

WEEDS: An Important Source of Natural Medicine

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ABSTRACT

Medicinal biology is one of the oldest fields of Biology, and it originates from Ayurveda. Ayurveda mainly focuses about life style and incorporation of natural resources (plant) for the betterment of human being. There are many cultivated plant which are used as food while there are many unwanted plants, which have tendency to grow them, whenever they will get favorable conditions, we treat them as unwanted plants (weeds). This is the era of natural science and treatment of diseases through nature. There are many common weeds, which have very important chemical compounds. These chemical compounds can be treated as novel ligand molecules and it acts against different diseases. Complete details of the weeds like habitat, classification, common name, medicinal uses and chemical compounds found in it are explored. These weeds were already used by many tribal, local and villagers as medicine. These indigenous and traditional practices are now acknowledged by people all over the world. Use of weeds for medicinal purposes has proven to be a tremendous tool in expanding the roots of ethnobotany. Weeds compounds can be explored further to identify new possibilities and how It can be used positively for mankind. Plants like *Argemone Mexicana*, *Tridax procumbens*, *Chrysopogon zizanioides*, *Parthenium hysterophorus*, *Cynodon dactylon*, *Amaranthus spinosus*, *Mimosa pudica* and *Oxalis corniculata* easily found in our lawns, gardens and on road side which are having tremendous medicinal value. Exploring about them we can enriching our knowledge about weeds as medicine.

Keywords: Weeds, Traditional medicine, Phytochemicals, Alkaloids, Medicinal Plants

INTRODUCTION

Plants in any form for human life are important and treated as local heritage with global importance. Plants are widely used as medicine from ancient time and now due to overexploitations of different species, so protection measures are important, to save the species having medicinal value. At the beginnings, the medicinal plants' use were instinctive [1]. Variety of plants were used as medicine and oldest written evidence for preparation of drugs from plant has been found on a Sumerian clay slab from Nagpur, which is 5000 years old [2]. The variety and sheer number of plants with therapeutic properties is quite astonishing. Approximately 35,000 to 70,000 tons of raw medicinal traded per annum in the form of medicinal plant material [3]. New era is a scientific era and now scientist explore more in plants, a typical finding, which opens new doors in usage of weeds as medicine. Various weeds of medicinal importance and their parts such as flowers, fruits, berries, roots and rhizomes, tubers, seeds, sap, gel, barks etc are extracted to obtain various chemical constituents for pharmaceutical purposes [4,5].

Plants are utilised as medicine because they produced some active ingredients and are the effective against some diseases. Among this some of the main groups of active chemical constituents are Mucilage, Phenols, Tannins, coumarins, Anthraquinones, Flavonoids, Anthocyanins, Glucosilicates, Volatile oils, Saponins, Cardiac Glycosides, Alkaloids, vitamins and minerals. The active compounds are mainly secondary metabolites, produced by the plant for the protection against some pathogens like insects or from adverse climatic conditions like, frost and drought [5].

The weeds are mainly treated as a hazard to the cultivated crops like vegetables and the losses due to these are more than either diseases or insects. Thus, the eradication of weeds is necessary step to get a maximum yield from the crop. Many chemicals were used frequently, to control the growth of weed which ultimately affects the nutritive values of vegetables. To solve this major issue, it is proposed to use these weeds instead of killing them. Keeping this in view such losses can be compensated by exploring the medicinal utility of such weeds [6].

