

## Measurement of Pzformance and rate of effective materials of herbal Tipton's weed (*Hypericum Perforatum*) (case study: Saran-village in East Azarbijan grovience-Iran)

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**Abstract:** A pre-determined rate of *Hypericum perforatum* (6-7 seedlings per m<sup>2</sup>) was planted in 60m<sup>2</sup> area and was harvested during three phases. Then wet and dry weight of the plant were measured and its effective materials were assessed separately in each period of harvesting and different phases of harvesting plant age-ecological conditions (such as: climate, altitude from sea-level, longitude and latitude, humidity, sunshine, soil ph, soil type) and natural stresses in the area. Wet and dryperformance of the plant was 11.5kg and 3.5kg in 60m<sup>2</sup> in the first harvest respectively, while these figures were 20kg and 7.4kg in 60m<sup>2</sup> in the second harvest.

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### Introduction

It should be reminded that using medicinal plants in Iran is not as common as whatever seen in Europe and Americas, so that most of people in Iran are not aware of herbal plants scattered thought the country, or they do not know anything on their medical features. Now days, even research centers supply their needs to these plants from a broad. Therefore, lack of information about these plants in Iran or their precise assessment limit their wide spread use in there.

According to these points, one should know that those methods being used for sewing these herbals are similar to ones being applied for other plants. The only difference is ecological conditions (such as climate-altitude from sea-level, longitude and latitude-humidity- soil type- sunshine- seed breeding), because they are important in quality and quantity of planted herbals materials; and should be assessed by the researcher (3).

Tipton's weed has been used as a herbal especial for healing injuries since 2000 years ago. Then, scientist discovered its probabal feature in stimulating and enhancing human body's defective system. The most excitement and medical capacity of this herbal was discovered in 1988 when scientists found out its considerable activity against a group of viruses including H.I.V, the agent of acquired immunodeficiency syndrome (2).

In 16th century, an apothecary of the era, John Gerard introduced Tipton weed as the most valuable drug for healing serious injuries (2).

Olina Macope from London (1618) advised that if one mites Tipton weed's semi-grained flowers with an oil such as olive oil and puts the mixture against sun for three weeks, the product will be useful for

healing injuries. This method was dominant in English medicine for centuries (2).

In 17th century, another apothecary called. Nicholas cal pepper cited Tipton weed as the only effective drug for healing injuries in his notes (2).

Dr. Charles Millspaugh discovered this plant value and advised it for healing the injuries of the soldiers in America wars in 19th century (2).

Tipton's weed was surveyed widely and precisely in Russia and Germany. These studies show that this plant includes a lot of chemical materials named flavonoids and it can provide a balance in body defective system.

At the same time, another active chemical material is seen in this plant called Hypericine which acts against viruses and depression-other researches confirm this plant's anti-bacterial, anti-fungs, and anti-inflammation effects (2).

1) Farm operations:

Sewing *Hypericum perforatum* in North-east slopes of Sahand in farm fields of Saran, a village around Bostan-abad in East- Azarbijan provience.

Geographical and ecological conditions of the region are as the following:

Geographical features of the region: latitude: 37 51.

Longitude: 46 42

Altitude from sea-level: 1800m

Average annual temperature: 9.306 °C

Annual precipitation in the region: 300.76mm

Average annual sunny hours: 2729.3h/y

Average temperature-precipitation and sunny hours in spring-summer; and October and November in fall 2010 are as following:

Temperature average: 15.3 °C

Precipitation rate: 197.3mm  
Sunny hours: 2233.1h

Table1: *Hypericum perforatum* L. Classification

Kingdom	Plantae – Plants
Subkingdom	Tracheobionta–Vascular plants
Superdivision	Spermatophyta–Seed plants
Division	Magnoliophyta–Flowering plants
Class	Magnoliopsida – Dicotyledons
Subclass	Dilleniidae
Order	Theales
Family	Clusiaceae–Mangosteen family
Genus	<i>Hypericum</i> L.–St. Johnswort
Species	<i>Hypericum perforatum</i> L.– common St. Johnswort

Tipton's weed is a permanent-weed plant with 40-80cm height which has mutual leaves where small transparent dots are seen. Its stems are hard and its flowers are yellow with 5 petals (6).

