

Short Communication

EVALUATION OF THE EXHAUSTIVE EXTRACTION YIELDS FOR *TEUCRIUM POLIUM* L. FROM DIFFERENT REGIONS OF THE WEST BANK - PALESTINE

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ABSTRACT

Objective: *Teucrium polium* L. aerial parts have been used by local populations of Palestine for the treatment of various diseases as diabetes mellitus, amoeba, intestinal spasms and diarrhea for that the interest of using this herbal remedy among researchers and populations increased, this study was aimed to evaluate the best area in Palestine that may be considered the best source of collection and cultivation for *Teucrium polium* plant in the future, to be a good source for manufacturing active pharmaceutical dosage forms from this plant.

Method: The yield of the organic and water extraction method assessed by using exhaustive extraction method, by steeping the plant in ethanol, water and hexane to extract all the chemical ingredients without heating to prevent destroying or changing the plant chemical constituents.

Results: the best aqueous and organic yields were in Bethlehem region (6.4%, 2.6 %), while the lowest aqueous and organic yields were in Qalqilya (4.96%, 1.16%).

Conclusion: We recommended the pharmaceutical companies; Bethlehem region as the best area for cultivation and collection *Teucrium* plant for manufacturing the best standardized pharmaceutical dosage forms also we recommended the researchers to use the *Teucrium* plant from this region for their scientific research.

Keywords: *Teucrium polium* L, Exhaustive extraction, Organic extraction yield, Aqueous extraction yield.

Medicinal plants are playing very important and primary role in the health care systems all over the world as well as the most of the physiological active compounds are derived from natural sources such as plants, animal, or fungi [1, 2] and they used widely in the folk herbal medicines and natural cosmetics [3].

Isolation and production of pharmacological active ingredients from medicinal plants used various methods, from simple traditional technologies (simple distillation) to advance extraction techniques [4].

Extraction (as the term is pharmaceutically used) is the separation of physiologically active portions of the plants (and animals) tissues using selective solvents through standard procedures. Such extraction techniques can separate the soluble plant components and leave behind the insoluble portions [5]. The natural therapeutic forms contain a complex mixture of many medicinal plant primary and secondary metabolites, such as steroids, tannins, alkaloids, glycosides, flavonoids, anthraquinones and lignans. In order to produce modern drugs, these extracts may be further processed through various techniques of purifications and fractionations to isolate individual chemical compounds such as atropine, digoxin, vincristine, hyoscyamine, hyoscine, pilocarpine, forskolin, codeine, morphine and others [6].

To select extraction method of isolation physiological active components we must first choose the extraction method that can isolate these components without changing their structures and biological activities for that we select organic and inorganic solvents first to extract all the active ingredients (to extract both hydrophilic and hydrophobic constituents). So we must take polar and polar solvents to isolate polar and nonpolar active compounds from these medicinal plant and to avoid as much as possible using heating methods to prevent hydrolysis for these physiological active compounds [7].

Teucrium polium L. common names are poly germander, cat thyme, hulwort, mountain germander (English); (j'ada in Arabic) that is a perennial herbaceous or semi-shrub wild-growing flowering medicinal plant belonged to the *Lamiaceae* family [8-10] and this

plant is used in the folk medicine from the ancient time even its name (*Teucrium*) is gained from the King Teucer of the Troy[11].

Teucrium species have been used over 2000 years in traditional folk medicine due to its diuretic, diaphoretic, tonic, antipyretic, antispasmodic and cholagogic properties [12-16].

In addition, the plant possesses evidence based therapeutic studies as hypoglycemic, insulinotropic, anti-inflammatory, antibacterial activities also reduced body weight, lowered high blood pressure, decreased intestinal hypermotility[17-19] also approved its hypolipidemic, antinociceptive and antioxidant properties [15],[12], [20]

The *Teucrium* genus includes 300 species distributed all around the world[21] that contains phenylpropanoid glycosides[22], iridoid glycosides[23], flavonoids[24] and a mixture of volatile oils(about twenty volatile oils) of which the major components were β -caryophyllene (29%), farnesene (13%), β -pinene (11%) followed by germacrene D (6.5%) and α -pinene (5.5%)[25].

Teucrium polium L. is a perennial shrub, which can be considered as an out-crossing species with 10-35 cm height; the leaves are crenate, white and tomentose on both sides, with downwards rolled rounded-toothed margins (figure.1) and the stems of this plant are grey colored and prostrate [26, 27].



