

# Ethnobotanical Study of Fumaria Indica Plant From the Hilly and Plain Areas of Haripur

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## Research

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**Ethnobotanical study of *Fumaria indica* plant from the hilly and plain areas of Haripur**

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Waseem Ahmad<sup>1</sup>, Shah Masaud Khan <sup>1</sup>

## **Ethnobotanical study of *Fumaria indica* plant from the hilly and plain areas of Haripur**

### **Abstract**

**Background:** the purpose of this study was to find out the ethnobotanical use of *Fumaria indica* plant from the hilly and plain areas of Haripur . **Methods:**The plant samples of leaf, flowers and root were collected from two hilly areas (Srikot, Khanpur) and two plane areas (Haripur city, Tarbela) of District Haripur and processed for further analysis process. The preferences of local people for the treatment of various ailments in terms of medicinal plant used, part used, the category of diseases treated and the form of therapeutic use (recipe) were analyzed with the help of a questionnaire survey. The recorded data was tabulated theme wise and Microsoft Excel program was used in the calculation of values and percent references and its presentation in graphic form. **Results:** Ethnobotanical study showed that the *Fumaria indica* plant used as a source of medicine in local community, the powder form was used in allergies, fevers and diabetes. The plant was used as a source of medicine and cure many types of bacteria diseases. **conclusion :** *Fumaria indica* & *Caesalpinia bonducella* are the plants known for their digestive, spasmolytic, diuretic, anthelmintic, hepatoprotective, anti-inflammatory, antipyretic anti dysentery activity. Powder drugs of (leaves, roots and flowers) of *Fumaria indica* were made for different analyses.

**Keywords:** ethno medicinal survy, hilly areas , plain areas

## **Introduction**

Fumariaceae is a small family of flowering plants likely to contain about 14 genera and nearly about 400 species were found in Pakistan (Mabberley, 1987). The medicinal importance of Fumariaceae is well-known and has great values. The *Fumaria indica* of the family Fumariaceae are used in medicine for curing snake bite and having phytochemical constituents like alkaloids, tannins, triterpenoids, steroids which has huge medicinal value (Rao *et al.*, 2009). The species of the family are used traditionally in Pakistan and India has great medicinal value used for cured Allergy traditionally medicine as blood purifier, laxative, antiemetic, cholagogue, sedative and gastrointestinal disorder, also used for the cure of temperature (Maiza-Benabdesselam *et al.*, 2007). *Fumaria indica* has great medicinal importance used in the treatment of constipation, diarrhea, fevers and urinary diseases (Canales *et al.*, 2005). Its parts are being used for skin diseases, shoot are in dried form used as herbal tea for relieve abdominal pain (Shah and Khan, 2017). To evaluate the *Fumaria indica* in hilly and plane areas of Haripur and to measure the ethnomedicinal value of this herbal plant (Singh *et al.*, 2011). *F. indica* have extensive medicinal utilization in the Indian conventional medicine, searches conducted to evaluate severe and chronic toxicity of a 60% ethanolic extract of *F. indica* in rodents correspondingly. In severe toxicity search used Swiss strain albino rodent of a few gender were managed verbally *F. indica* quantity of 2, 1.6 and 6 g/kg found for behavioral alteration and death. During 30 days of management. They observed no death or abnormal behavior, in severe toxicity. Study in mice at all the three level *F. indica* did not generate any special change in body weight, daily food and water ingestion of rodents when evaluated to medium treated rats. (Kumar *et al.*, 2018). *Fumaria indica* is a wild

growing weed found in Pakistan and many other region of the world. *Fumaria* also known since long to be a medicinal plant to the practitioners of Ayurvedic and Unani systems of medicine. *Fumaria indica* has potential health element these phytochemicals have proportion of human health benefit for curing of diseases. These chemical used as herbal medicine for the treatments of liver complaints, aches pains, diarrhea, fever, and influenza.

## **Material and Methods:**

### **Ethno-botanical study**

#### **Selection of Sites**

Study on the origin of introductory investigation of the valley and conversation with stakeholders, four different locations namely Srikot and Khanpur (hilly areas), City and Tarbela dam (plane areas) were recognized and elected. These sites are different from one another on the basis of their environment particularly difference in elevation, incline, geography, surroundings, plants type and plant community. The present study is mainly base on investigation taken from the consultation with the "ancestral and local people" on the plant (*F. indica*) have cost-effective significance to them. Appropriate plants were gathered from the following study areas, recognized and conserved at the Herbarium of the Department of Botany, Hazara University Mansehra. In this study taken view of local people about the daily used of the plant which parts of the plant are used by local community were investigated. During this also tells about the local name of the plant in locally language.