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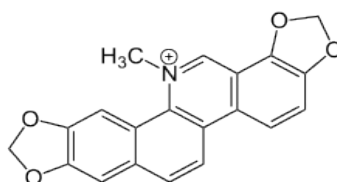
Discovery of alkaloids, Flavonoids and other secondary metabolites, that acts against many disease were the major through back. Traditional medicines are the actual originator of modern medicines. Different phytochemicals were obtained from many weeds plants like like *Amaranthus spinosus*, an alkaloids, which helps in treatment of ulcerated mouth, ulcers and sores. *Chrysopogon zizanioides* (*Vetiver*) has been used in traditional medicine in India, Pakistan and Sri Lanka [7]. *Sida cordifolia* weed of Malvaceae is used to cure illness such as fever, headache, and intestinal parasitic infections. *Hygrophilla longifolia* (*Asteracantha longifolia*), family Acanthaceae; which is having medicinal values in Ayurveda and diabetes [8-10]. *Leucas aspera* belonging to family Lamiaceae commonly known as "Thumbai" (in Tamil). It has traditional important and its flowers are used as stimulant, expectorant (treats cough), asperients (relieve constipation), insecticide. Its flowers are mixed with honey to treat cold in children [11,12]. In the present study we have tried to compile data of few weeds which are having some important phytochemicals and can be utilized as medicinal plant, rather than unwanted weeds.

1. *Argemone mexicana* (Papaveraceae)

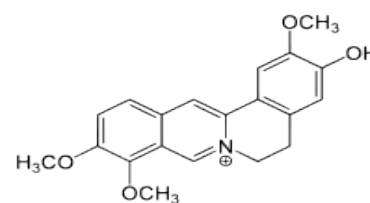
It is commonly known as Satyanashi. It is a pioneer plant, grow easily in poor soil conditions and tolerant of drought (Figure 1a). It secretes bright yellow latex, poisonous to grazing animals, so rarely untilled by animals. The plant is used both as fresh and dried, it helps in relieving the kidney pain, expelling a torn placenta and overall cleanses the body. It contains some important phytochemicals like alkaloids sanguinarine, jatrorrhizine, oxyberberine (Figure 1b, c). Sanguinarine is one of the most important used as alternative medicines to cure pneumonia, coughs, weak lungs, kidney, liver, bladder. It is also used as emetic [13]. Jatrorrhizine, has an anti-inflammatory effect and it improves blood flow in body [14].



(a)



(b)

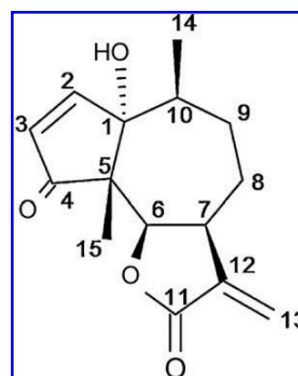


(c)

Figure 1: Showing (a) *Argemone maxicna* plant (https://en.wikipedia.org/wiki/Argemone_mexicana) and phytochemicals (b) Sanguinarine (c) Jatrorrhizine.



(a)



(b)

Figure 2: (a) Showing *Parthenium hysterophorus* plant (<https://www.sheepcentral.com/prohibited-weed-parthenium-appears-at-forbes-and-walgett/>) and (b) phytochemical

properties and it is used for the protection against various disease like osteoporosis and cardiovascular disease (Figure 3c) [25]

4. *Saccharum spontaneum* (Poaceae):

S. spontaneum commonly known as kans grass, khagori, keshe. It is a perennial grass of height 100-200 cm (Figure 4a). Root of *Saccharum spontaneum* when boiled in cow milk improves the quantity of milk of lactating women [26]. The active component of this plant is flavonoids and alkaloids. Flavonoids are important antioxidants, and promote health effects (Figure 4b) [26]. Alkaloids act as lifesaving medicines used in the treatment of like heart failure, blood pressure (Figure 4c) [27].

5. *Oxalis corniculata* (Oxalidaceae):

Commonly known as creeping wood sorrel or sleeping beauty (Figure 5a). It is an endangered plant with medicinal important

[28]. It is well known as, good appetizer and for anaemia, dyspepsia, cancer, dementia, convulsion and piles [29]. It is also used as homemade remedy for indigestion and diarrhoea in kids [30]. The leaves are very effective in skin related diseases like warts, corns etc. Leaves juice mixed with castor oil is a useful against insomnia [31,32]. Its major constituents are flavonoids, which are effective against diseases (Figure 5b).

