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Prospects and Problems of Utilization of Weed Biomass: A Review.

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Review Article

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ABSTRACT

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, phyto-remediation, industrial, soil and water conservation resources etc. 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. Biodegradable material of microbial, plant or animal origin shall form the basis of the fertilization programme in organic farming. 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, applications of leaf manuring and crop residue incorporation are also in practice to some extent. There are some weeds species which are largely available can also be used as organic manures.

INTRODUCION

Weeds are the plants growing where it is not desired, weeds deplete crops environment and compete for nutrients, water and light thereby reducing the crops yield. Considerably weeds which always exist on earth in large number, have more vigour, high persistence and can thrive in any extreme climatic and edaphic condition. Weeds also create health hazards. They are also responsible for the loss of biodiversity. Among the biotic factors weeds cause about 37% of loss of agricultural produce (Fig.1). Food loss due to the weeds is estimated around 20 m.t and about 100 billion rupees is spent on weed management annually in India. Though weeds cause considerable damage in various ways they are not regarded as absolutely useless and many advantages have been attributed to them.

Weeds show tremendous growth potential having a capacity to produce huge biomass viz., 5-20 kg/m^2 in *Parthenium*, 9.3 kg/m^2 in *Chromolaena*, 3 kg/m^2 in *Cassia*, 1-1.5 kg/m^2 in *Lantana* and 10-11.5 kg/m^2 in *Water hyacinth* with higher plant nutrient content [1]. In order to maintain ecological balance it is necessary to utilize the weed biomass generated in and around our ecosystem very effectively. Utilization of these weed biomass for

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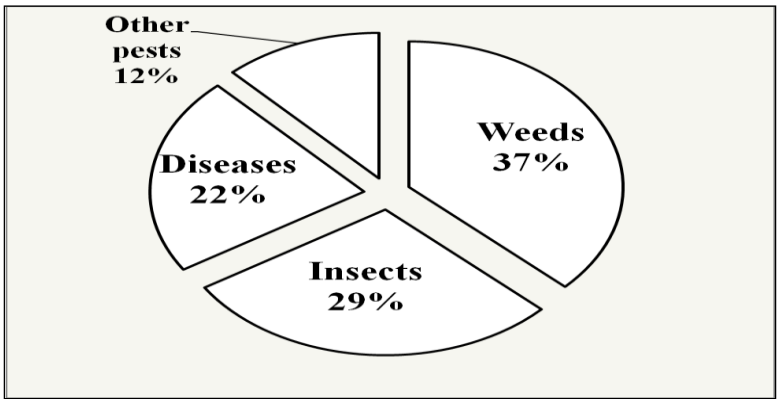
various purposes certainly give a better substitution of the certain resources, which are under scarcity. So that better conservation of resources will be meet in long run.

Figure 1: Total annual loss of agricultural produce in India



Das [5] reported that weeds reduce the quantity of crop yield indirectly by competing with crops for light, space, nutrients and water (Table 1). The magnitude of yield loss, however, depends on kinds of weeds and crops (root and shoot growth habit, canopy architecture, nutrient, water and light requirement, growing duration), severity and duration of weed infestation (density, biomass and species-distribution/spread of weeds), competitive ability of crop plants and climate and soil conditions.

Table 1: Crop yield reductions (%) in due to season-long weed infestation in India

Crops	Yield reduction (%)	Crops	Yield reduction (%)
Rice (upland)	50-60	Chick pea/lentil	10-15
Rice (transplanted)	15-20	Cotton (Rainfed)	30-50
Dwarf wheat	10-25	Green gram/ black gram/cowpea	15-20
Tall wheat	10-25	Groundnut	50 (erect varieties)
Maize	20-30		25 (spreading varieties)
Sorghum	20-30	Sugarcane	20-70
Pearl millet	20-30	Jute	30-70

