WEEDS: ECOLOGICAL AND SCIENTIFIC ATTRIBUTES

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***Abstract*– Weeds are the actual green cover on earth protecting erosion and also improve the soil quality. In the present study, we have conducted a random survey in Mangaluru Taluk as part of the Peoples Biodiversity project from Karnataka Biodiversity Board. In this survey we identified most common weed plants and documented the associated traditional knowledge from Traditional practitioners and localities. Our survey suggests people are less aware of ecological benefits of weeds in soil conservation, green cover and its medicinal benefits. Along with documentation we created awareness about the ecological importance of weeds and their medicinal values through group discussions and meetings. We have done a thorough literature survey of selected weed plant species for their bioactive properties and validated its scientific attributes with recent publications by scientific community. This study highlights the importance of weeds and their attributes.**

Keywords*– *Weeds, traditional knowledge, soil conservation, green cover.

INTRODUCTION:

A weed is a sporadically spreading plant species in an undesirable land. Weeds are also referred as unwanted plants in human-controlled settings, such as farm fields, gardens, lawns, and parks. The term "weed" has no botanical significance in terms of taxonomy, because a plant that is a weed in one context and place may become a desirable crop or species at different setting or land. As part of Peoples Biodiversity Report (PBR), we surveyed 3 villages belonging to Mangalur taluk to gather information on the vegetation and crops. Interesting part of the study was to identify the weeds in the open field and follow lands. The huge and vast spreading of weed plants in many regions appeared like a green cover against soil erosion and dry lands. Hence we planned for an awareness program on "need of weeds" along with the PBR data collection. The following study was an effort to understand the basic knowledge and notion of the people for weeds and their usage in their local settings. It was also an effort to spread the awareness on weeds in maintaining the green cover on and also its medicinal uses.

Most of the weeds are effectively well adapted to grow and proliferate in diverse areas[1]. The weedy nature of these species often gives them an advantage over more desirable crop species because they often grow quickly and reproduce quickly, or may have short lifespans and they commonly have seeds that persist in the soil for many years. Some weeds complete multiple generations in the same growing season. Whereas, perennial weeds often have underground stems that spread under the soil surface or have creeping stems that root and spread out over the ground. These weedy natures allow them to grow unrestricted in agricultural fields, lawns, roadsides, and construction sites.

There are approximately 250,000 species of plants worldwide; and approximately 8000 species are considered to behave as weeds. There are various methods and features to categorise the types of weeds. They can be categorised based on their invasive strength, crop interference, adaptability etc. Similar morphological characters, life cycle, requirements of soil, water, and climatic condition are grouped together as a class or category. This classification of weeds is helpful for management of a larger weed groups instead of an individual weed species. It is always economical and practically feasible to manage the group of weeds as compared to manage the individual weed species.

Table 1: Classification of weeds[2]

Based on their life cycle	
Annual Weeds:	They complete their life cycle within one year or one season.
Kharif Weeds:	They appear with the onset of monsoon (June, July) and complete their life cycle when rainy season is over (Oct or Nov). Eg. Cock's comb, *Parthenium* etc
Rabi Weeds:	They complete their life cycle during winter season (Oct/Nov to Feb). Eg. *Chenopodium album*, *Portulaca oleracea*, wild oat etc.
Summer Weeds:	They complete their life cycle during summer season (Feb to May), Majority of the Kharif seaosn weeds grow during summer season in irrigated farming. Eg. *Parthenium*, *Amaranthus* spp. *Euphorbia Spp*