This plant is augmented through seeds and running stems.

Treatments required for compensating seeds dormancy period: washing seeds with lots of water increases seeds germinations. In addition, Percent of seeds germination increase after harvesting and through time. Light. also, helps seeds germination (6).

#### Activities prior to sowing:

In spring 2009, 3.5 kg/m<sup>2</sup> manure was given to the farm, though, as it was alfalfa farm before that, the soil had not been turned down. Ploughing, in spring 2010 was done 20 days prior to sowing. Farm's roughness was smoothed before plating, then sewing operation was done.

Table2: Soil ph, soil type, nutritive elements rate, and farm soil survey data are as following:

Clay	Silt	Sem	K	P	Organic carbom	T.N.V	PH	EC
11%	19%	70%	640 p.p.m	16.4 p.p.m	2%	5.5%	7.8	1.39ms/cm

#### Sewing *Hypericum perforatum*

This plant is sewed as following: first seeds of the plant are sewed in greenhouse, then seedlings are transported to farm. In present study, the seedlings were purchased from shafa pazhohan-e-Sabz company, and were planted on 10 May 2010 by transporting the seedlings to farm, separating the seedlings from one another together with roots and planting them in farm concerning required distance.

Sewing plants were done while the farm humidity was more than its capacity. 60m<sup>2</sup> of the farm was planted. Almost 6-7 seedlings per each m<sup>2</sup> were planted.

Sewing was performed in farrows method. The plants were sewed on slope mounds. Distance between two bushes is 30cm and distance between two mounds is 40-45cm. Most of the seedlings were brown one week later and then turned into their natural color (green) after a while.

#### Planting

According to considerable weeds in the field, weeds eradication in different phases of growth was done by agronomy metode and weeding. In fact, no chemical poisons were used for weeds control.

After the first harvesting on 15th August 2010 (97days after sewing), about 0.5kg Dry Nitrogen fertilazer was given to the plants.

The plants irrigation continued up to 6th July 2010 (55 days after sewing). Then, they were irrigated for a 16-days period. Irrigation was performed in conventional/traditional leaking way. Water shortage in the region leads to large interval of irrigations.

#### The plant harvesting

*Hypericum perforatum* is harvested by scissors from 3-5cm up to the soil surface, as running stems are one of the ways for the plant augmentation, most of these stems are not harvested on the earth. Therefore, a little soil is put on these stems to germinate new shoots. During harvesting operation, one should be careful of the new roots.

Harvesting is dome from, stems then they are taken to shadow and dried in natural condition (in shadow and gradually).

The first harvest was done on 15th August 2010 (97 days after sewing) when nearly 10% of the plants had flowers.



Figure 1: Tipton's weed- at planting time

The second harvest of the plant was done on 30th October 2010 (173 days after planting) so that about 67, of the plants were free zed and lost.



Figure 2: 10 Tipton's weeds- a day prior to second harvesting

## 2) Laboratory operations

*Hypericum perforatum*, harvested in two times, was ready. Sixty gr of its stema were taken in each time and then it was extrancted. Extracting the effective materials was done by soxhlet machine. Each harvested part was extracted two times. In the first phase, the effective materials were extracted by petroleum ether, while for stems of the second phase ethanol was used for extraction, so that a part of the plant was taken, grained, and 60g of the powder was poured into filtration paper, then it was put inside soxhlet pipe, petroleum ether solvent was poured into soxhlet flask, and finally, temperature was set according to boiling point of this solvent. The solvent was evaporated, went up into the pipe, then it turned into liquid in condesor part cooled by cold water. The liquid drops went through the powdered plant and extraction started when the solvent level in the soxhlet pipe got the siphon level, it entered into the flask automatically. This process went on regularly (for 3.5 hours) to do extraction on the plant dry powder in the first harvest and to complete the experiment. In this phase, those materials solveable in petroleum ether were extracted from the plant.



Figure 3: Extraction by petroleum ether by soxhlet machine in the first harvest.

Completing the experiment in the first phase, the plant was spread in fresh air and in laboratory conditions to be dried and got ready for the second phase.



Figure 4: After the extraction by petroleum ether solvent in the first phase, the plant was spread in laboratory condition to be dried.