Table 2: Weeds show tremendous growth potential

Weeds	Biomass (t/ha)	Quantity of nutrients (kg) added /ton of weed biomass		
		N	P	K
Parthenium (2.16, 0.55 & 1.68%)	50-200	21	5	16
Chromolaena (2.5, 0.4 & 3.2%)	93	25	4	32
Cassia	30	-	-	-
Lantana (2.5, 0.25 & 1.4%)	10-15	25	2	14
Water hyacinth (2.2, 0.56 & 2.5)	100-115	22	5	25

Weeds show tremendous growth potential having a capacity to produce huge biomass - 5-20 kg/m^2 (from parthenium), 9.3 kg/m^2 (from chromolaena), 3 kg/m^2 (from cassia), 1-1.5 kg/m^2 (from Lantana) and 10-11.5 kg/m^2 (from water hyacinth) with higher plant nutrient content in their biomass [1].

Reasons for utilization of weed biomass

- Availability of organic manures like FYM & green manures is continuously declining in Indian agriculture.
- Supply of nutrients through inorganic fertilizers is costly & unsustainable in the long run.
- Synthetic agro-chemicals & fertilizers have caused adverse effects on the environment leading to loss of biodiversity.
- Chemical fertilizers & pesticides not only pollute environment but also diminish soil health & sustainability.
- Weeds are natural source of great potential value and the utilization of weeds for compost preparation is very beneficial for organic farming.

- Balanced application of compost & chemical fertilizers is essential to obtain optimum yields & to maintain soil fertility.
- Management by utilization.

Nutrient composition of Weeds

When we study about the nutrient composition of weeds a higher NPK content is noticed which is a potential and an alternative source for synthetic fertilizers (Table 3). Certain plants have got higher % of major nutrients [1].

Table 3: Nutrient composition of Weeds

Name of Weeds	N (%)	P_2O_5 (%)	K_2O (%)
Chromolaena odarata	2.5-2.6	0.38-0.58	2.2-4.0
Parthenium hysterophorus	2.16	0.55	1.68
Lantana camara	2.50	0.25	1.40
Water hyacinth	2.20	0.56	2-3.1
Cynodon dactylon	2.40	0.45	2.50
Cyperus rotundus	2.50	0.38	2.70
Salvinia molestra	2.05	0.54	2-3.1
Chenopodium album	2.59	0.37	4.34
Barnyard grass	2.98	0.54	2.96
Digitaria marginata	0.95	0.50	0.93
Ipomoea carnea	2.30	0.75	3.00

MRS, Hebbal, Bangalore Ramachandra Prasad [16]

Prospects on Utilization of Weed Biomass

Though weeds are hazardous as far as farming is concerned; has beneficial effects too. Many weeds are having economic importance as it can be used for food, fodder, and green manure, medicinal and other purposes.

Beneficial aspects of weeds or Ethno botany

Green manure, Composting, Vermicomposting.

Several leguminous weeds are used for green manuring and composting, e.g. *Ipomoea carnea, Eichhornia crassipes, Vernonia, Calotropis gigantia,Cassia tora.*

Good leafy vegetables

Higher nutrients content of several weed species namely, *Chenopodium, Amaranthus, Cassia, Trianthema, Coccinia, Digera* have tempted humans since time immemorial to use them as vegetables for fulfillment of nutritional requirement.

Feed and fodder for animal

Weeds are used as fodder and feeds and important sources of nutrients for animals. For example, *Amaranthus viridis, Trianthema portulacastrum, Echinochloa colona, Phalaris minor* and *Avena fatua.*

Prevention of soil erosion

Weeds control soil erosion by water and wind. For example, *Agropyron repens, Cynodon dactylon, Panicum repens* and *Imperata cylindrical* are excellent soil-binder weeds by virtue of the soil binding ability of their roots.