## **Identification of Medicinally Important Plant Species.**

Local herbalists, agricultural and forest experts, local elders, and leaders were interviewed and the plant species enlisted in the first part of the study were discussed with them. Moreover, the available literature on the subject was thoroughly studied and relevant information was used to help document the plant species which were medicinally important and available in the valley.

## **Determination of Community Preferences**

The preferences of local people for the treatment of various ailments in terms of medicinal plant used, part used, the category of diseases treated and the form of therapeutic use (recipe) were analyzed with the help of a questionnaire survey. The feedback form (as annexed in appendix 1.1) cover up the following four main areas (Ilangovan *et al.*, 2018).

### **Most Preferred Medicinal Plant Species.**

The respondents were invited to describe the plant name that was generally preferred by the local people for curative care. The percentage for the plant was analyzed through the aid of the following formula (Hussain *et al.*, 2011).

$$\text{Percent Preferences of a Species} = \frac{\text{number of respondents who termed it as most preferred species} * 100}{\text{Total number of respondents}}$$

### **Most preferred Type/category of ailment, cured with medicinal plants.**

The participants were invited to mention the type of an illness by the traditional healthcare. The percent preferences for *Fumaria indica* were analyzed by the aid of following formula (Hussain *et al.*, 2011).

$$\text{Percent Preferences of an ailment} = \frac{\text{number of respondents who termed it as most preferred ailment} * 100}{\text{Total number of respondents}}$$

### **Most preferred type of plant part, used.**

The respondents were asked to mention the name of a plant part which was mostly preferred by the local people for traditional healthcare. The percent preference for plant part was considered through the aid of the following formula (Hussain *et al.*, 2011).

$$\text{Percent Preferences of a plant part} = \frac{\text{number of respondents who termed it as most preferred part} * 100}{\text{Total number of respondents}}$$

### 3.15.4 Most preferred form of utilization (recipe).

The responded were investigated to mention the recipe which was favored by the local people for their curative care. The percent preferences for each recipe were determine through the aid of the following formula (Ahmad and Husain, 2008).

$$\text{Percent Preferences of a Reciepe} = \frac{\text{number of respondents who termed it as most preferred recipe} * 100}{\text{Total number of respondents}}$$

Total one hundred (100) respondents, 25 from every site, were consulted. From each site 5 most popular villages were chosen and 5 accessible eldest participants were investigate (Khan *et al.*, 2012), and the data on every parameters were documented.

#### Statistical Analysis:

The recorded data was tabulated theme wise and Microsoft Excel program was used in the calculation of values and percent references and its presentation in graphic form.

#### Determination of Proximate analysis of *Fumaria indica*

Proximate analysis such as a (fresh, dry weight, ash, crude fiber) in *Fumaria indicaplants* will be determined according to the method of (Rao and Sunitha, 2011). Fresh plant was taken from the field and wash them with water for removed all dust particles from the plant moisture by the use of soft paper and weighted on scale. The plant was taken and it was freed from any sort of moisture and dust. Plant was dried in an oven at 100°F overnight later on the plant was cooled and weighted on scale. Plant sample was ignited in the muffle furnace at 500-600 °C for 8 hrs and ash contents of samples were measured by AOAC (1984) method Crude fiber content was determined by taking 2 gram of plant with 4ml of H<sub>2</sub>SO<sub>4</sub> and remains free for 30 minute after that 2ml Sodium hydroxide (NaOH) were added than all samples were weighted for the absorbance of crude fiber by AOAC (1984) method. Soil pH was calculated in 1:6 soil water suspensions with a pH meter (Jackson *et al.*, 1962).

#### Results

## **Peroxidase contents**

The peroxidase content of different parts *Fumaria indica* in Figure 1 (a) from different locations in which the hilly area Srikot the peroxidase contents were higher (5184 $\mu$ g/g) in the leaf extract of *Fumaria indica* as compare to peroxidase content (4433  $\mu$ g/g) were found in the root extract of *Fumaria indica*. The peroxidase contents were lower ( 3111 $\mu$ g/g) in the flower extract of *Fumaria indica* and from the Khanpur the peroxidase contents were higher (7143 $\mu$ g/g) in the leaf extract of *Fumaria indica* as compare to peroxidase content (5587  $\mu$ g/g) were found in the root extract of *Fumaria indica*. The peroxidase contents were lower ( 4854 $\mu$ g/g) in the flower extract of *Fumaria indica* and from the plane area City peroxidase contents were higher (10638 $\mu$ g/g) in the flower extract of *Fumaria indica* as compare to peroxidase contents (7813  $\mu$ g/g) were found in the root extract of *Fumaria indica*. The peroxidase contents were lower (3333  $\mu$ g/g) in the leaf extract of *Fumaria indica* and from Tarbela the peroxidase contents were higher (9524 $\mu$ g/g) in the flower extract of *Fumaria indica* as compare to peroxidase content (7692  $\mu$ g/g) were found in the leaf extract of *Fumaria indica*. The peroxidase contents were lower (7576 $\mu$ g/g) in the root extract of *Fumaria indica*.