6. *Ricinus communis* (Euphorbiaceae)

Castor is found throughout in tropical regions and it is indigenous to India. Plant is purplish, bronze in colour with long, shiny leaves (Figure 6a). Castor oil is one of the well-known product of this plant. which is useful in many areas is obtained from this plant. Whole plant is useful in many ways, like the aqueous solution extract has analgesic effect on some animals, while the ethanolic extract of root bark has antihistamine and inflammatory properties. The

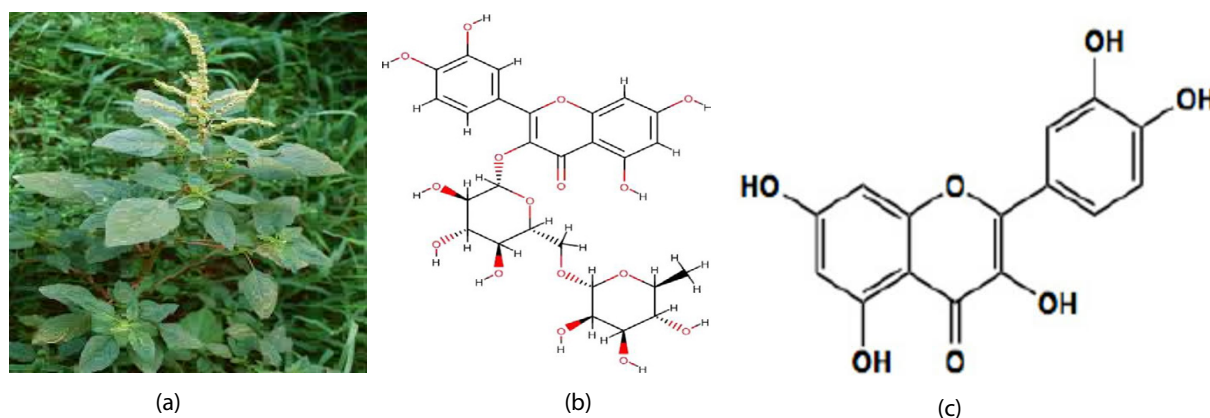


Figure 3: Showing (a) *Amaranthus spinosus* plant (<https://gobotany.nativeplanttrust.org/species/amaranthus/spinosus/>) and phytochemicals (b) Rutin (c) Quercetin.

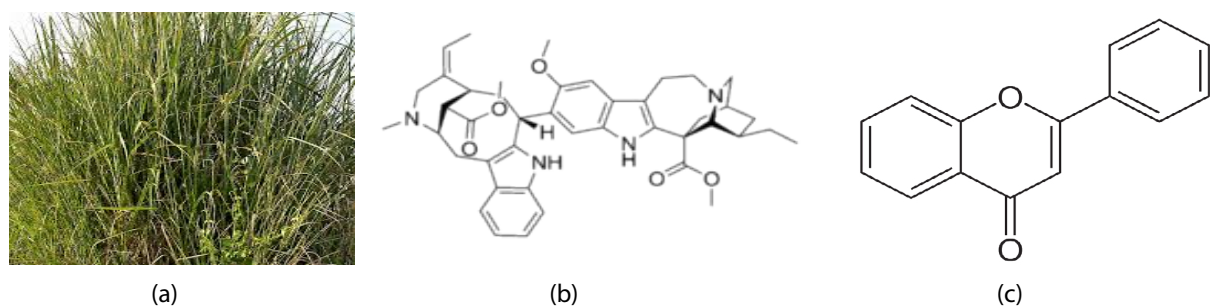


Figure 4: Showing (a) *Saccharum spontaneum* plant (<https://assessment.ifas.ufl.edu/assessments/saccharum-spontaneum/>) and phytochemicals (b) Flavonoids (c) Alkaloids.

