Habitat and Sociability of studied species in the Asteraceae family.

| | **Characters** / **Taxa** | **Annual** | **Perennial** | **Flowering period (months)** |
|---|---|---|---|---|
| 1 | Aizoon hispanicum | + | | 3-5 |
| 2 | Aster sublutus | + | | 3-4 |
| 3 | Calendula persica | + | | 3-4 |
| 4 | Gymnarrheana micrantha | + | | 3-5 |
| 5 | Onopordon canum | | + | 3-6 |
| 6 | Silybum marianam | | + | 3-4 |
| 7 | Sonchus oleraceus | + | | 2-4 |
| 8 | Taraxucum officinale | + | | 4-7 |
| 9 | Aizoon hispanicum | + | | 2-4 |
| 10 | Aster sublutus | + | | 2-4 |
| 11 | Anthemis nobilis | + | | 5-3 |
| 12 | Artemisia herba-alba | | + | 6-3 |
| 13 | Lactuca serriole | + | | 4-2 |
| 14 | Achellia fragrantissima | | + | 6-3 |
| 15 | Launaea mucronata | + | | 5-3 |
| 16 | *Carthamus oxyacantha* | | + | 6-3 |
| 17 | *Carduus pycnocephalus* | | + | 6-3 |

The results of the study showed that all species were herbaceous, but in terms of the durability of the species, it was possible to separate them into two groups (Table 1).

**Annual plant**s : it included several species as shown in Table (1), including: *Aizoon hispanicum, Aster sublutus ,, Sonchus oleraceus Taraxucum officinale, Calendula persica*.

**Perennial plants**: including several species, including: *Onopordon canum, Silybum marianam, Artemisia herba-alba* . Table (2).

The flowering period of the studied species varied (Table 1), according to the environment, weather characteristics and plant nature, the highest flowering period was three months in *Onopordon canum* and *Achellia fragrantissima*, while the minimum flowering period was two months in *Aster sublutus* and *Anthemis nobilis*. Through the field survey of the current study and from the environmental observations that were recorded within this study as well as the information that was sought and taken from plant samples that were previously collected, it was found that the studied species, some of which grow in all regions of the Anbar province and are widely spread, and this may be due to the ease of transmission of their seeds. Most species of the Asteraceae family are characterized by the presence of bristles that help the seeds to move faster in the air, including *Taraxucum officinale* and *Sonchus oleraceus*, and some species are spread primarily in agricultural fields, orchards, near the Euphrates and near the waterways and in a limited way in deserted places inside cities and there are species Among them are *Carthamus oxyacantha* and *Artemisia herba-alba*. Note their prevalence in dry environments, completely deep in the desert, and in different soils such as clay, gravelly clay, sandy, sand rocks, limestone and gypsum soils.

And some species were spread in the form of small population groups as in the two species *Anthemis nobilis* and *Calendula persica*, or in the form of limited population groups, as in *Silybum marianam*, while the few of the species are spread in the form of small individuals close together or as individuals apart, and this may be due to the large number of flowers and seeds In the plant of the Asteraceae family, which makes the next season rich in seeds that fill or cover a large area of land to produce individuals in huge numbers to form a large population on the contrary such as *Achellia fragrantissima* that prefer to grow in the depth of the desert, which exposes it to the strong winds that expose the seeds to continuous migration. Wide, as well as the lack of rain, which makes it live under conditions that result in this limited distribution in the desert. And through field surveys, overlapping population groups of two species in one environment, namely *Artemisia herba-alba* and *Carduus pycnocephalus*, were recorded in some areas on the highway to Heet, as well as other interactions in the northwestern Ramadi area, as well as in the Al-Baghdadi area at the edge of the agricultural fields in Al-Baghdadi and Haditha. It also recorded an overlap of the *Aizoon hispanicum* with the previous two species at the edges of the dead agricultural fields on the highway towards Al-Qaim and the irrigated agricultural fields there.