## **Proximate analyses**

### **Fresh weight**

The Figure 1(b) were represented that the fresh weight *Fumaria indica* from different locations in which hilly area Srikot fresh plant weight (5.51g) and Khanpur fresh plant weight (5.53g) and from the plane area City the fresh plant weight (5.56g) were observed and from tarbela the fresh plant weight (5.72g) were observed in the *Fumaria indica* plant.

### **Dry weight**

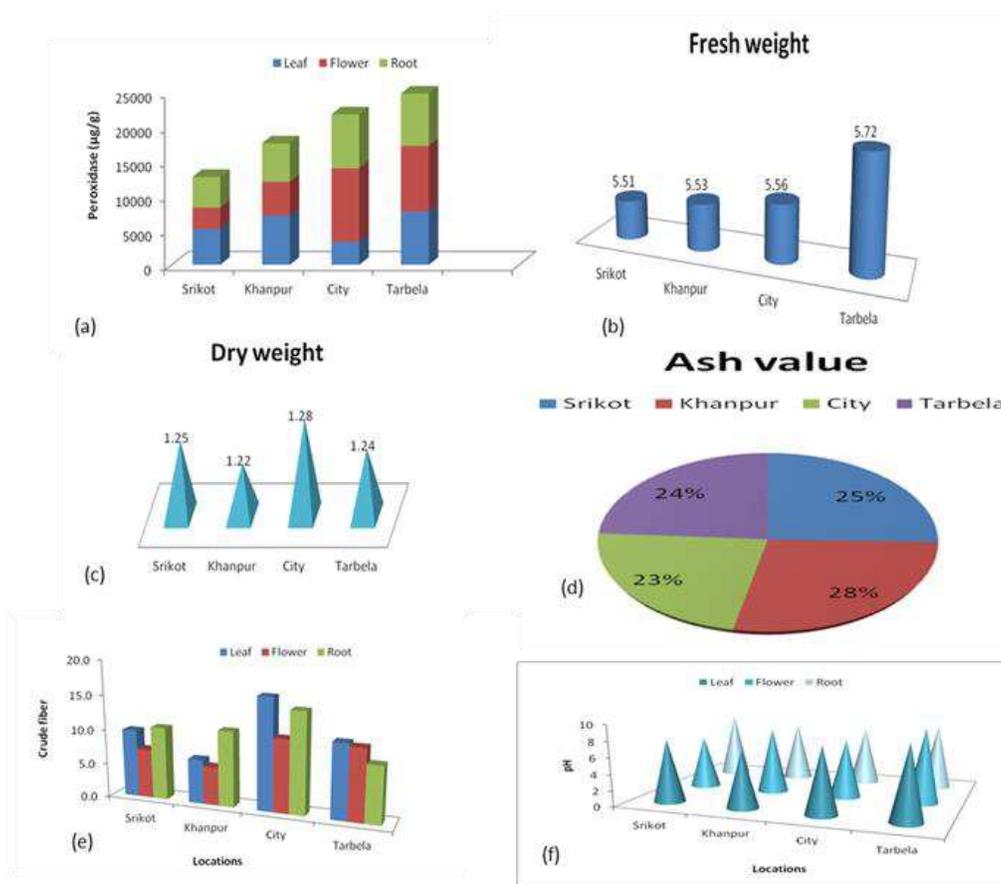
The Figure 1(c) were represented that the dry weight *Fumaria indica* from different locations in which hilly area Srikot dry plant weight (1.25g) and from Khanpur dry weight (1.22g) and from the plane area City the dry plant weight (1.28g) were observed and from Tarbela the dry plant weight (1.24g) were observed in the *Fumaria indica* plant.

### **Ash contents**

The data regarding ash content of *Fumaria indica* were showed in Figure 1(d) represent that the ash content *Fumaria indica* from different locations in which hilly area Srikot ash content (0.48%) and Khanpur ash content (0.52%) and from the plane area City ash content (0.43%) were observed and from tarbela the ash content (0.45%) were observed in the *Fumaria indica* plant.