Nutrients recycling

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Since time immemorial weeds are being used as a source of plant nutrients. At the early stages, weeds grow very fast almost four to five times higher than crop plants and cover the ground in a short period. They usually absorb mineral nutrients faster than many crops and accumulate them in their tissues in relatively large amounts. *Cassia sofera, Cassia tora, Tephrosia purpurea.*

Medicinal value

Weeds have great potential for use as medicine, but very little work has been carried out on this aspect. Some weeds were indispensable in ancient medicinal herbal pharmacies and are still used for medicine today. For example, *Strophanthus granatus* is a source of drug stropanthine, *Argemone Mexicana* seed is used for control of skin diseases.

Water purification

Eichhornia crassipes can take up heavy metals like mercury, lead, iron, copper, silver, gold, zinc and tin from water.

Source of pesticide

Some weeds are source of pesticides, e.g. *Chrysanthemum cinerarifolium* is a source of pyrethrum.

Source of fuel, fibre, and dye

Jatropha gossypifolia is the source of bio-diesel for automobiles and generators. *Malvastrum coromandelianum, Abutilon indicum, Sida cordifolia. Chrozophora rottleri* yields a dye.

Nematicidal properties

Economic utilization

Typha and *Saccharum* spp are used in cottage industry for making ropes and thatch boards.

Genetic material for crop improvement

C. bijugum has multiple disease resistance used for the production of disease resistance hybrid plants.

Green manuring and composting

Nanjudappa *et al*. reported that highest Napier fodder yield was obtained with poultry waste, resulting in highest gross returns. Water hyacinth at 20 t/ha produced high forage yield and highest B:C ratio (3.1), while the net returns were highest with water hyacinth at 10 t/ha. RDF (150:90:60 NPK kg/ha) produced lower mean yield than poultry waste and water hyacinth. Perhaps, this was a consequence of high nutrient status maintained by the organic manures. Further, organic manures could have supplied several micronutrients besides improving moisture holding capacity of soil under rainfed conditions [10].

Sushil Kumar *et al*. reported that the composition of all the nutrient parameters was low in post flowered Parthenium than the pre flowered Parthenium. The wide variation in the nutrient contents i.e. N, P, K, Ca and Mg was observed in the compost prepared by different methods. All nutrients were on higher side in Vermicompost followed by NADEP method while it was in less in the FYM. Maximum yield of compost was obtained in the pit method followed by NADEP method (use of additives) and least yield in NADEP method [18].

Channappagoudar *et al*. reported that the application of RDF + Parthenium compost before flowering recorded significantly higher grain yield compared to only RDF because parthenium contains higher N, P, K content in their biomass. These results indicated that composts prepared from weed species specially from *Parthenium, chromolena* and *cassia* before flowering were far superior in increasing the productivity and other morpho-physiological traits in sorghum than FYM and comparable with vermicompost. Among *Cassia* (2962 kg/ha) before flowering. RDF alone has given significantly lower yield (2418 kg/ha) as compared to application of RDF plus organic manures. It has been attributed to the additional availability of N, P and K nutrients in the soil due to the application of organic manures and also conversion of unavailable form of nutrients in to available forms [3].

Krishnamurthy *et al*. observed that the highest grain yield was recorded with the application of *chromolaena* compost at 7.5 t/ha but lowest in control. The lowest grain yield of 25.77 q/ha was recorded in control and highest (45.16 q/ha) with the application of RDF + *chromolaena* compost @ 7.5 t/ha. The yield increase is due to conjunctive application of RDF and organic manures which could be reasoned out that combined

application of organic and inorganic nutrients sources increases the availability of nitrogen, phosphorus and potassium in soil and in turn increases the number of tillers, panicle and other growth attributes as a result of better uptake of nutrients from soil. This result is also in close conformity with the findings of several workers on the usage of other green manures in rice production and reviewed the efficiency of the prolonged manural practices in building up the soil fertility and yield of rice in sandy loam. Organic matter increased the availability and unavailable plant nutrients by enhancing the biochemical activity of microorganisms. T_{10} recorded highest total NPK uptake, followed by higher level of compost along with RDF [8].