The *Onopordon canum* and some of the plants of *Achellia fragrantissima*, were found during the current study that they grow in the depth of the desert far from the environments we have already mentioned, especially in dry clay soils and lands of gravel nature and sandy soils at the edges of valleys and hills and the edges of wild roads, and we observed the *Gymnarrheana micrantha* and *Aster sublutus* at the edges of the highway between Ramadi and Syria, where sand and rainwater collect at the edges of the road, providing a suitable environment for the growth of this species. As for the *Silybum marianam* was distinguished by its spread on the dry slopes of gravel lands and in the form of a limited population group at the sides of the land roads and at the approaches of the bridges along the highway 40 km east of the Iraqi-Syrian border. It has been observed during the study that spiny species such as *Onopordon canum, Carthamus oxyacantha,* and *Carduus pycnocephalus*, which spread in dry clay soils and gravel and rocky environments, and there are species such as *Anthemis nobilis* and *Calendula persica* spread near fields and their edges, gardens and abandoned houses, which appeared in the form of close groups. There are species that appeared, such as *Aizoon hispanicum* on the road leading to Lake Habbaniyah and the surrounding areas.

## 4. The enzymatic activity of peroxidase

**Table 2.** Enzymatic activity of peroxidase in seeds of studied species in the Asteraceae family.

| | **Taxa** | Peroxidase activity unit\ ml |
|---|---|---|
| 1 | Aizoon hispanicum | 0.0023 |
| 2 | Aster sublutus | 0.26 |
| 3 | Calendula persica | 0.075 |
| 4 | Gymnarrheana micrantha | 0.005 |
| 5 | Onopordon canum | 0.590 |
| 6 | Silybum marianam | 0.542 |
| 7 | Sonchus oleraceus | 0.540 |
| 8 | Taraxucum officinale | 0.544 |
| 9 | Aizoon hispanicum | 0.032 |
| 10 | Aster sublutus | 0.065 |
| 11 | Anthemis nobilis | 0.076 |
| 12 | Artemisia herba-alba | 0.510 |
| 13 | Lactuca serriole | 0.043 |
| 14 | Achellia fragrantissima | 0.076 |
| 15 | Launaea mucronata | 0.421 |
| 16 | Carthamus oxyacantha | 0.0871 |
| 17 | Carduus pycnocephalus | 0.0623 |

The results of the enzymatic activity test for peroxidase in Table (2), showed the difference in the value of the soluble peroxidase enzyme in the extracts of the seeds of plants selected in the study, the effectiveness of the enzyme in which the phosphate buffer was used as an extraction solution that the plants differed in the effectiveness values and this may be due to the nature of the environments, so we had noticed the superiority of plants with environments zerophyte plant perennial as the *Carduus pycnocephalus* which recorded the highest value of the enzyme 0.0623 units / ml, while the *Onopordon canum* recorded the activity of the enzyme of 0.590 units / ml, and the annual species that lived near the water and water channels preferred the less effective semi-humid environments. Like *Gymnarrheana micrantha*, which had an enzyme value of 0.005 units / ml and *Aizoon hispanicum* 0.0023 u\ml. The species can be divided according to the activity of the enzyme into three groups Tab (2):

The first group: The efficacy is high (0.550-0.800) u\ml includes species: *Achellia fragrantissima, Carduus pycnocephalus, and Artemisia herba-alba*

The second group: The efficacy is medium activity (0.040-0.550) u\ml, including the species: *Sonchus oleraceus* and *Calendula persica*

The third group: is of lower efficacy (0.002-0.040) u\ml and includes : *Gymnarrheana micrantha, Aizoon hispanicum* and *Lactuca serriole.*

Medicinal plants contain a high variety of proteins and active substances whose presence affects the effectiveness of peroxidase and its quantity, especially the wild ones [(4)] that contain small elements from the soil that give them good chemical active components in their tissues, and seeds in which important substances in Asteraceae are concentrated sources of proteins, fats and enzymes that protect chloroplasts and other cell components from damage by hydrogen peroxide and the resulting hydroxyl radicals [(12)] Many studies have shown that the methods of extraction solution has a role in removing all enzymes from the plant tissue and giving a real value for efficacy, and the phosphate buffer was the best [(13)] and the isolation conditions are important in determining the enzyme values and the best isolation conditions were used in terms of number. PH 7 or close to the neutral point, which has a role in increasing the efficiency of enzyme extraction and work, as in *Spondias dulcis* [(14,15).] The species and environment of plants also have a role in the difference in the amount of the enzyme, as research has shown the superiority of wild ones over cultivated ones [( 13).]