### **Crude fiber**

The crude fiber of different plant samples of *Fumaria indica* were presented in figure 1(e) the results indicated that there was a wide range of variation in the crude fiber concentration of different plant samples which are collected from different areas. From the hilly areas Srikot the crude fiber content was higher (10.5mg) in the root extract of *Fumaria indica* as compare to leaf extract (9.8mg) and the lower content of crude fiber (7.1mg) was recorded in the flower extract of *Fumaria indica* and Khanpur the crude fiber was higher (10.9mg) in the root extract of *Fumaria indica* as compare to leaf extract (6.9mg) and the lower content of crude fiber (5.5mg) was recorded in the flower extract of *Fumaria indica*. From the plane area City the crude fiber content was higher (16.1mg) in the leaf extract of *Fumaria indica* were observed as compare to the root extract (14.5mg) and the lower contents of crude fiber (6.9mg) was recorded in the flower extract of *Fumaria indica* and from Tarbela the crude fiber contents was higher (10.7mg) in the leaf extract of *Fumaria indica* as compare to the flower extract (10.3mg) were observed and the lower content (8.1mg) was recorded in the root extract of *Fumaria indica*.



**Figure 1 (a)The peroxidase contents *Fumaria indica* at different locations**Figure (b) Total fresh weight of *Fumaria indica* plant from different locations**Figure (c ) Total dry weight of *Fumaria indica* plant from different locations. (d) The Ash content of *Fumaria indica* from different locations. € Crude fiber contents of *Fumaria indica* at different locations. (f) pH values of *Fumaria indica* in different parts of plant from different locations**

## pH

The pH of different plant samples of *Fumaria indica* were presented in figure 15. The results indicated that there was a wide range of variation in pH of different plant samples which are collected from different areas. From the hilly areas Srikot the pH was higher (7.8) in the leaf extract of *Fumaria indica* compare to the root extract (7.6) and the least pH value (6.58) was recorded in the flower extract of *Fumaria indica*. From Khanpur the pH was higher (7.5) in the leaf extract of *Fumaria indica* compare to the flower extract (7.2) and the least pH value (7.1) was recorded in the root extract of *Fumaria indica*. From the plane area City the pH was higher (8.2) in the leaf extract of *Fumaria indica* compare to the root extract (7.4) and the least pH value (7.3) was recorded in the flower extract of *Fumaria indica* and from Tarbela the pH was higher (9.1) in the

leaf extract of *Fumaria indica* compare to the root extract (8.1) and the least pH value (7.0) was recorded in the flower extract of *Fumaria indica*. The pH value depends on the different compounds which present in the plant.

### **Ethnobotanical study of *Fumaria indica***

The *Fumaria indica* belong to family Fumariaceae, flowering periods (April-May) plant species were grow habit herb. Understandable reality that the public of Pakistani rural areas widely depend on plant drug for the treatment of diseases. The residents of Srikot, Khanpur, City and Tarbela valley are blessed to have wide range of wild plant that are beneficial, play vital role in environment. The results show that from these areas selected *Fumaria indica* were locally called (papra) and know about their medicinal importance from these selected locations.

### **Most preferred medicinal use of *Fumaria indica***

The results obtained on this factor were given in Figure 16. In terms of this study exposed that the medicinally important of species “*Fumaria indica*” at different locations. From the hilly area Srikot (12.21%) and from Khanpur (13.11%) on the other hand from plane area City (10.22%) and from Tarbela (11.33%) were obtained.

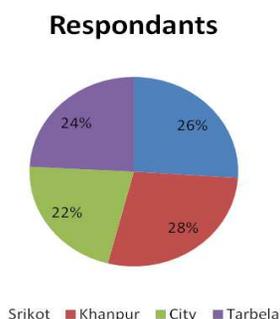
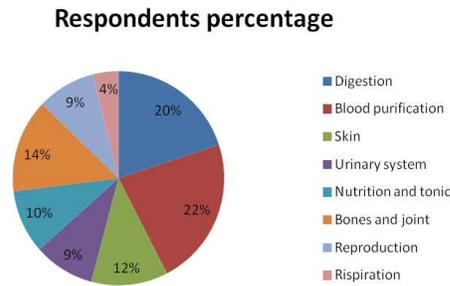


Figure 2: Percentage of respondent`s preferences for medicinal use of *Fumaria indica* at different locations.