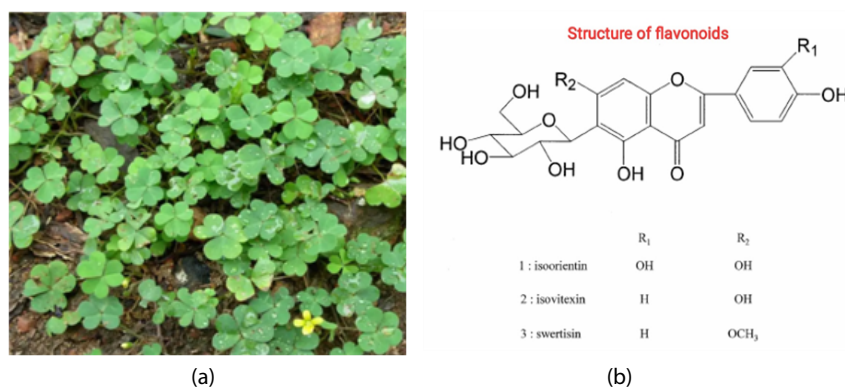


Figure 5: Showing (a) *Oxalis corniculata* plant (<http://tropical.theferns.info/viewtropical.php?id=Oxalis+corniculata>) and phytochemicals (b). flavonoids structure [1: luteolin 6-C- glucoside (isoorientin), 2: apigenin 6-C- glucoside(isovitexin), 3: isovitexin 7- methylether (swertisin)] isolated from the shoots of *O. corniculata* (29).

active compounds found in this plant are terpenoids and tocopherol [33,34] (Figure 6b, c). The terpenoids basically helps in aromatic properties of plant, and useful against cancer, inflammation, anti-bacterial [35]. Another most important component is Tocopherol, which is having antioxidant properties of vitamin E. It prevents skin damage by UV radiation [36].

7. *Taraxacum officinale* Asteraceae:

Taraxacum officinale is one of the most common plant found in lawns, roadside, sea shore etc (Figure 7a). It is medicinal very important against anti-inflammatory, anti-carcinogenic and anti-oxidative activities [37]. The plant extracts helps in curing some liver related diseases, increases appetite [38]. *Taraxacum officinale* are having some very important phytochemicals like luteolin, apigenin, caffeic acid, isoquercetin, chlorogenic acid and sesquiterpenes (Figure 7b, c, d) [39]. Apigenin is neurogenesis, helps in curing neurological disorders, as it easily crosses the blood brain barrier. It is less toxic to normal cells and helps to treat cancer. Caffeic acid is having antioxidant properties while Chlorogenic acid helps to lowers the blood pressure [39].

8. *Sida acuta* (Malvaceae)

It is commonly known as Brown weed and wire weed. Plant is having cymose inflorescence, leaves are simple and linear (Figure 8a). This plant contains phytochemicals like Asparagine, saponins, alkaloid and cryptolepine [40]. Whole plant body decoction is used to cure variety of health problems like fever, dysentery, headache and to cure wounds [41]. It is also widely used as anti-inflammatory agent and for digestion related problems [42]. There

are many chemical constituents found but the main functional constituent is alkaloid cryptolepine which help in curing wounds (Figure 8b) [43].

9. *Datura stramonium* (Solanaceae)

It is popularly known as jimson weed. *D. Stramoniumis* is a herbaceous plant with funnel shaped, white or purple coloured flower fig9a). It is widely used for the treatment of asthma. Mainly used to cure headache and leaf infusion vapours are used to relieve the pain of rheumatism and gout [44]. Burning leaf smoke gives relief to asthma and bronchitis patients. Its fruit juice is used to treat falling hair and dandruff. Seeds and leaves were used for hysterical and psychotic patients. Scopolamine is important compound which is used for cholinergic - blocking hallucinogen (Figure 9b) [45].

