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## Review Article

### EXPLOITATION OF WEED PLANTS AS BENEFICIAL PURPOSE

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*Correspondence	Abstract
<p>Deepika Srivastava Department of Microbiology, Kanya Gurukul Girls Campus, Gurukul Kangri University, Haridwar, Uttarakhand, India</p> <p>DOI: 10.7897/2321-6328.01219</p> <p>Article Received on: 07/06/13 Accepted on: 13/08/13</p>	<p>Weed is anything which does not require much care to grow. They are useful plants just in wrong location. Although they cause adverse effect on plant productivity and health hazards in animals and human beings but they have numerous beneficial properties in one way or the other. While some are incredibly invasive to detriment plants, sometimes they can also save a landscape from further degradation. There are certain weeds which help in breaking up and aerating soil, fixing nitrogen and providing organic material when they die, such as <i>Taraxacum officinale</i>. They are important from the standpoint of medicinal, allelopathic and food values such as <i>Elytrigia repens</i>, <i>Aegopodium podagraria</i>, <i>Allium uineale</i>, <i>Chenopodium album</i>, <i>Polygonum vulgare</i> etc. There is a great scope of many weeds for phytoremediation, making compost and vermicompost, biopesticides, herbal medicines, soap, glue, food, fodder, essential oil, industrial, soil and water conservation etc. They have a great potential which can be utilized by poor farmers at very low cost. This is also eco friendly and can save our national drainage of money for purchasing inorganic fertilizers which are source of pollution. They also provide more balanced environment by providing food and habitat for insects and other creatures. Biological control represents a concrete alternative to chemicals as it saves and strengthens the ecological balance that existed before the use of agrochemicals. This control method diminishes the dependency of local farmers on external inputs like pesticides, thus allowing for healthier living and working conditions. Efforts should be made for commercial utilization of weeds having beneficial potential, so they can be used on large scale which will be eco friendly and cost effective.</p> <p><b>Keywords:</b> Weeds, allelopathic, bio pesticides, ecological balance, agrochemicals</p>

## INTRODUCTION

Weed is anything which does not require much care to grow. They are the plants growing just in the wrong location, so they are removed as they will interfere or compete with our desirable plants. They are comprised of the more aggressive, troublesome and undesirable elements of the world's vegetation<sup>1</sup>. In many cases the use of the term "weed" as a collective description of all those plants which detract from the productivity of an area is more or less arbitrary. Many plants which are of good nutritive value or which contains elements necessary for maintaining the health and performance of domestic animals are counted among the weeds and controlled because their yield is relatively low. Along with nutritive value they play several important roles in different fields such as medicinal, phytoremediation, industrial etc. As early as 1891 Stebler and Schrocter wrote in the *Landwirtschaftliches Jahrbuch der Schweiz* "There is probably hardly any plant which is purely injurious and from the farmer's standpoint of no use whatever." Even the directly poisonous plant may be of significance on account of the contribution it may make. Weeds not only adversely affect the plant productivity but many of them also cause health hazards in human beings and animals. They also affect seriously the biodiversity.

Apart from this, they may have numeral beneficial properties in one way or the other and have immense potential as food and fodder, medicinal, aromatic, phytoremediation, industrial, soil and water conservation resources etc. If some

of the weeds are invasive to detriment the plants, some of them can also save the landscape from further degradation. So proper utilization of weeds can contribute significantly to enhance the income of poor farmers; besides giving benefit to control in various ecosystems. There are some reports regarding the utilization of weeds. There have been several reports to show that weeds are also playing important role in various ways.

In June, 1949 by F. von Gruenigen presented a paper in fifth international grassland congress, Noordwijk, Netherland about the importance of weeds for the nutrition of cattle<sup>2</sup>. In September 1978 S.C. Dutta and A.K. Banerjee, published a paper in which they reported about the useful weeds of West Bengal, India rice fields. Out of 158 weed species collected from the rice fields of Hooghly and Midnapore districts of West Bengal, India 124 possess economic importance in one way or the other<sup>3</sup>. S. Jeeva *et al.*, 2006 reported about the weeds of Kanyakumari district, India and their value in rural life. In this they enumerated about the medicinally important weeds frequently used by the local communities of Kanyakumari district, Tamil Nadu, India. In this a total of 93 Medicinal weedy species from 85 genera used in traditional medicines were identified, majority of which were used in curing skin diseases, fever, cold and cough, etc<sup>4</sup>.