### **Most preferred Type/category of ailment, cured with *Fumaria indica***

The results achieve on this factor were given in figure 17 indicates that *Fumaria indica* are highly medicinal value use to cured many disorders related with the digestive system (31.05%) follow by

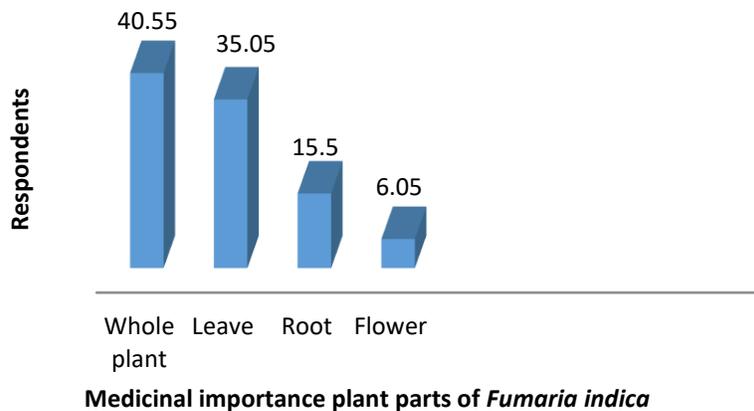
those linked by respiration (6.1%), blood purification(35.05%), skin(18.35%), urinary(14.43%), nutritional and tonic (15.2%), bones and joints (22.05%) , reproductions (13.84%) .



**Figure 3: Percentage of respondent`s preferences for category of use, of *Fumaria indica* from all selected locations.**

**Most preferred type of plant part, used**

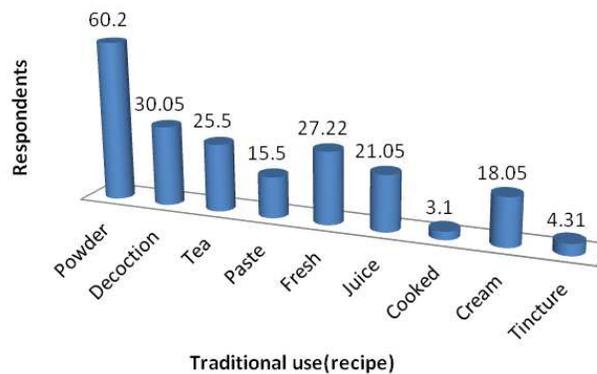
The introductory survey showed in figure 18 indicated that in maximum treatments. Whole plants (40.55%) ,Leaves (35.05%) , Roots (15.5%),Flowers (6.05%) were used by the local community.



**Figure 4: Percentage of respondent`s preference part used of *Fumaria indica* at different locations.**

### Most preferred form of utilization (recipe)

The four conclusion showed in figure 18 was a survey concerning the type of apply (recipe). Indicated that maximum consumption of *Fumaria indica* plant in the form of following. Powder (60.2%) Decoction (30.05%) Tea (25.5%) Paste (15.5%) Fresh (27.22%) Juice (21.05%) Cooked (3.1%) Cream (18.05%) Tincture (4.31%) The results of this study indicated that powder form followed by decoction was the mainly favored the consumption by the local native community of Srikot, Khanpur, City and Tarbela in their daily life.



**Figure 5: Percentage of respondent`s preference for traditional use (recipe) of *Fumaria indica* at different locations.**

### Major Themes:

#### Most used /preferred local medicinal plant species.

Local name of the species: Uses in the Area:Which part is collected:

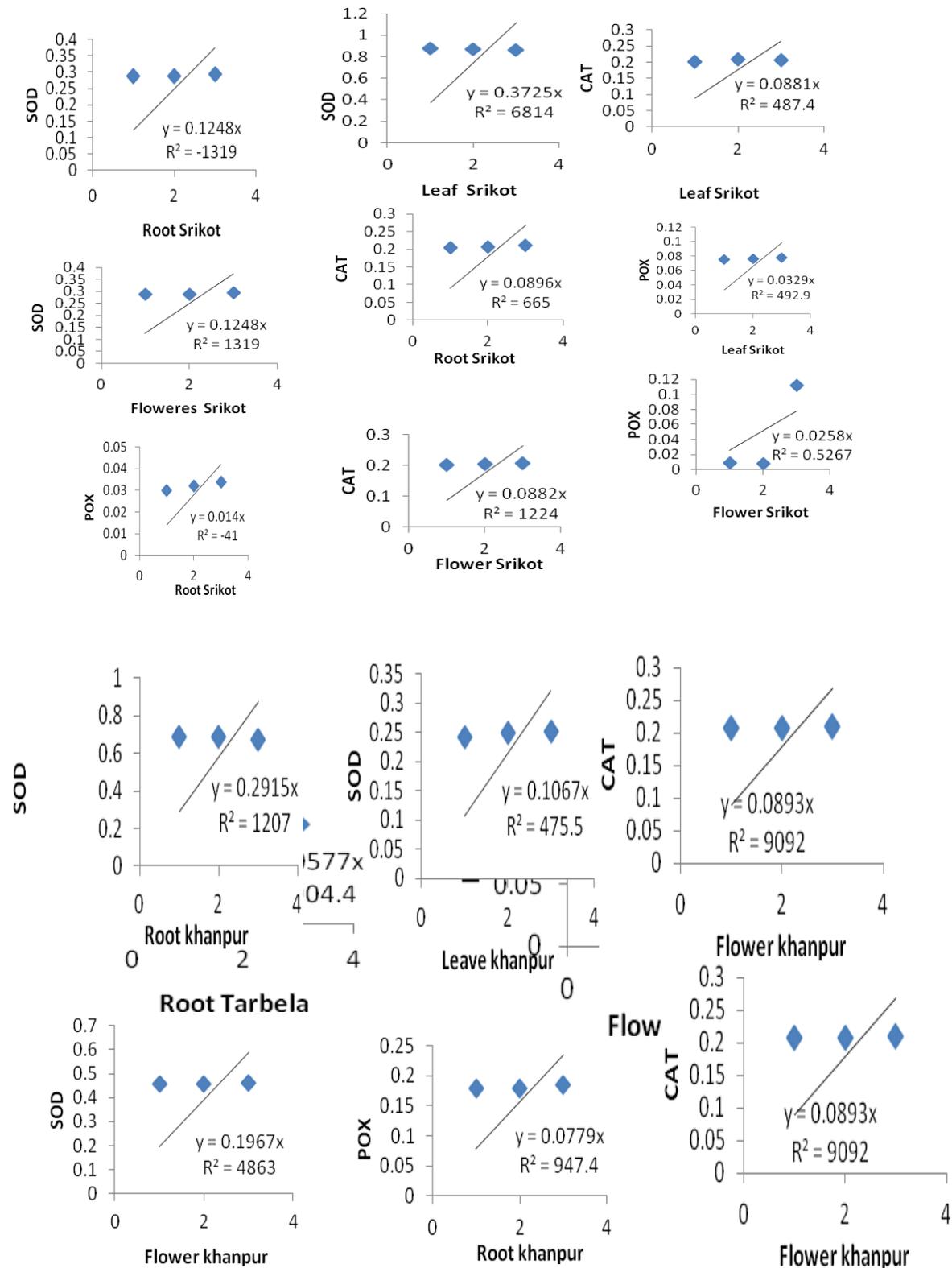
#### Most preferred health problem treated with local plants.

Health problems related to: Reproduction, skin, digestion, nutrition and tonic, respiration, blood purification, bones and joints, brain and nerves, urinary system.

**Most preferred traditional use / recipe commonly used** Tea, paste, fresh, cream, tincture, powder, and decoction, juice, cooked.

**Most preferred plant part used in traditional healthcare.** Flower, shoot, root, rhizome, leaves, fruit, whole plant, bark, seed

The linear standard curved of SOD, CAT and POX in different parts *Fumaria indica* from different locations were represented in following figures.



## Discussion

Proximate analyses and ethnobotanical study of *Fumaria indica* from different locations to promote this medicinal plant. Medicinally the plants have countless significance. Its part is utilized to prevent vomiting, Fever and diabetes. *Fumaria indica* is rare plant a precise exploration has been performed so that's why peoples are unaware of plant importance. Ethnobotanical study is very important for plant medicinal value and knows information for traditional used of medicinal plant that's used for the treatments of different diseases. Pakistan is the homeland of different medicinal plant people used native plants in their daily routine life for medicinal purposes (Ahmad and Husain, 2008). Fresh weight of *Fumaria indica* was measured from different locations results were found that more fresh weight is obtained Tarbela plant (5.72g) compare to City (5.56) Khanpur (5.53g) and Srikot (5.51g) fresh plant weight shown Figure 11. The difference occurred due to biotic factor that influence the plant. Analyzed the dry weight of *Fumaria indica* from different locations from which more dry weight quantity was measured (1.28g) from City plant than that of Srikot (1.25g) Tarbela (1.24g) and Khanpur (1.22g) shown Figure:12. The difference occurred due to moisture contents which was present in plant. . Ash content of *Fumaria indica* was observed from different locations the result was obtained the higher ash content (0.52%) from Khanpur area plant compare to Srikot (0.48%) Tarbela (0.45%) and City (0.43%) shown Figure:13. This is similar to the finding of (Fu *et al.*, 2016). investigated that Ash content were different in different plant found that there is a negative response of ash with organic matter and both have an inverse relationship. They reported that increase in ash content decreased the organic matter content.