10. *Vernonia cinerea* (Compositae)

Plant is erect, rarely decumbent, annual herb. It is mainly found in wet and dry soil and on the rock crevices (Figure 10a). The plant juice given to children with urinary incontinence. A decoction of it is also given in diarrhoea, stomach aches and cough [46]. Plant possess anti cancerous properties. Leaves are useful in conjunctivitis and in lacrimation, eaten as a potherb [47]. Triterpenes, is an important compound found, which show anti inflammatory effects, so are potentially useful phytopharmaceuticals [48] (Figure 10b).

In the present study we have studied twenty three most common weeds, which are plants medicinal importune. Out of this we

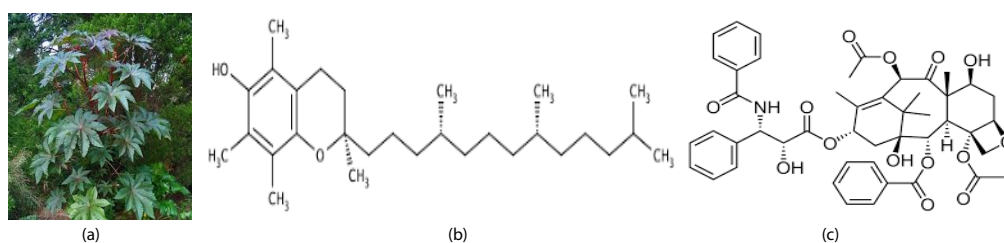


Figure 6: Showing (a) *Ricinus communis* plant (<https://www.pinterest.com/pin/378372806174000243/>) and phytochemicals (b) Terpenoids (c) Tocopherol.

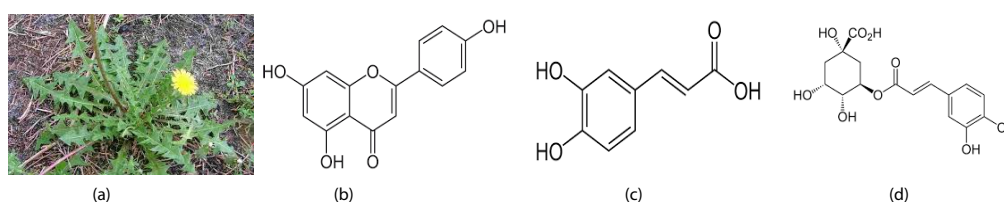


Figure 7: Showing (a) *Taraxacum officinale* plant (https://keyserver.lucidcentral.org/weeds/data/media/Html/taraxacum_officinale.htm) and phytochemicals (b) Apigenin (c) Caffeic acid (d) Chlorogenic acid.

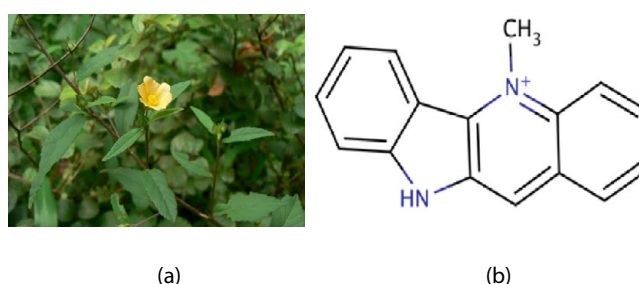


Figure 8: Showing (a) *Sida acuta* plant (<http://tropical.theferns.info/viewtropical.php?id=Sida+acuta>) and phytochemicals (b) cryptolepine structure.

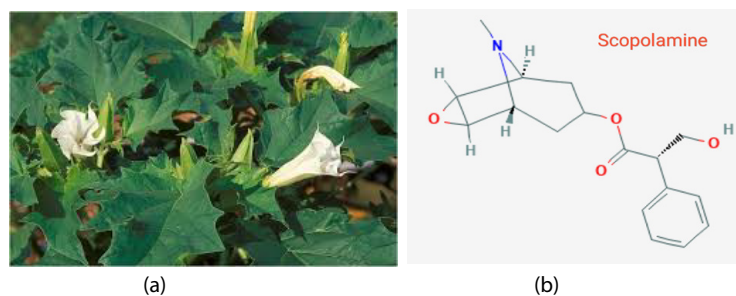


Figure 9: Showing (a) *Datura stramonium* plant (https://www.fs.fed.us/wildflowers/ethnobotany/Mind_and_Spirit/datura.shtml) and phytochemicals (b) Scopolamine structure.