In 2008 D.K. Bhattacharya and P.C. Borah gave information about medicinal weeds of crop fields of Nalbari district, Assam, India in which they described about 32 medicinally important weed species found in different crop fields along

with some other plant species believed to have medicinal properties, which are being used by the rural people, particularly the woman in Nalbari district, Assam, India. The herbal recipes recorded in the study may provide ample opportunities to study them critically for their efficacy and also for the new drug development<sup>5</sup>. So, it is very important to explore and further trap the information on this aspect, for which a “National Consultation on Weed Utilization” was convened at directorate of weed science research, Jabalpur, India during 2009. The purpose of this National Consultation was to provide a platform to all the weed scientists engaged in different aspect of research on weed utilization at various Institute and universities.

### Utilization of Weeds in Different Aspects

#### Medicine

Many of the weeds are known to possess medicinal values with a high potential as a source of income with a very little cost. Some of them are:

#### *Prunella vulgaris* (Self heal)

It can be used in the treatment of wounds, ulcers, sores etc. It can also be taken internally as a tea in the treatment of conditions such as fever, diarrhea, sore mouth and internal bleeding.

#### *Urtica dioica* (Stinging nettle)

A tea made from the leaves has traditionally been used as a cleansing tonic and blood purifier. So, the plant is often used in the treatment of hay fever, arthritis, anemia etc. The roots contain a substance which have been shown to have a beneficial effect upon the prostate and is now used in a very effective formula to treat an enlarged prostate.

#### *Polygonum aviculare* (Knotweed)

It is safe and effective astringent and diuretic herb that is used mainly in the treatment of complaints such as bleeding, dysentery and hemorrhoids. It is also taken in the treatment of pulmonary complaints because it contains salicylic acid which strengthens connective tissue in the lungs. Recent research has shown that it is useful medicine in the treatment of bacterial dysentery.

#### *Elytrica repens* (Couch grass)

It is considered as a herbal medicine, a decoction of the roots being very useful in the treatment wide range of kidney, liver and urinary disorders.

#### *Plantago major* (Common plantain)

It is safe and effective medicinal herb. The leaves are externally used as a healing poultice and treatment for bleeding, quickly staunching blood flow and encouraging the repair of damaged tissue. Internally they are used in the treatment of a wide range of complaints including diarrhea, gastritis, peptic ulcers irritable bowel syndrome, hemorrhage etc.

#### *Stellaria media* (Chickweeds)

It is beneficial in the external treatment of any kind of itching condition, it has been known to soothe severe itchiness even where all other remedies fail. When applied as poultice, relieves any kind of roseolo and is effective wherever there

are fragile superficial veins. An infusion of the fresh or dried herb can be added to the bath water and its emollient property will help to reduce inflammation in rheumatic joints.

#### *Taraxacum officinale* (Dandelion)

It is specially effective and valuable as a diuretic because it contains high level of potassium salts and therefore can replace the potassium that is lost from the body when diuretics are used. The latex contained in the plant sap can be used to remove corns and warts. The latex has a specific action on inflammations of the gall bladder and is also believed to remove stones in the liver.

#### *Tussilago farfara* (Colts foot)

It is an effective demulcent and expectorant herb, colt's food is one of the most popular European remedies for the treatment of wide range chest complaints, soothing cough and helping to get rid of catarrh.

#### *Oxalis corniculata* (Yellow sorrel)

Its leaves are used as an antidote to poisoning by the seeds of *Datura* spp., arsenic and mercury, while the leaf juice has a soothing effect when applied to insect bites, burns and skin eruptions.

#### *Portulaca oleracea* (Purslane)

It has more  $\beta$ -carotene than spinach and has been used historically as a remedy for arthritis and inflammation in Chinese medicine.

#### *Verbascum thapsus* (Mullein)

Its leaves are an expectorant, stimulating coughing to clear congested lungs. The dried leaves can be taken as tea or in capsules to treat a number of respiratory ills including asthma and oil made with the flowers is a natural remedy for ear infections.

#### *Pueraria montana* (Kudzu)

It has been used in Chinese medicine for centuries to treat a host of ills including dysentery, allergies, migraines and diarrhea and it is currently being researched for use in western medicine as a treatment of alcoholism.

#### *Arctium lappa* (Burdock)

National Cancer Institute has expressed an interest in further researching the lignin compounds in Burdock as potential cancer preservatives.