It was found that crude fiber content were analyzed in different parts of *Fumaria indica* at different locations (Srikot, Khanpur, City, Tarbela). The higher content (16.1mg) was obtained in leaves of City and the lower crude fiber content (5.5mg) was measured in flower of Khanpur area plant and locations wise result were show that from hilly areas crude fiber contents were found higher in samples collected from Srikot as compare to Khanpur site plant samples on the other hand from plane areas higher crude fiber contents were found in City site sample as compare to Tarbela site samples shown Figure:14. This is similar to the finding of (Ravikhanthe, 2014) studied nutritional chemical constituents of the *Fumaria indica*. They isolated that *F. indica* contain huge amount of chemical constituent such as crude fiber, protein, fat, which was highly medicinal

value. pH value were found in different parts *Fumaria indica* from different localities (Srikot, Khanpur, City, Tarbela) The higher pH value was show in (9.1) in leaf of Tarbela and the least pH value (6.58) in flower of Srikot and locations wise result were show that from hilly areas pH value were found higher in Srikot plant as compare to Khanpur area plant samples on the other hand from plane areas higher pH value was found in Tarbela plant as compare to City area plant samples shown Figure:15. The collection of plant samples in various places of Haripur due to different places soil pH effect the plant parts that's why the pH values or extract values the pH is changes. This observation is relevant to plants. (Laleh *et al.*, 2006) who reported that the pH values depends on the different compounds which present in plants the variations in abiotic conditions during field and the factors effecting on plants pH, temperature and soil condition etc. Ethnobotanical study of *Fumaria indica* were found from different locations (Srikot, Khanpur, City, Tarbela) in local language *Fumaria indica* was called "Papra" finding that *Fumaria indica* has highly medicinal value plants were connected through stomach disorders follow by those related with reproductive, respiratory, cleansing of blood, skin allergies, brain and nerves, urinary, nutritional and tonic, and use to relief the bones and joints pain. Plant was used by local community as whole plant, leave, root and flower these all part were highly medicinal used for the treatment of diseases, utilized in the form of powder, decoction, tea, paste, fresh, juice, cream and Tincher shown in Figure. 16-19. which is closest to (Ravikhanthe, 2014) investigated that *Fumaria indica* & *Caesalpinia bonducella* are the plants known for their digestive, spasmolytic, diuretic, anthelmintic, hepatoprotective, anti-inflammatory, antipyretic anti dysentery activity. Powder drugs of (leaves, roots and flowers) of *Fumaria indica* were made for different analyses.

**Conclusion:** *Fumaria indica* & *Caesalpinia bonducella* are the plants known for their digestive, spasmolytic, diuretic, anthelmintic, hepatoprotective, anti-inflammatory, antipyretic anti dysentery activity. Powder drugs of (leaves, roots and flowers) of *Fumaria indica* were made for different analyses.

## **Declarations**

**Ethics approval and consent to participate**

Not applicable.

**Consent for publication**

Not applicable.

**Availability of data and materials**

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

**Funding**

No funding supported this study.

**Competing interests**

Conflict of interest no potential conflict of interest reported.

**Authors' contributions**

Lubna conducted the whole study. Gulam Mujtaba supervised the study, Nadia helped in data collection. Saira Bibi and Fiaz Khan prepared and formatted the manuscript, Masood and Waseem co-supervised the research.

**Acknowledgments**

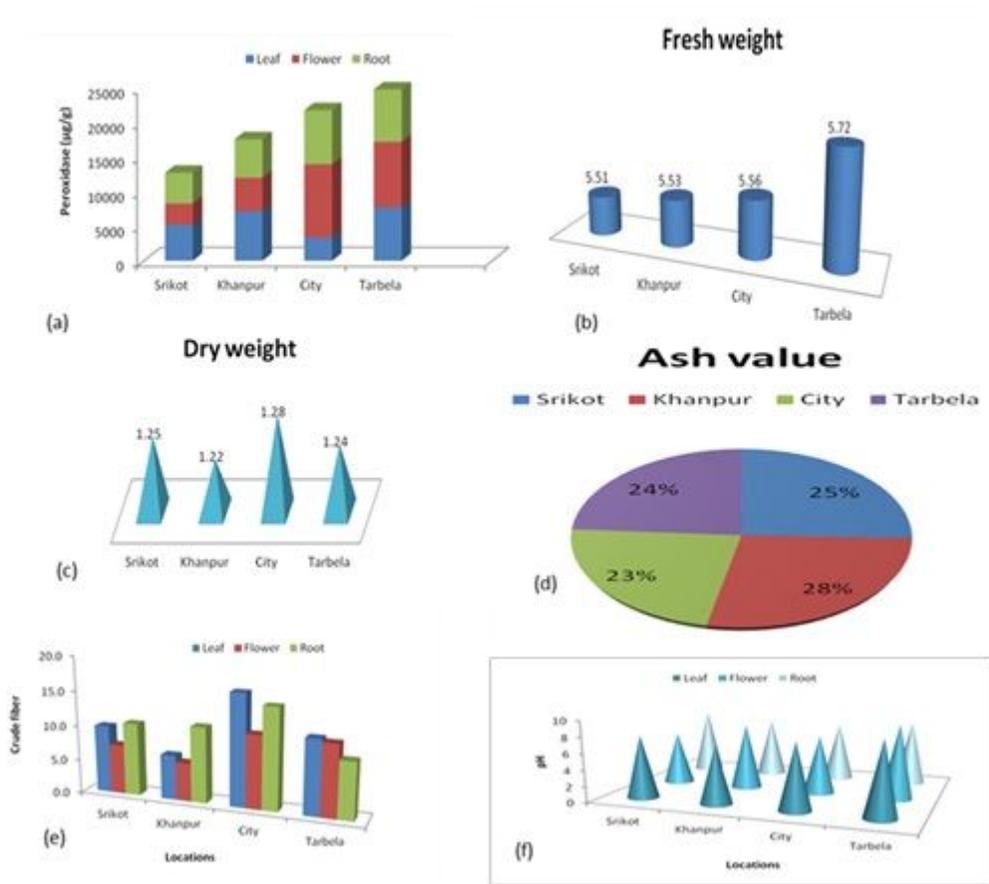
I would like to acknowledge my supervising team and my coauthors.

