AATCC Review

16 March 2023: Received
08 July 2023: Revised
12 September 2023: Accepted
15 November 2023: Available Online

www.aatcc.peerjournals.net

Research Article Open Access

Weed Vegetation Analysis and Documentation of Weed Species of Western Zone (Kia Farm) of Tamilnadu

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ABSTRACT

Vegetation analysis is used to determine weeds that have a high ability to grow to dominate in a living space. The dominant weed population can later be used as a consideration to make some decisions. This survey aimed to analyze the weed vegetation in North farm and South farm in Kumaraguru Institute of Agriculture and find the species that is dominant. Identification on plant species inside the farm is conducted directly based on the characteristic and morphology from every species found. Vegetation analysis is used to determine weeds that have a high ability to grow and dominate in a living space. The dominance generally determines whether weeds are important or not. The dominant weed population can later be used as a consideration to make some weed control decisions. From the survey, there are 24 species of weeds from 13 families identified which were consisting of 7 no of species belongs to Poaceae, 4 no of species belongs to Euphorbiaceae remaining are from other families. The dominant species in broadleaved weeds compromising of Trianthema portulacastrum followed by Phyllanthus niruri, Dactylactenium aegyptium in grasses and Cyperus iria in sedges. This survey concluded that Trianthema portulacastrum is the species which have the highest important value index of 16.75. It means that this plant has the highest level of domination in the observation plots. Whereas Phyllanthus madraspetansis recorded the lowest important value index of 1.43.

Keywords: *Weed survey, Vegetation analysis, Weed density, Important value index, Farm*

Introduction

Weeds are the plants that grow where they are not desired or unwanted plant species growing spontaneously in crop ecosystem and also on open land areas. It has been estimated that out of 2,50,000 flowering plants, about 8000 species are weeds in the world [8]. In the field, they make a competition with the cultivated plant to make use of nutrients, water, light, and the area. Weed is one of the limiting factors that affect the growth and yield of cultivated plants. They have better characteristics such as a growth ability that is faster than cultivated plants. They flower earlier, run to seed in profusion, and mature ahead of the cultivated plant. Other weed characteristics are the ability to survive under adverse conditions, and they have a very high reproductive capacity. If there are no efforts to control them, they will become harmful. The proper weeding regime for effective and economic weed management needs to be done to obtain high yields and profit. [4]. In sustainable agriculture, farmers need to be aware of the life cycle of the weed species and have knowledge about when and what actions should be taken to control weeds on the cultivated site [7]. Vegetation analysis is used to determine weeds that have a high ability to grow and dominate in a living space. The dominance generally determines whether weeds are important or not. The dominant weed population can later be used as a consideration to make some weed control decisions. With this background the survey was conducted to identify and document the predominant weed species in the KIA farm.

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DOI: https://doi.org/10.58321/AATCCReview.2023.11.04.327

Materials and Method

The survey was conducted at Kumaraguru Institute of Agriculture, Nachimuthupuram, Erode district, Tamil Nadu which is located at 11°49`N Latitude, 77°56`E longitude and with an altitude of 200 m above MSL from April to July 2023.

The survey was aimed to determine the weed types present in the college farm. Sampling was carried out in purposive manners based on the presence of weeds in the cultivated area. The equipment used for this survey was stationery rope, a tally sheet to measure the weed population. The first step of the research was observation of weeds in the campus to know about the areas covered by the weeds.

The sample observation plots were made by purposive sampling with a size of 1 m x 1 m, totaling 20 slots. Randomly selected each 10 sites in North farm and South farm in KIA. Identification on plant species inside the observation plot is conducted directly based on characteristics and morphological or of every species found. If there are unknown species found, so a herbarium sample is made for further identification [3].

Vegetation analysis was carried out by recording the weed species found in the sample plots and calculating the dominance of weed species by measuring the weed biomass, the above data is then used to calculate the density (D), relative density (RD) frequency (F), relative frequency (RF). The Summed Dominance Ratio (SDR) values were measured to find the dominance of each species found.

D = Certain individual number in an observation plot

$$F = \frac{\text{Number of plots where a species found}}{\text{Number of total observation plots}} \times 100$$

$$RD = \frac{\text{Number of individual weed species}}{\text{Total number of weeds}} \times 100$$

$$RDw = \frac{\text{The dry weight of weeds of individual species } (gm^{-2})}{\text{Total dry weight of weeds } (g\,m^{-2})} \times 100$$

$$SDR = \frac{\text{Relative density + Relative Dry weight } (gm^{-2})}{2} \times 100$$

Important Values Index = Relative density + Relative Frequency

D is the number of individuals per unit area or unit volume [3]. RD is the ratio of one type of vegetation density to all vegetation types densities in an area [9]. F is a value that indicates the spread of a vegetation type in a number of sample plots under study [3]. RF is the percentage ratio between the frequency of a vegetation type with the frequency of all vegetation types in the area. IVI shows the ecological importance of a plant species and shows its role in a community so that it is known to be influential or not [1]. SDR is the level of dominance of species in a plant community [5]