Kishor *et al*. reported that application of 100% n through composted parthenium resulted in significant reduction in plant height, tillers and root volume of plant and ultimately grain and straw yield of wheat. This may be due to Allelopathic potential of parthenium and Integrated use of 50% recommended dose of N through each of urea and composted parthenium along with *Azotobacter chrooccum* is beneficial to target higher yield of wheat. Inoculation of *Azotobacter chrooccum* produced 33-130% more volume of roots as compared to its corresponding uninoculated treatment indicating synergistic effect of composted parthenium. Clearly showed that integrated use of parthenium compost and Azotobacter increased nitrogen, phosphorus, potassium and sulphur acquisition in wheat than urea and parthenium compost [14].

Rajkhowa reported that vermicompost prepared from either *I.carnea* or *E. crassipes* resulted in significantly higher plant height, grain and straw yield of rice compared to the fresh biomass incorporation of *I.carnea* , *E. crassipes* as well as FYM. The effect was similar in both autumn and winter rice. The increased and prolonged availability of nitrogen from vermicompost with narrow C:N ratio might have resulted in increased yield components which ultimately reflected in higher grain yield [15].

Chinnusamy reported that, the application of parthenium vermicompost @ 5 t/ha recorded a higher grain and straw due to combined application of inorganic NPK along with organics recorded the highest uptake of N, P and K in maize and sunflower and the treatment was attributed to its slow decomposition leading to slow release of N nutrients as compared to other organic materials [4].

Effect on soil fertility

Vijaya Sankar Babu *et al*. reported that Vermicompost from different materials was applied to the field of groundnut as test crop and data collected are presented in Table 9. The pH of the soil showed a decreasing trend when compared to the initial soil. The decrease of pH may be due to the presence of humic and fulvic acids produced along with CO_2 from the decaying organic matter by the activity of microorganisms and also significant increase in electrical conductivity in all the treatments may be due to mineralization of organic substances through better aeration and enhancement of microbial activity. The available N, K and organic carbon content of the soil was increased significantly over initial values in all the treatments except the available P i.e. decreased from initial values. This might be due to higher utilization of P by the crop. Study reveled that the Vermicompost produced from the farm wastes and weeds is not only having beneficial effects on soil health, growth, quality and yield of crop but also playing vital role in eradication of pollution hazards. A huge quantity of domestic, agricultural and rural industrial organic wastes includes weed population from the agricultural fields and surrounding areas can be recycled by the effective and fast decomposition through Vermicomposting [20].

Effect of utilization of weed biomass on soil microflora

Rajkhowa reported significant variation in soil microbial population was recorded due to incorporation of different organic manures. Vermicompost prepared either from *I.carnea* or *E. crassipes* recorded significantly higher bacteria and fungal population over the other sources of organic manures. Among the nitrogen substitution level, substitution of 50% recommended nitrogen through organic manures resulted in significantly higher bacteria and fungal population in soil over 25% substitution.

Biogas production

Nataraj revealed that the data pertaining to the effect of *Salvinia*, cattle dung and interaction effects on biogas yield are presented in Table and Fig. Biogas yield was significantly influenced due to *Salvinia*, cattle dung as well as their interaction effects. Partially decomposed *Salvinia* (20.89 l/kg) found significantly superior to fresh *Salvinia* (17.56 l/kg). Among the cattle dung treatments, T_1 (30.68 l/kg) recorded significantly higher biogas yield which was sequentially followed by T3, T4 and T5. Significantly lowest biogas yield was recorded in T_2 (8.56 l/kg). In the interaction effects, in fresh *Salvinia*, T_1 (30.72 l/kg) found advantageous over rest of the treatments. The next best treatment was T_3 which was followed by T4 and T5 significantly lowest biogas yield was recorded in T_2 (5.29 l/kg). Additionally, in partially decomposed *Salvinia*, T_1 (30.63 l/kg) found advantageous over rest of the treatments. The next best treatment was T_3 and was sequentially followed by T4 and T_5. Significantly lowest biogas yield was recorded in T_2 (11.83 l/kg). The biogas yield varied significantly between fresh *Salvinia* and partially decomposed *Salvinia* with all the cattle dung treatments (except T_1) due to Cattle dung contains higher amount of

methanogenic bacteria results in high biogas production in T_1 which was followed by T_3, T_4 and T_5 having the *Salvinia*: cattle dung in the proportion of 1:3, 1:1 and 3:1, this shows that as the cattle dung quantity decreased, the production of biogas also decreased [11] .