Fig. 1: *Teucrium polium* L

Teucrium species are nearly most common to the Mediterranean climates and in the Middle East. They usually develop in the regions belonging to the semi-dry and dry bioclimatic and they like sun and well-drained soil and grow widely on hillsides, sands and in arid places [28]

The aerial parts of the *Teucrium polium* L. collected during the spring (May–June, 2013) from the hills and mountains of the different regions of the West-bank, Palestine (Nablus, Jenin, Tubas, Tulkarem, Salpheet, qalqilya, Ramallah, Jericho, Jerusalem, Bethlehem, Hebron) as seen in (fig. 2). The herbariums of plant material prepared and further identified by the pharmacognist Dr. Nidal Jaradat

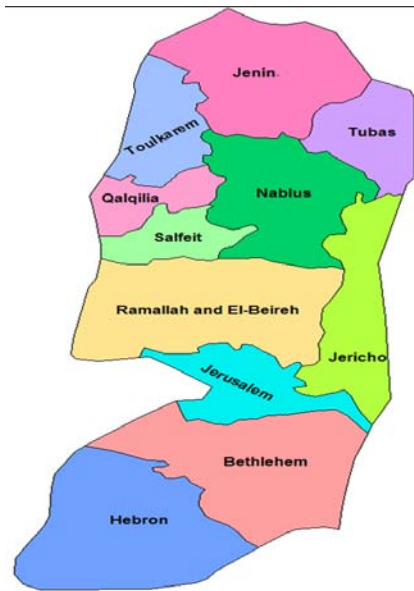


Fig. 2: The eleven regions of the West Bank/Palestine

The plant aerial parts collected and washed twice with triple distilled water, dried for 7–10 days in the shade at room temperature at An-Najah National University, in the Department of Pharmacy laboratories, Faculty of Medicine and Health Sciences then the dried parts grounded and the powder stored in cloth bags at 5°C until transferring them to the laboratory for preparing dry extracts [29].

25 g of the plant dried powder soaked in mixtures of 150 ml 50% ethanol and 50 ml of hexane in well closed Erlenmeyer flask. Then the containers placed in the shaking incubator for 72 hours of 200 round/min shaking at 25°C, after that the soaked materials were filtered by using semi permeable filter paper and suction vacuum (the filtration is done by Buchner funnel and white man paper No-1 at room temperature) then the organic phase and the aqueous phase extracted from each other by using a separator funnel. After that 150 ml of 50% ethanol was added to the same powdered sample. The extraction was repeated and placed in the "shaker" for further extraction for another 72 hour then the procedure repeated as the first extraction [30,31].

The organic phase evaporated under the hood and then weighted and the aqueous phase evaporated in a rotator evaporator for one hour at 35 °C, to get rid of ethanol after that the aqueous phase freeze dried and weighted the yield. These procedures repeated for eleven samples from the all regions.

Teucrium polium L. the aerial parts used by local populations of Palestine and other Middle East countries as infusions for treatment of diabetes mellitus, amoeba, intestinal spasms, diarrhea and other diseases. Due to the increasing the interest in using this plant among researchers, this study was aimed to evaluate the best area in the West Bank of Palestine that can be considered as the best sources of collection and cultivation of this plant for further researches also for

further source of manufacturing standardized pharmaceutical forms. Exhaustive extraction method has been selected which involves successive extraction with solvents of increasing polarity from a non-polar (hexane) to a more polar solvent (50% ethanol), to be sure that a wide ranges of natural compounds could be extracted without using any boiling methods of extractions to avoid any hydrolysis of the plant active components.

The yields of exhaustive extractions for *Teucrium* plant were the highest in Bethlehem region and the lowest was in Qalqilya regions as presented in the (Fig.3,4,5).

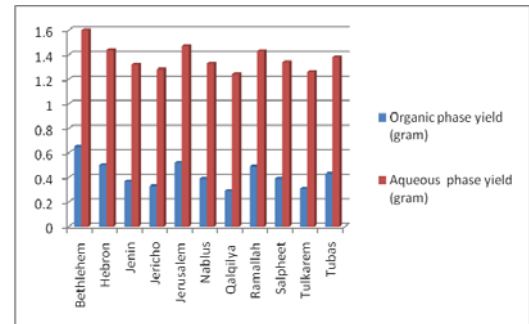


Fig. 3: Exhaustive extraction yields for eleven regions in Palestine

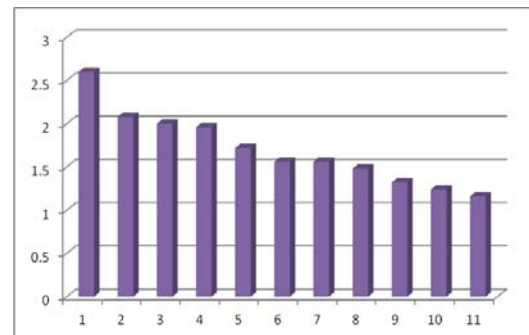


Fig. 4: Organic phases exhaustive extraction yields percentages

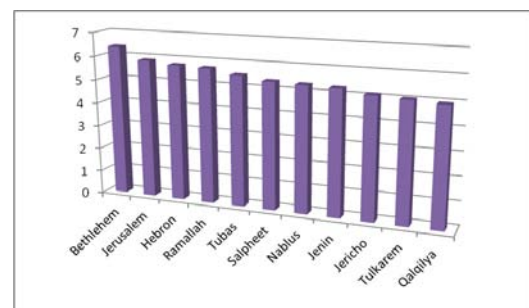


Fig. 5: Aqueous phases exhaustive extraction yields percentages

This research scientifically certified that this plant which cultivated and collected in Bethlehem region of Palestine is the best source for further manufacturing of physiologically standardized active and evidence based pharmaceutical forms also we recommended the researchers to use this plant from Bethlehem region for their scientific works.

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