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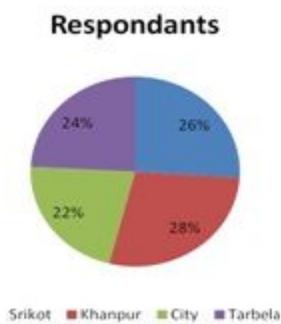
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# Figures



**Figure 1**

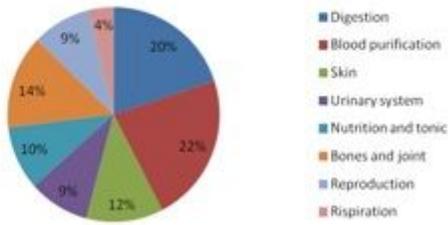
(a) The peroxidase contents of *Fumaria indica* at different locations. Figure (b) Total fresh weight of *Fumaria indica* plant from different locations. Figure (c) Total dry weight of *Fumaria indica* plant from different locations. (d) The Ash content of *Fumaria indica* from different locations. (e) Crude fiber contents of *Fumaria indica* at different locations. (f) pH values of *Fumaria indica* in different parts of plant from different locations.



**Figure 2**

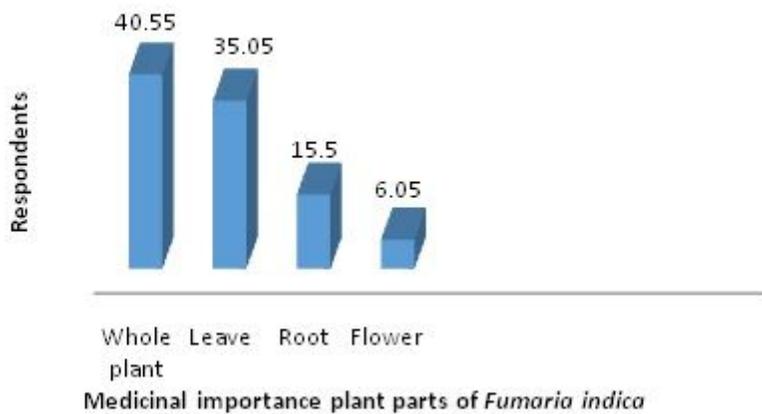
Percentage of respondents' preferences for medicinal use of *Fumaria indica* at different locations.

**Respondents percentage**



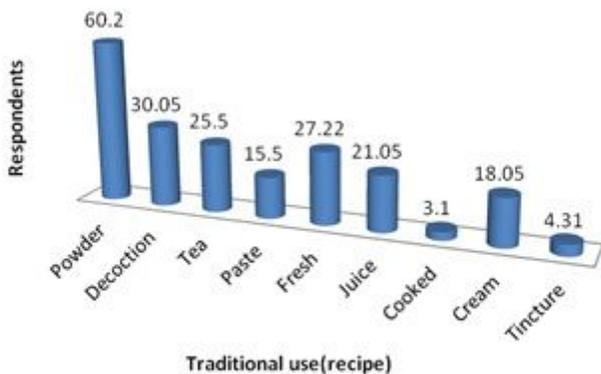
**Figure 3**

Percentage of respondent`s preferences for category of use, of *Fumaria indica* from all selected locations.



**Figure 4**

Percentage of respondent`s preference part used of *Fumaria indica* at different locations.



**Figure 5**

Percentage of respondent`s preference for traditional use (recipe) of *Fumaria indica* at different locations.