Mushroom cultivation

Substrate made from water hyacinth plants has high biological efficiency (8-9%) for mushroom cultivation. Due to high cost of wheat straw, mushroom farming can be made economical by using water hyacinth for preparing substrate.

Veena savalagi *et al.* A preliminary experiment was conducted to find out the feasibility of growing oyster mushroom on commonly occurring weed *Cassia hirsute*, in combination with different levels of bagasse, mixture of these substrates in 1:1 proportion gave the highest yield and % bioefficiency. The harvest of oyster mushroom considerably reduced C:N ratio of the spent substrate [19].

Effect of use of trianthema on quality aspects of spinach

Pratap *et al.* reported that the incorporated *Trianthema* organic manures had significant influence on leaf chlorophyll contents (a, b and total) of spinach. Highest amount of total chlorophyll was found in DLM treated spinach lowest in CON. The minimum chlorophyll in control treatment had been observed to diminish carbohydrate production and a restriction in the assimilating power of the plant increase in chlorophyll o and b contents of the spinach may contribute to increased photosynthetic activity [13].

The application of *Trianthema* organic manures had important persuade on ascorbic acid and β carotene content of spinach. In first harvesting the highest amount was found in DLM amended spinach and lowest in CON. Ascorbic acid and β carotene contents of spinach are increased due to application of organic manures.

Food for human consumption

Weeds has lot of nutritive value for human beings

- *Chenopodium album,*
- *Amaranthus viridis,*
- *Portulaca spp,*
- *Alternentra triandra,*
- *Coccinia indica,*
- *Solanum spp,*
- *Celosia argensia* etc used as leafy vegetables

Fodder for animals

Some grasses like *Eleusine aegyptiacum, Phalaris minor, Cynodon dactylon, Sorghum halepense* serve as palatable fodder. While some other serve as pot herbs viz., *Chenopodium album, Amaranthus viridis, Digeria arvensiss* because of their nutritive value.

Sushil Kumar and Kamlesh Vishwakarmar observed that alligator weed is a good source of protein, CHO, Ca, Mg and other nutritional requirements of animals this may be the reason that the dairy owners use it as a green fodder substitute [17].

Herbicidal effect

Arshad Javid *et al* [2]. reported that in contrast, the n-hexane shoot extract exhibited insignificant effects on germination. Lower concentrations of 5 and 10% of the methanol shoot extract showed insignificant seed germination, while those of 15 and 20% significantly suppressed seed germination. Root extracts were found to be comparatively less effective than the shoot extracts. None of the concentrations of aqueous, methanol or n-hexane root extracts showed significant effects on seed germination. This could be attributed to the different chemical natures of the extracted solvents. Both water and methanol are polar in nature, while n-hexane is non-polar. This reveals that only the polar compounds in the shoots of *D. metal* are toxic against the germination and growth of parthenium. Various withanolide compounds have been isolated from *D. metal* which may be responsible for the herbicidal activity of this medicinal plant against the parthenium weed. The difference in the herbicidal activity of the shoot and root extracts of *D. metal* could probably be due to the different types and/or different amounts of chemical constituents between the two types of extracts. For example, Afsharypuor, Mostajeran and Mokhtary (1995) reported that the root was the organ which often accumulated higher amounts of atropine. The aerial parts,

if compared with the roots of the plant, usually accumulated higher amounts of scopolamine and lower amounts of atropine.