In the second phase, the dry plant extracted by petroleum ether was poured into filtration paper (like the first phase) and it was put inside soxhlet machine. This time ethanol solvent was poured into the soxhlet flask to extract the effective materials, so that this time, also, soxhlet machine worked for 3.5 hours. Materials which were solved in ethanol were collected in the soxhlet flask together with the solvent. In each phase of the extraction, materials solved in the solvent and collected in the soxhlet flask were put in laboratory conditions in fresh air for 4 days. During this time, both solvents were diminished and the plant extract left, though the extract was not completely dry so the extracts were put in front of a heater with air flow to be dried. It should be mentioned that the extract taken by petroleum ether was in open air in laboratory for three days more than the one taken by ethanol solvent (for 7 days) as it was wet.

Extraction in the second harvest was done in 2 phases the same as the first harvest so that 60g of dry powder of the plant stems was extracted by soxhlet machine with petroleum ether in the first phase and with ethanol in the second. Like the first harvest, the extract taken by petroleum ether was wet so it was in open air in laboratory condition for 7 days while the extract taken by ethanol was in air for 4 days. However, the extracts taken in both phases in the second harvest were wet and plastic like, therefore they were put in front of a heater with warm air drying (the same as the first harvest).

The most important materials of the plant with drug efficiency are volatile oil, Tanns, Haipersin, Flanoeid, Haiprezid, acids, carotnaied, choline, nicotinameid, and pectin (4).

Medical characteristics and consumption: This plant has anti-spasm and effects, and stimulates the digestive system secretion especially bilious. Eaten by animals, hypercine in the plant causes photosensitivity, heals cuttings and burnings (6).

Consumption: Tizan prepared by tipton's weed (1-2 Food spoon of the plant is poured in cold water,

boiled, and kept for a while) is used for digestion disorders especially for bilious and irregular.

Menstruation. On the other hand, herbal oil of the plant cloog of the grained fresh top branch of the plant with its flower is soaked in 250g olive oil in front of the sun for 15 days, shaken regularly, kept and then filtered). The product is used for healing injuries and ecchymosis (1).

Results: field results are as following:

Studied species	Planted area	Harvesting time	Fresh weight	drg weight	Freezed dry weight
Hypericum perforatum	60m <sup>2</sup>	First harvest:97 days after sewing	11.5kg	3.5kg	-
		Second harvest: 173 days after sewing	20kg	7.4kg	0.450kg

Laboratory results:

Studied species	Harvesting time	Experimental sample	Extract taken by petroleom ether	Extract taken by ethanol
Hypericum perforatum	First harvest	60g of the palnt dry powder	3.04g	7.26g
	Second harvest	60g of the plant dry powder	2.98g	7.12g

### Discussion:

Due to high humidity of the farm soil that was higher than field capacity, the seedlings loss was minimum after being transported to the farm. However, there was suitable conditions for shooting despite of weeds in the field. Weeds grow faster too, though they were controlled with ease because of planting method (farrows).

According to beginning of fall and cool weather, it was expected in the second harvest that the plant performance decline in area and its effective materials loss. That is, a few prior to harvest and during harvest, the weather temperature declined dramatically; and on 29th October 2010 (172 days after sewing) it was -0.8 °C at night. Despite of all these factors, the plant performance increased per area in the second harvest. The plant's fresh weight was 20kg/60m<sup>2</sup> and its dry weight was 7.4kg/60m<sup>2</sup>. These figures were two times of those obtained in the second harvest because the plant was augmented after the first harvest through its running stems on earth. But the quantity of the effective materials in the second harvest and in both phases, with petroleum ether and with ethanol, decreased due to temperature decline in the region. However, as irrigation period up to 6th July 2010 (55 days after planting) was 10 days in the first harvest, 16 day irrigation intervals (because of water stress in the region) can play a role in little decrease of the plant's effective materials.

Another important point is this that the plant extract in the first and second harvests by ethanol was

nearly dry after deleting the solvent, but the extract obtained by petroleum ether was plastic like in the first harvest while in the second phase it was completely plastic. There is no reason for this state due to lack of data on the material's quality.



Figure 5: Extract obtained by petroleum ether solvent in the first and second harvests

Left side: first harvest extract

Right side: second harvest extract

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