### Nutritional Food

Many of the weeds are rich supplements of nutrients such as protein, vitamins, minerals, antioxidants etc. Some of them are:

#### *Stellaria media* (Chickweed)

It is having nutritional elements and can be eaten raw or cooked. It is great source of vitamin A, D, B complex and C. It is also packed with minerals like Fe, Ca, K, Zn.

#### *Taraxacum officinale* (Dandelion)

They are rich in vitamin A, C, folate and calcium (Ca). They can be eaten in salads and even the flowers are also edible.

*Epilobium angustifolium* (Rosebay willow)

It is good source of vitamin A and C. The roots are eaten raw, cooked or dried and ground into a powder.

*Polygonum aviculare* (Knotweed)

It can be used as a potherb; they are rich source of zinc (Zn).

*Glechoma hederacea* (Ground ivy)

They can be used in herb tea, rich in vitamin C.

*Portulaca oleracea* (Purslane)

It is eaten throughout much of Europe and Mexico. It contains a number of antioxidants which neutralizes cancer causing chemical agents known as free radicals. It contains more Omega-3 fatty acids than any other leafy vegetable plant. It is loaded with ascorbic acid (vitamin C),  $\beta$ -carotene (previtamin-A), glutathione (a common antioxidant compound that can even detoxify some pesticide) and tocopherol (vitamin E). It can be eaten in salads; stir fried, or can be cooked like spinach.

*Equisetum* (Horsetail)

It is primeval plant that produces its own vitamin D and is high in silica; Tops are very similar to and can be eaten like asparagus.

*Chenopodium album* (Lamb's quarters)

High in iron, protein, calcium and Vitamin B and an excellent spinach substitute, a favorite vegetable in the middle Ages.

**Organic Farming**

Organic farming is defined as production system which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators and livestock feed additives to the maximum extent feasible. The main aims of organic farming are to achieve food and nutritional security, to encourage long term maintenance of soil fertility, crop productivity and soil health, to encourage and enhance biological cycles within the farming system, involving microorganisms, soil flora, soil fauna, plants and animals. This also help in conserving, developing and utilizing the natural resources in the efficient way, to recycle / reuse biomass materials either on farm or elsewhere in order to minimize pollution that may result from agricultural practices. Generally in India, FYM and compost are the main sources of manuring. However these have become scarce and costly due to reduction in the cattle population and increase in mechanization. Besides, application of leaf manuring and crop residue incorporation is also in practice to some extent. There are some weeds species which are largely available can also be used as organic manures.

In Karnataka, India *Parthenium*, *Cassia*, *Chromolaena* and *Portulaca* area available in large quantity. Although *Parthenium* is a toxic weed it can be used for many purposes such as compost and green leaf manure<sup>6</sup>. Further, *Cassia serecia* is used to control *Parthenium*, which can also be utilized for composting as this weed produce high biomass. Besides, *Chromolaena odorata* is another obnoxious weed fastly spreading in western ghat region is also useful in composting<sup>7</sup>. Commonly found another weed *Partulaca oleracea* in the field crops of heavy rainfall area having higher succulence can also be tried for composting. With this

background in view, the present investigation was carried out to find out the influence of composts prepared from the various weed species on growth and yield of Sorghum crop.

**For Nitrogen Fixation and as Fertilizer**

Some of the weeds can be used for breaking up and aerating the soil, fixing nitrogen. *Asclepias* (Milkweed) can be used as a more effective insulator and emits a chemical that breaks up hard soil allowing nearby plants to develop healthier root systems. The occurrence of a symbiotic nitrogen fixing bacteria in the rhizosphere of twenty weed species has been investigated. Using the roll tube method root-rhizosphere soil samples were diluted and added to test tubes containing low nitrogen media. Tubes were flushed with nitrogen, stoppered and rolled to form a thin film of media on the inner wall. After 7 days incubation the nitrogen fixation rates were estimated using the acetylene reduction technique. Rates ranged from 38 to 783 nmoles acetylene reduced per hour. Of twenty species tested, three showed high rhizosphere populations of a symbiotic nitrogen fixing bacteria. *Pteridium aquilinum* (Bracken) ashes can be used as fertilizer as it is rich in potassium. It can also be mulched to increase the fertility. *Rumex crispus* (Curled Dock) is a good plant for establishing fertility in the soil. Its deep roots bring up nutrients that would otherwise be lost while its leaves make compost.