Both aqueous and methanol extracts significantly suppressed the shoot length of one-week and two-week-old parthenium plants. In contrast, the effect of these extracts was insignificant on root length. The aqueous as well as the methanol extract significantly reduced the shoot and root dry biomass of parthenium due to the root growth of parthenium was more sensitive to *D. metal* extracts than its shoot growth. Similar effects of plant extracts have also been reported against parthenium.

Pesticide

Many weeds have insecticidal property. Reduce the pest resistance resurgence and environmental pollution. Weeds acts in following ways

- As hosts for adult insect parasites
- As hosts for non-economic insects that serve as alternative hosts or food for parasites or predators.
- By increasing effectiveness of biological control organisms and their by reducing damage to crops.

Manager Singh *et al.* find out the effective dose and method of extract application of *Calotropis procera* for the control of termites in sugarcane. Damage was significantly greater in the untreated control. Dipping of setts in 20%, 15%, 2% solution of Calotropis extract and soil treatment with phorate 10 G at 2.5 kg ai/ha were statistically on par with each other and significantly superior to the untreated control. The number of millable canes was maximum under the treatment T_6 followed by T_1 and T_5, while it was minimum under T_7. The maximum cane yield was recorded under treatment T_6, followed by T_1 and T_5 compared with minimum in T_7 [9].

Deepak reported that, the application of PHC @ 100 q/ha with incidence of cut worm (0.75%), root infestation of fungi (23.40%), grain yield (19.80) q/ha and straw yield (20.40)q/ha respectively has potential to manage its pest fauna and induce the yield of chick pea, significantly over the untreated control due to parthenium having a pesticidal properties; including stomach, contact, systemic and mitochondrial poison and as neurotoxin [6].

Pollution indicators

Chenopodium album is very sensitive to H_2S_2 and SO_2 and Wild mustard to ammonia. Water hyacinth is very valuable plant for the reclamation of industrial effluents as this weed absorbs heavy metals such as Mercury, Lead, Iron, Copper, Silver, Gold, Zinc and Tin.

Water hyacinth plants have the capacity of absorbing heavy toxic metals like mercury, lead, iron, manganese, aluminum, cadmium, nickel copper, silver, sodium, zinc and chromium from effluent enriched water and hence improves its quality.

Use of weed biomass in silk worm rearing

Weeds extensively used in sericulture to increase the silk yield. *Tribulus terrestris* and *Psoralea coryleifolia* increase the silk and egg yield of mulberry silkworm. Solvent extract of *Lantana camara* and *Clerodendron inerme* induce more feeding of worms and bigger cocoon size. Parthenium is acts as phagostimulant.

Patil *et al* reported that during rainy season maximum larval weight was noticed in leaf extract and did not differ with control, where as root extract recorded least larval weight. However, higher pupation was effected in root extract. (94.3%) Least pupation was noticed in leaf extract. Higher shell weight and shell ratio were recorded in leaf extract. Maximum pupation as well as shell weight were recorded in root extract and were on par with carrier control during winter season. During summer season root and leaf extracts without differing among themselves produced maximum larval weight, shell weight and shell ratio compared to control [12].

Medicinal values

Menthol extracted from *Mentha spicata* is used for preparing medicines for human beings. Homeopathic medicine is prepared from Parthenium plants in order to cure allergy form *Parthenium hysterophorus*. Similarly plant extract of *Cleome viscose* is very useful for curing pain of ears. Many weed plants like *Solanum xanthocarpum, Datura stramonium, Calotropis procera* etc. have medicinal values for animals. Dried plants of *Fumaria parviflora* can be used to purify blood in order to cure skin disease. Seeds of *Tribulus terrestris* are used in rectifying kidney troubles.