Ephemerals:	The short- lived annual weeds are called ephemerals. These weed completes its life cycle within a very short period of 2 to 4 weeks. Eg. *Phyllanthus niruri*
Biennial Weeds:	They take at least two years or two seasons to complete their life cycle. They complete their vegetative growth in first year or season and produce flowers and seeds in the next year or season. Eg. Wild carrot, wild onion.
Perennial Weeds: They continue or grow for more than two years or several years.	
Shallow Rooted Perennials:	Those perennial weeds having about 20 to 30 cm deep root system are called shallow rooted perennial weeds. Eg. *Cynodon dactylon*, *Agrophyron repens*.
Deep Rooted Perennials:	Weeds having about one meter or deeper root system. Eg. Nutgrass (*Cyperus rotundus*), Johnson grass (*Sorghum holepense*), *Acacia spp*.
According to Mode of Reproduction:	
Simple Perennials:	a) Reproduce mostly by seeds. Eg. *Lantana camara*, *Acacia spp*, *Zizyphus spp*.
Bulbous Perennials:	Propagate by underground parts like bulbs, rhizomes, tubers etc, as well as seeds. Eg. *Typha spp*), Nut grass (*Cyperus rotundus*), Johnson grass (*Sorghum halepense*).
Creeping Perennials:	Spread by lateral extension of the creeping above ground stem or roots or by seeds. Eg. *Cynodon dactylon, Oxalis litifolia*.
According to the Habitat: Depending upon the place of their occurrence.	
Weeds of cropped lands:	Eg. *Striga*, Wild rice etc.
Weeds of grazing lands:	Eg. *Eupatorim, Cleome sps*
Weeds along water channel:	*Eichhornia, Lagasca mollis*.
According to Nature of Stem:	
Woody Weeds:	These are the woody and semi-woody and semi-woody rough stem shrubs and are collectively called brush weeds. Eg. *Acacia, Lantana camara.*
Herbaceous Weeds:	These weeds have green and succulent stem and common occurrence on farm lands. Cocks comb, *Eupatorium*.
Facultative Weeds or Apophytes	Weeds which grow primarily in undistributed or close communities but may sometimes escape to the cultivated fields.
Obligate Weeds:	Weeds which grow or occur primarily in cultivated field where the land is distributed frequently. Eg. *Convolvulus arvensis*
Noxious Weeds:	The weeds which are undesirable, troublesome and difficult to control are called noxious weeds. Eg. Nutgrass, *Eupatorium, Striga*, Water hyacinth
Objectionable Weeds:	Weeds which produce seeds that are difficult to separate once mixed with crop seeds are called objectionable weeds. Eg. The mixture of *Argemone mexicana* seeds in mustard. Wild onion in cultivated onion
Poisonous Weeds:	Weeds that have poisonous alkaloids and neurotoxic components. *Datura*, *ivy sps*.

Weeds have certain unique characteristics that allow them to survive even at unfavourable conditions.

- ability to occupy sites disturbed by human activities.
- seed dormancy;
- abundant seed production;
- rapid population establishment;
- long-term survival of buried seed;
- adaptation for spread;
- presence of vegetative reproductive structures

These are the characteristics that also help in covering the dry and unproductive lands with green and convert them into nutritive and fertile in long run.

METHOD

Organized group meetings in selected Gram panchayaths to explain the objectives and purpose of the study. The documentation process includes information gathered from individuals through detailed questionnaire, focused group discussion with persons having knowledge and published secondary information. The data and plant species were validated with scientific literature and herbarium specimens respectively.

RESULTS AND DISCUSSION:

Man breeds plants for yield, while nature breeds plants for survival. Weeds are naturally strong competitors and are resistant to many adversities. Those weeds that can best compete always tend to dominate. Though there are several disadvantages of weeds in crop fields but there are much more benefits which ensures the soil stabilization; habitat and feed for wildlife, aesthetic qualities; add organic matter; and medicine. The importance of weeds was explained to the local people in a selected area with various examples as given in table 2.

Table 2: Weeds and their importance in ecosystem[2].

	Importance of weeds	Description
1.	Enrich organic matter and Nutrients in soil	Weeds add about 5 to 15 tonnes of green matter per hectare depending upon weed species and their growth. Many weeds have luxuriant leafy growth and when buried in the soil as green manure add considerable amount of organic matter and plant nutrients.
2.	Prevent Soil Erosion	Weeds growing on waste lands and sloppy fields' lower wind and water erosion.
3.	Weeds as Fodder	Most weeds are palatable and of acceptable quality for animal feed if they are grazed or cut when young.
4.	Weeds are used as Leafy Vegetables	Many weeds can be used as leafy vegetables as they are palatable and rich in minerals and vitamins. Amaranthus *Polygamus, Amaranthus viridis, Digera arvensis, Portulaca spp* etc.
5.	Medicinal Value	Almost every plant on earth has some kind of medicinal property. Weeds also have potential medicinal value. (Listed in table 3)
6.	Weeds have Economic Importance	Many weeds can be used for commercial purposes. Such as Broom sticks, essence sticks, fodder. Paper Pulp, Bio-gas and Manufacture of Edible Proteins.
7.	Reclamation of Alkali Soils	Some plants have unique features such as, the application of powder of the weed *Argemone mexicana* can reclaim alkali soils.
8.	Weeds Serves as Ornamental and Hedge Plants	*Lantana camara* and *Cactus sps* etc can be used as ornamental and hedge plants.
9.	Weeds act as Nematicidal	*Crotalaria spp; Calotropis spp, Parthenium* etc. can control nematodes when incorporated in to the soil.