*Urtica dioica* (Stinging nettle) leaves are excellent addition to the compost heap and can be soaked for 7-21 days in water to make a very nutritious liquid feed for plants.

*Plantago major* (Common plantain) helps to maintain the fertility of the soil. Trifolium (Clover) is a legume which hosts nitrogen fixing bacteria in its roots and thus fertilizes the soil for neighboring plants. *Vicia americana* (Wild vetch) is a legume which fixes nitrogen.

**Phytoremediation**

Phytoremediation is a non destructive and cost effective in situ technology that can be used for the cleanup of contaminated soils.

Some plants can render harmless, extract or stabilize a contaminant in soil, thus making it unavailable for other organisms and reducing environmental hazards in a process termed phytoremediation<sup>8</sup>. The mechanisms and efficiency of this technology called phytoremediation depend on the type of contaminant, bioavailability and soil properties<sup>9</sup>. The mechanism believed to be responsible for most of the degradation of petroleum hydrocarbons in vegetated soil is the stimulation of growth and activity of degrading microorganisms in the rhizosphere<sup>10</sup>. There are several approaches to selecting candidate plants for phytoremediation of soils contaminated with organic pollutants.

These approaches have been based on the occurrence of plants under specific climatic conditions<sup>11,12</sup> their resistance to pollutant phytotoxicity<sup>13</sup>, the presence of phenolic compounds in the plant root exudates<sup>14,15</sup> or their capability to reduce the pollutant concentration in soil. Most studies on the phytoremediation of petroleum hydrocarbon contaminated soils have employed grasses (poaceae) and legumes (legu-minosae)<sup>16-21</sup>. Some weeds of the grass family are considered to be particularly suitable for phytoremediation since they offer an increased rhizosphere zone because of their multiple ramified root systems. This

gives room for more microbial activity and growth around the root zone<sup>16</sup>. Researchers like, Adam and Duncan, (1999); Merkl *et al.*, (2004, 2005) have concluded that grasses and legumes are the best candidates for the process of phytoremediation or rhizoremediation because of their root systems<sup>22,18,23</sup>. There was an investigation carried on by Obgo *et al.*, 2009 in which they choose weeds commonly found in abundance in Nigeria for screening for the purpose of phytoremediation in a country like Nigeria where environmental contamination with petroleum based products occur frequently.

The plants chosen are *Phyllanthus amarus* Schum and Thonn., *Hyptis spicigera* Lam., *Sida rhombifolia* L. and *Mariscus alternifolius* Vahl. *Phyllanthus amarus* belongs to the family Euphorbiaceae it is a common weed of cultivated fields which is very wide spread in West Africa. *H. spicigera* Lam. of the family Lamiaceae is a widespread weed in the Guinea-savannah zone. It occurs mostly in moist soils in bush fallows and by the road side. It is cultivated as a food flavouring agent and used locally as an insect repellent for protecting cowpea seeds and other grains during storage. *S. rhombifolia* of the family Malvaceae called wire weed is also wide spread in West Africa and commonly found on roadsides, grasslands, pastures and disturbed areas in both the derived savannah and Guinea savannah zones. *Mariscus alternifolius* of the family Cyperaceae is common weed of cultivated crops and wastes. It is very widespread in west Africa, especially Nigeria<sup>24</sup>.

The *Eichhornia caassipes* (water hyacinth) can also tolerate very high levels of heavy metals like arsenic, mercury, chromium, nickel and toxins such as cyanide. The Plants absorb most of these poisons and help to purify water.

#### Others

*Pteridium aquilinum* (Bracken)

A glue can be made from its rootstock. Its rhizome lathers readily in water and can be used as soap.

*Taraxacum officinale* (Dandelion)

Researchers have discovered that dandelion root sap can be economically used in the production of high quality rubber.

*Urtica dioica* (Stinging nettle)

A beautiful permanent green dye is obtained from a decoction of the leaves and stem.

*Polygonum aviculare* (Knot grass)

Blue dye is obtained along with it yellow and green dye can also be obtained.

*Eichhornia caassipes* (water hyacinth) can be used for the production of biofuel- both bio ethanol and biogas. This will save our national drainage of money and will also lower the air pollution.

#### CONCLUSION

It is important to recognize weeds that can play a constructive role. There are several ways in which weeds can be useful such as food, fodder, medicines, biopesticides etc. Researchers should work for the commercial utilization of weeds, so that it can be used on large scale which will be cheap as well as environment friendly.

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