Paper pulp and fibre

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Leaves of *Thpha latifolia* are used for preparing mats as well as its ropes are prepared for tying wheat bundles. *Saccharum munja* is widely used in cottage industry for preparing baskets, furniture's and curtains. Apart from this, it is also used by poor people for preparing huts for living. Few weeds like *Sida cardifolia*, *Abutilon indicum, Chorchorus capsularis* are used for this purpose though the fiber obtained from these weeds is little or poor quality. Weeds produce fiber and pulp for paper. Leaves of water hyacinth are beaten directly to make a sheet. Tiles can be prepared after mixing pulp with cement and whitener. Leaves used as a cigar wrapper. Fiber from stem is substitute for jute. Addition of 8-10% of jute or cotton fiber with water hyacinth leaves to prepare paper and board. *Cyperus panporei* and *C. corymbosus* are good material for making mats.

Table 3: Medicinal value of weeds

Sl. No	Name of the weed	Uses
1	*Argemone mexicana*	Externally for skin diseases Stomach troubles.
2	*Gynandropsis pentaphylla*	Decoction of seeds and leaves is given in typhoid fever.
3	*Cleome viscosa*	Oil from seeds for treatment of leprosy and skin diseases. Anthelmintic properties. Leaves for external applications of wounds and ulcers.
4	*Portulaca quadrifida*	Curing low fevers, cough, asthma, eye diseases and skin infections.
5	*Oxalis corniculata*	Good appetizer. Famous as a cure for scurvy.
6	*Cassia occidentalis*	Root is an antidote to poisons and used in snake bite with pepper
7	*Mimosa pudica*	Root is useful in asthma and diseases of blood.
8	*Centella asiatica*	Blood purifier and Improves the memory.
9	*Eclipta alba*	Curing asthma, Leaf is a good remedy for scorpion sting.
10	*Solanum xanthocarpum*	Curing asthma, Cough and fever
11	*Calotropis gigantea*	Juice has tonic properties. Root is an antidote to poison. Leaves with pepper are used for snake bite.
12	*Ocimum sanctum*	Treatments of skin diseases. The plant is used as mosquito repellent.
13	*Achyranthes aspera*	Whole plant extract is good for kidney troubles. Antidote for poison of snacks and scorpions
14	*Aerva lanata*	Is useful for kidney disorders.
15	*Phyllanthus niruri*	Infusion of tender shoots is administered in chronic dysentery and jaundice.
16	*Cynodon dactylon*	Juice is useful in the treatment of asthma, dysentery and diarrhoea. Infusion of the plant stops bleeding in piles.

Mulching

Goswami and Saha reported that biomass of water hyacinth can be directly used in the form of mulch in wider row sown crops. Black polythene, paddy straw and water hyacinth recorded significantly higher yield compared to no mulch. B:C ratio was lowest in polythene mulching. But water hyacinth and paddy straw mulch gave the highest B:C ratio. Blackpolythene showed the highest efficiency with least weed population and dry weight of weeds. Wheat straw recorded the lowest weed control efficiency and high weed index due to greater light penetration and delayed decaying process of the straw.

Problems on utilization of weed biomass

Weeds compete with crops for nutrient, moisture, space and light. It takes 1/3 of applied fertilizers in Ist 3 weeks and removes 1250 tons of water in a season from 1 ha of land. Weeds compete for light lead to reduction in photosynthetic rate of crop plants.

Impact on Human and animal health

Parthenium causes skin diseases, hay fever, asthma, allergic and bronchitis in human beings to an extent of 5-25 % [2].

Allergy

Individual in the age group of 20-30 years showed more allergic reaction to most of weed species. *Chromolaena odorata* 31-40 years followed by 41-50 years. Parthenium cause allergy in all age group except 51-60 years. 40-60 kg was more susceptible to allergy from all species except in aspergillus. Where in weight group of 30-

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40 kg also showed considerable less incidence for male tested with pollen of *Cassia sericea, Cassia tora.* More incidence of allergenicity in both male and female was observed in Aspergillus species. and work efficiency of the labour is decreases.