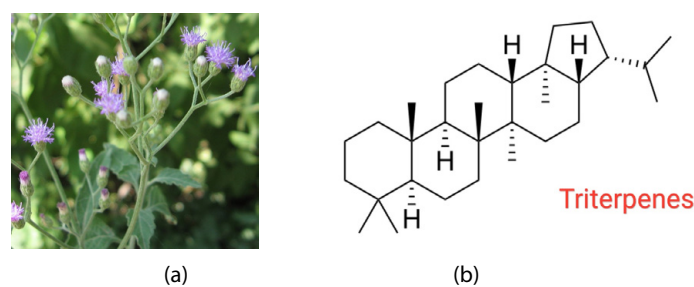


Figure 10: Showing (a) *Vernonia cinerea* plant (<https://www.naturalmedicinefacts.info/plant/vernonia-cinerea.html>) and phytochemicals (b) Triterpenes structure.

Table 1. Showing different weed plants and its part used for disease control with active phytochemicals.

SNO.	PLANT NAME	FAMILY	PART USED	CHEMICAL CONSTITUENT	MEDICINAL VALUE	References
1	<i>Argemone Mexicana</i>	Papaveraceae	Whole plant	Sanguinarine, jatrorrhizine	Kidney pain, Malaria	13, 14
2	<i>Tridax procumbens</i>	Asteraceae	Leaf	Flavonoid procumbenetin	Boils, Blisters, cuts	49
3	<i>Chrysopogon zizanioides</i>	Poaceae	Roots	A-Vetivone, khusimol, terpinen-4-ol	Fever, Skin diseases	50
4	<i>Parthenium hysterophorus</i>	Asteraceae	Roots	parthenin	Dysentery, Fever, Neurological disorders	51
5	<i>Cynodon dactylon</i>	Poaceae	Roots	Flavonoids, alkaloids, triterpenoids	Stomach ulcers, Constipation	52
6	<i>Amaranthus spinosus</i>	Amaranthaceae	Roots	Chlorogenic acid, quercetin	Menorrhagia, Eczema	53
7	<i>Mimosa pudica</i>	Fabaceae	Roots, Leaves	Tannins, alkaloids	Renal stones, Fracture of bones	54
8	<i>Saccharum spontaneum</i>	Poaceae	Roots	Flavonoids, alkaloids	Burning micturion, Diarrhoea	55
9	<i>Bidens pilosa</i>	Compositae	Whole plant	luteolin	Inflammation, Rheumatism	56
10	<i>Oxalis corniculata</i>	Oxalidaceae	Leaves	flavonoids	Stomaches, Skin diseases	57
11	<i>Ricinus communis</i>	Euphorbiaceae	Leaves	Terpinoids, tocopherol	Protect liver	58
12	<i>Taraxacum officinale</i>	Asteraceae	Whole plant	Luteolin, apigenin, chlorogenic acid, sesquiterpenes	Increases appetite, Liver-related diseases	59
13	<i>Cuscuta europaea</i>	Convolvulaceae	Whole plant, Roots	cuscutine	Blurred vision, Polyurea	60
14	<i>Sida acuta</i>	Malvaceae	Whole plant	alkaloid	Fever, Headache	61
15	<i>Datura stramonium</i>	Solanaceae	Seeds, Leaves	scopolamine	Asthma, Insomnia	62
16	<i>Opuntia ficusindica</i>	Cactaceae	Seeds, Flower, Pulp	Belatin, flavanoids	Diabetes, Hypertension	63
17	<i>Vernonia cinerea</i>	Compositae	Whole plants, Leaves, Seeds	triterpenes	Stomach aches, Cough, Conjunctivitis	64
18	<i>Achyranthes aspera</i>	Amaranthaceae	Roots	saponin	Itching, Skin diseases	65
19	<i>Ageratum conyzoides</i>	Asteraceae	Whole plant, Leaves	tannins	Colic, Rheumatisms	66
20	<i>Hygrophila auriculata</i>	Acanthaceae	Whole plant, Roots	alkaloids	Urinary infections	67
21	<i>Euphorbia hirta</i>	Euphorbiaceae	Leaves	Azelin, quercitrin, myricitrin	Pneumonia, Asthma	68
22	<i>Phyllanthus amarus</i>	Phyllanthaceae	Whole plant	Phyllanthin, ellagitannins	Cough, Reduce blood sugar level	69
23	<i>Leucas aspera</i>	Lamiaceae	Leaf, Flower	Stilbene, tannins	Diabetes, Gastric trouble	70