## 5. References

[1]. Sa MC, Ferna V. Journal of Food Composition and Analysis Nutrient composition of six wild edible Mediterranean Asteraceae plants of dietary interest. 2014;34:163–70.
[2]. Issa N.A ,Hasan Z. Y. M. , Hameed A.T Phytochemical investigation and antioxidant activity of total phenols in the aerial parts of some *Asteraceae* family wild plants grown in western of Iraq. Sys. Rev. Pharm.2020. 11(1):62-68.
[3]. Science NC. Protein and Mineral Concentrations in Tubers of Selected Genotypes of Wild and Cultivated. 1990;44(3):322–35.
[4]. Corlett JL, Clegg MS, Keen CL, Grivetti LE. Mineral content of culinary and medicinal plants cultivated by Hmong refugees living in Sacramento , California. 2002;117–28.
[5]. Mohammed, I.H. ,Hameed A.T. , Salman H.F. Phytochemical and Biological of *Anthemis nobilis*. (Asteraceae family) a Native Herbs of Iraq. Sys Rev Pharm, 2020. 11(2): 458 - 461.
[6]. Broadley MR, Bowen HC, Cotterill HL, Hammond JP, Meacham MC, Mead A, et al. Phylogenetic variation in the shoot mineral concentration of angiosperms. 2004;55(396).
[7]. Journal S, Mar N. Mineral Nutrient Concentrations as a Function of Seed Size Within Seed Crops : Implications for Competition Among Seedlings and Defence Against Herbivory Author ( s ): Peter J . Grubb and David F . R . P . Burslem Published by : Cambridge University Press Stable URL : http://www.jstor.org/stable/2560003 Mineral nutrient concentrations as a function of seed size within seed crops : implications for competition among seedlings and defence. 2016;14(2):177–85.
[8]. Katz O, Lev-yadun S, Kutiel PB. Plasticity and variability in the patterns of phytolith formation in Asteraceae species along a large rainfall gradient in Israel. Flora [Internet]. 2013; Available from: http://dx.doi.org/10.1016/j.flora.2013.07.005
[9]. Akrout A, Jani H El, Zammouri T, Neffati M. P HYTOCHEMICAL S CREENING AND M INERAL C ONTENTS OF A NNUAL P LANTS G ROWING W ILD IN THE S OUTHERN OF. 2010;2(1):34–40.

[10]. Zhang Y, Yang Y, Xi X, Niklas KJ, Sun S, Miller EJS. DO SPECIES WITH LARGE CAPITULA SUFFER HIGHER RATES OF PREDISPERSAL SEED LOSS THAN SPECIES WITH SMALL CAPITULA ? A FIELD SURVEY OF 34 ASTERACEAE SPECIES IN AN ALPINE MEADOW. 2018;179(7):7–12.
[11]. Chavan YR, Thite S V, Aparadh VT, Kore BA. Comparative mineral uptake potential of some exotic weeds from family Asteraceae Original Research Article Comparative mineral uptake potential of some exotic weeds from family Asteraceae To complete life cycle successively all. 2014;(March).
[12]. Bruschi P. Antioxidant and Mineral Composition of Three Wild Leafy Species : A Comparison Between Microgreens and Baby Greens. 2019;
[13]. Composition MI, Habitats D. Oecologia. 1976;143:125–43.
[14]. Katz O, Lev-yadun S, Bar P. Ac ce pt e cr t. Elsevier GmbH [Internet]. 2014; Available from: http://dx.doi.org/10.1016/j.flora.2014.03.010
[15]. Luo FL, Guo QS. Influences of host species on transpiration , photosynthesis , chlorophyll and mineral contents of medicinal hemiparasite Thesium chinense Turcz. 2010;1093–102.