Results and Discussion

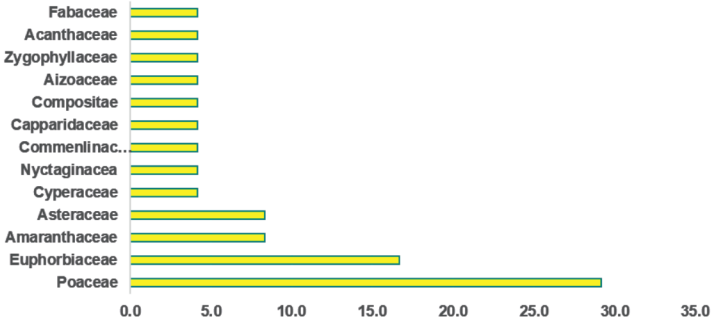
Weather on Weeds Growth

Weather elements play an important role in exploiting the growth and yield potential of any crop. Weather variability is considered one of the major factors of inter-annual variability of crop growth and yield in all environments. The variations in agricultural production are mostly attributed to the effect of seasonal weather conditions on plant growth. The weather parameters during the survey of the farm are as follows. The Maximum temperature of 37.95º C, Minimum temperature of 20.5º C, Average rainfall of 221.6 mm and evapotranspiration is 40.8 mm are documented.

Weed flora

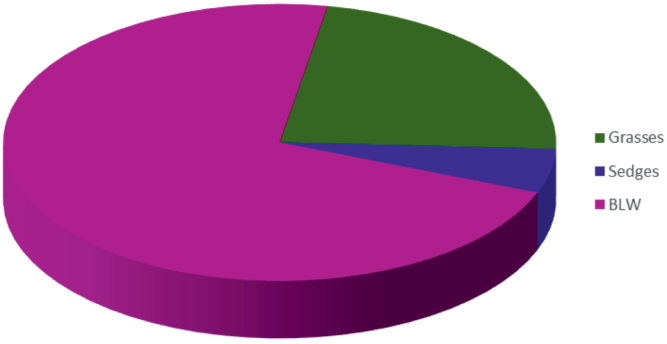
Weeds are plants that grow around cultivated plants that can inhibit the growth of crop plants. The presence of weeds causes competition between weeds and cultivable plants for available soil nutrients. From the survey 13 families of weed species have been identified.

Figure 1. Percentage (%) of weed families in KIA Farm



The weed flora of the survey was dominated by seven species of grasses *Bracharia reptans, Chloris barbata, Cynodon dactylon, Dactylactenium aegyptium, Eragrostis amabilis, Panicum repens, Perotis indica was the dominating grasses, Acalypha indica, Amaranthus viridis, Boerhavia diffusa, Commelina benghalensis, Cleome viscosa, Euphorbia hirta, Flaveria trinervia, Gomphrena decumbens, Mimosa pudica, Phyllanthus madraspetansis, Phyllanthus niruri, Parthenium hysterophorus, Ruella tuberosa, Trianthema portulacastrum, Tribulus terrestris, Tridax procumbens are the dominant broadleaved weeds* and *Cyperus iria, are the only sedges which were conclude from survey of our farm.* The highest percentage of weed species was found in Poaceae family followed by Euphorbiaceae family (Table 1).

Figure 2. Percentage (%) of weed groups based on morphological characteristics



Weed density

Different weed species were found on the farm, dominant weed species were then determined by analysing the vegetation. There are 24 species of weeds from 13 families identified which were consisted of 7 no of species belonging to Poaceae, 4 no of species belonging to Euphorbiaceae remaining are from other families. The dominant species in broadleaved weeds compromising mainly *Trianthema portulacastrum followed by Phyllanthus niruri, Dactylactenium aegyptium and sedge of Cyperus iria* (Table 2)

Frequency

Overall, the presence of a weed species in both the farm is based on the RF classification according to research conducted by [2] [6]. The highest RF value was obtained in *Trianthema portulacastrum, Cyperus iria, Cleome viscosa, Dactylactenium aegyptium* showing that these four weeds were often found in every observation in both the farm (Table 2)

Important Value Index

The Important Value Index (IVI) is quantitative parameter that can be used to state domination level (dominance level) of certain species in one plant community. The dominant species in one plant community will have a high important value index, so the dominant species of course would have the highest important value index [2]. In this survey, *Trianthema portulacastrum* is the species which have the highest important value index of 16.75 (Table 1) respectively. It mean that this plant has the highest level of domination in the observation plots. Whereas *Phyllanthus madraspetansis had the lowest IVI of 1.43.* (Table 2)

Table 1. Weed species found in survey of KIA farm.