We also surveyed the local area and identified the most widely spread weeds in the selected area. We segregate and finalised around 20 species that are wide spread in low lands and follow lands. We also documented associated traditional knowledge for these species from traditional practitioners and elder people of the village. Most of the people have a common notion that weeds are just disturbances in the field and the mere thought of weed comes along with an action of uprooting the species. The survey and the awareness regarding the usefulness of the weeds were accepted positively by the people and they were excited to share their knowledge on weeds and its traditional uses. Many weeds were used for medicinal purposes and few were used as hedge plants or as ornamental plants. A literature survey was carried out to support and validate the medicinal properties as claimed by the local people. Most of the weeds have been studied and explored for its medicinal benefits. We have listed and referenced the recent publications and findings from the scientific community on these selected 20 plants in Table 3.

Table 3: Weeds with their local name and scientific attribute.

No.	Scientific name	Local name	Traditional Knowledge	Scientific attributes	References
1.	*Alternantera sessilis*	Honagone soppu	Edible and medicinal	antihyperglycemic and analgesic	[3]Hossain et al 2014
2.	*Asclepias curassavica*	Kaad gida	Used as an ornamental	antioxidant and antiproliferative	[4]Baskar et al 2012
3.	*Calotropis procera*	Ekka	Latex used in medicine, Plant is worshipped	Antiproliferative, antiplasmodial	[5]Chan et al 2016
4.	*Cassia auriculata*	Giri sidi	As an hedge plant	Antidiabetic	[6]Fauzi et al 2016
5.	*Cassia fistula*	Chogate soppu	Used for fever and kidney stone	Against constipation	[7]Esmaeilidooki et al 2016
6.	*Colacasia esculenta*	Kesuvina dantu	Suckers and leaves are used as vegetable	Biosorbant to remove Chromium	[8]Nakkeeran et al 2016
7.	*Cynodon dactylon*	Garike	Religious and medicinal	Wound healing	Biswas et al 2016
8.	*Duranta repens*	Cuttings gida	Using as hedge plant	Antioxidant	
9.	*Echinopse echinatus*	Brahma dande	Religious and medicinal	Antipyretic, antifungal	
10.	*Eupatorium odoratum spp.*	Congress gida	As an ornamental plant	Anti-malarial	Khan et al 2013
11.	*Lantana camara*	Kaadu gulabi, beli gida	Used for cut wounds, hedge plant	Against parasitic diseases	Maurya et al 2015
12.	*Leucas aspera*	Kaadu thumbe	Religious and medicinal	Larvicidal effect on mosuitos	Elumalai et al 2016
13.	*Mimosa pudica*	Nachike mulu	Roots used to treat tooth ache	Anti-proliferative	Jose et al 2016
14.	*Mirabilis jalapa*	Chandra mallige	Used as an ornamental plant	Antimicrobial	Gogoi et al 2015
15.	*Oxalis corniculata*	Huli soppu	Fruits and leaves consists sour taste	Anticancer	Salahuddin et al 2016
16.	*Plumbago zeylanica*	Antu chandra mallige gida	Useful in curing skin diseases	Anticancer	Xue et al 2016
17.	*Portulaca olaracea*	Goni soppu	Edible Vegetable	Antidiabetic	Tabatabaei et al 2016
18.	*Solanum torvum*	Sunde gida	Fruits as the remedy for	*Anti-mycobacterial*	*Nguta et al 2016*

			finger pains.		
19.	*Synedrella nodiflora*	Kale gida	No specific use	antimicrobial	Wijaya et a 2011
20.	*Widelia trilobata*	Kale gida	Wound healing	Antibacterial, antifungal	Li et al 2016

CONCLUSION:

In this survey we identified most common 20 weed plants and documented the associated traditional knowledge from Traditional practitioners and local people. Our survey suggests people are less aware of ecological benefits of weeds in soil conservation, green cover and its medicinal benefits. Along with documentation we created awareness about the ecological importance of weeds and their medicinal values through group discussions and meetings. We have done a thorough literature survey of selected weed plant species for their bioactive properties and validated its scientific attributes with recent publications by scientific community. This study highlights the importance of weeds and their attributes.

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