Symptoms of weed allergies in human beings

Hazards to animal health

- Grazing of animal infested with *Euphorbia simplex*, *Lepidium sativa*, *Cleome viscosa*
- Milk gives foul smell
- *Datura stromarium* and *Sorghum helepense* cause death of animals
- Dense perennial snake weed stand reduce 70 % of grass production
- It is toxic to Sheep, Goat and Cattle
- Death of Sheep by consuming 3.6 kg of green Snake weed foliage in 5 days
- Death of Goat by consuming 10.9 kg of green Snake weed foliage in 14 days
- Rabbits and Guinea pigs also died

Weed menace in animal husbandry

Weed species	Causes
Sorghum halepense, xanthium pungens, Agrostemma githago	Poisonous
Parthenium hysterophorus	Contact dermatitis
Euphorbia esula	Scours and weakness
Chenopodium, Amaranthus, Cirsium, and Polygonum spp.	Asphyxia

Weed menace to human health

Parthenium hysterophorus, rhus spp., A	Dermal allergies
Mbrosia artemessifolia and Helenium spp.	
Pistia lanceolata, Salvinia auriculata and Alternanthera sp.	Malaria, yellow fever, dengue fever, and filariasis.

Vijaya Sankar Babu *et al* [3]. revealed that the lower multiplication rate was observed when compost made out of the weeds when compare to the other residue, weed infestation also noticed if the compost made from weed crop but no effect as in case of the other residue.

GERMINATION OF WEED SEEDS

Weeds are highly persistence and hardiness refers to their ability to withstand all kinds of natural stresses at a given place. Longer and high % viability of weed seeds. Weeds seed poses dormant under unfavorable condition.

Sushil Kumar *et al.* revealed that high number of seeds was found viable in the compost prepared by the NADEP method. While only a few was viable in conventional pit method [4].

Girijesh *et al*. [7]reported that increase in the concentration of parthenium leaf extract, enhanced the deleterious effect on seed germination and growth parameters of ground nut, sorghum and green gram among the crop species, sorghum and ground nut were more sensitive and showed reduction of germinations are in agreement with the finding of Bhatta *et al.* (1994) who observed significant reduction in germination percentage in wheat due to leaf leachates of parthenium. The Allelopathic effects of parthenium leaf extract on root and shoot length in different crops showed significant differences and followed the same trend as that of germination percentage. Inhibitory effect of parthenium on the seeds may be due to allelochemicals such as sesquiterpene mainly parthenin, traces of phenolics and organic acids.

Saied Abu-Romman *et al*. (2010) reported that leachate of *E.hierosolymitana* leaves showed inhibitory effect on seed germination and seedling growth of wheat grown in Petri dishes. Leachate of *E.hierosolymitana* inhibited wheat seed germination compared with the control. The control treatment produces the highest germination rate (96.3%). Using 100% leachate, germination reduced to 30%. Higher concentration of leachate exhibited inhibitory effect on radical Coleoptile length. At 25% leachate, the radical and Coleoptile length were reduced to nearly 31% and 34% respectively. At concentrations of leachate, allelochemicals gradually decreased in root length as well as root fresh and dry weights. The shortest roots and the lowest root fresh and dry weights were recorded at the 100% concentration. Due an indirect relationship between lower germination rate and Allelopathic inhibition may be the consequence of inhibition of water uptake and alteration in the synthesis of gibberllic acid.

Transportation cost

More cost is required to transfer the weed biomass from the place where it is available in large quantities to place of utilization

Lack of skill

Since difficult procedure involved in preparation of weed extract for pesticide and medicinal purpose and also while use of weed biomass as compost and green manure it requires skilled labour

CONCLUSION

- Weeds produce huge amount of biomass, which can be utilized as a rich source of nutrients which enrich the soil fertility through green manure, Vermi compost and compost. Thus, serve as alternative source for synthetic fertilizers.
- Weed biomass extract can also be used to control weeds, pest and diseases which helps in reducing use of synthetic insecticides and herbicides.
- Weed biomass can be used for various purposes like leafy vegetables, fuel wood, fodder and raw material for household, media for mushroom cultivation and preparation of medicines.
- Biogas energy assumes special importance with reference to rural sector for that weed biomass can be used for biogas production.

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