S.No	Family	No	Scientific Name	No of individuals/m²
1	Poaceae	1	*Cynodon dactylon*	13
	Poaceae	2	*Chloris barbata*	21
	Poaceae	3	*Dactylactenium aegyptium*	30
	Poaceae	4	*Eragrostis amabilis*	10
	Poaceae	5	*Panicum repens*	18
	Poaceae	6	*Perotis indica*	17
	Poaceae	7	*Bracharia reptans*	27
2	Euphorbiaceae	8	*Acalypha indica*	10
	Euphorbiaceae	9	*Euphorbia hirta*	20
	Euphorbiaceae	10	*Phyllanthus niruri*	32
	Euphorbiaceae	11	*Phyllanthus madraspetansis*	5
3	Amaranthaceae	12	*Amaranthus viridis*	22
	Amaranthaceae	13	*Gomphrena decumbens*	8
4	Asteraceae	14	*Flaveria trinervia*	12
	Asteraceae	15	*Tridax procumbens*	24
5	Cyperaceae	16	*Cyperus iria*	30
6	Nyctaginacea	17	*Boerhavia diffusa*	26
7	Commenlinaceae	18	*Commelina benghalensis*	12
8	Capparidaceae	19	*Cleome viscosa*	21
9	Compositae	20	*Parthenium hysterophorus*	14
10	Aizoaceae	21	*Trianthema portulacastrum*	193
11	Zygophyllaceae	22	*Tribulus terrestris*	12
12	Acanthaceae	23	*Ruella tuberosa*	2
13	Fabaceae	24	*Mimosa pudica*	10

Table 2- Result of weed vegetation analysis of KIA farm.

S.No.		D	WI	AD	RD	Q	AF	RF	IV	SDR
Grasses										
1.	*Bracharia reptans*	27.0	6.05	2.70	0.60	4.00	0.40	4.76	5.36	2.68
2.	*Chloris barbata*	21.0	4.15	2.05	0.41	4.00	0.40	5.16	5.57	2.78
3.	*Cynodon dactylon*	13.0	2.91	1.30	0.29	5.00	0.50	5.95	6.24	3.12
4.	*Dactylactenium aegyptium*	30.0	5.67	3.00	0.56	6.00	0.60	8.33	8.89	4.44
5.	*Eragrostis amabilis*	10.0	2.12	1.00	0.21	4.00	0.40	5.06	5.27	2.63
6.	*Panicum repens*	17.5	3.64	1.75	0.36	4.50	0.45	5.65	6.01	3.01
7.	*Perotis indica*	17.0	3.81	1.70	0.38	4.00	0.40	4.76	5.14	2.57
Sedges										
8.	*Cyperus iria*	30.0	6.27	3.00	0.63	6.50	0.65	8.43	9.05	6.03
Broad Leaved Weeds										
9.	*Acalypha indica*	10.0	2.24	1.00	0.22	3.00	0.30	3.57	3.79	1.89
10.	*Amaranthus viridis*	22.0	4.72	2.20	0.47	3.00	0.30	3.87	4.33	2.17
11.	*Boerhavia diffusa*	26.0	5.55	2.60	0.55	5.50	0.55	6.84	7.39	3.70
12.	*Cleome viscosa*	21.0	4.26	2.05	0.42	6.00	0.60	7.84	8.26	4.13
13.	*Commelina benghalensis*	12.0	2.26	1.20	0.22	4.00	0.40	5.55	5.77	2.88
14.	*Euphorbia hirta*	20.0	3.78	2.00	0.37	3.00	0.30	4.16	4.53	2.26
15.	*Flaveria trinervia*	12.0	2.26	1.20	0.22	2.00	0.20	2.77	2.99	1.50
16.	*Gomphrena decumbens*	8.0	1.79	0.80	0.17	3.00	0.30	3.57	3.74	1.87
17.	*Mimosa pudica*	10.0	2.24	1.00	0.22	3.00	0.30	3.57	3.79	1.89
18.	*Parthenium hysterophorus*	14.0	2.96	1.40	0.29	5.00	0.50	6.45	6.74	3.37
19.	*Phyllanthus madraspetansis*	5.0	0.94	0.50	0.94	2.00	0.20	2.77	2.86	1.43
20.	*Phyllanthus niruri*	32.0	6.04	3.20	0.60	3.00	0.30	4.16	4.76	2.38
21.	*Ruella tuberosa*	2.0	0.44	2.00	0.04	1.00	0.10	1.19	1.23	0.62
22.	*Trianthema portulacastrum*	193.0	38.55	19.30	3.86	10.00	1.00	12.89	16.75	9.05
23.	*Tribulus terrestris*	12.0	2.52	1.15	0.50	2.50	0.25	3.17	3.42	1.71
24.	*Tridax procumbens*	24.0	4.95	2.35	0.50	5.50	0.55	7.04	7.54	3.77

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