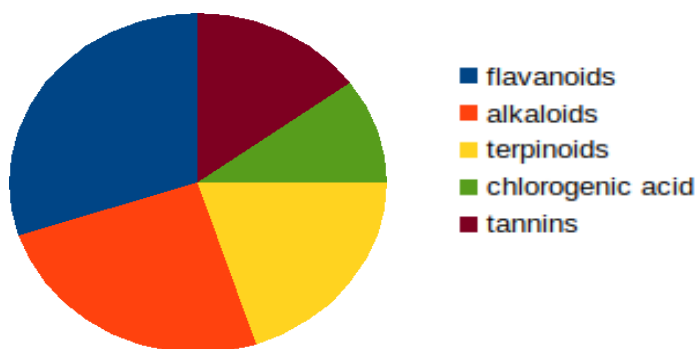


Figure 11: Some common active components found in above mentioned weed plant.

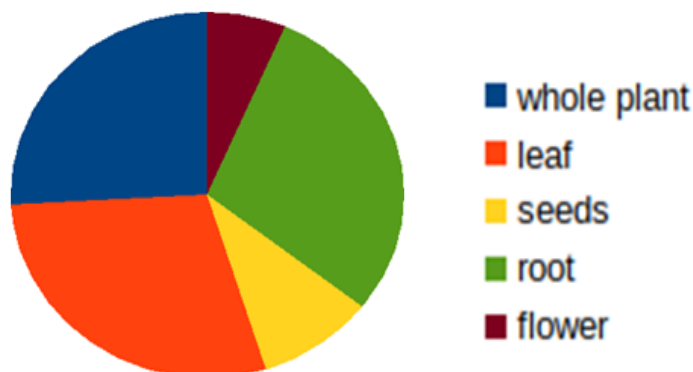


Figure 12: Parts of plant used for medicinal purposes of above mentioned weed plant.

summarises ten plants in details with families and their uses in different diseases control. Table 1 shows different plants with active phytochemicals, and these compounds actually made the weed important.

We have also tried to analyse the most common type of phytochemical found throughout the weeds. We can conclude from our analysis that flavonoids are the main chemicals responsible for the medicinal value of plant (weed), the second most common is alkaloid. Tannins and terpenoids are although common in plants but having less medicinal importance (Figure 11).

Similar to this we have also tried to conclude the main plant part which is highly useful as medicine and from figure 12, we can easily demarcate that leaves and roots are the most important part as it has more medicinal value. In many weed plant whole plant is also useful, while flowers and seeds are less medicinally important

CONCLUSION

Although we use plants in different forms and our traditional and modern living style is completely dependent upon plants. Weeds are the most ignored plants in our biological system, but as science develops, it opens new doors for the uses of weeds as medicine. These plants help human beings in many different ways. Study of weeds and its active phytochemical as medicine can give a new insight to the plant research.

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