DISEASED WEEDS AND WEED PATHOGENS IN PADDY FIELDS OF CHELLURU VILLAGE, RAYAVARAM MANDAL OF EAST GODAVARI DISTRICT, ANDHRA PRADESH.

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Abstract: The study was on diseased weeds and weed pathogens in Paddy fields of Chelluru village, Rayavaram Mandal in East Godavari District, Andhra Pradesh. A survey has been conducted to identify the diseased weed plants in that area, their frequency, density, abundance and their relative values and important value index (IVI) were calculated. 16 diseased weed plants were identified, belonging to 7 different families which belongs to both monocots and dicots. *Chloris barbata* (3.5) is the abundant weed. The identified diseased weed plant parts are isolated and are inoculated in Potato dextrose agar (PDA) medium and incubated for two days, then the growth of the mycelium was observed and later spores were obtained.

Index Terms: Agricultural weeds, Weed Pathogens, Chelluru, Identification

INTRODUCTION

A weed is an undesirable plant which grows along with the cultivated crops. weeds have been described by different authors as colonizers or pioneer species in a disturbed field (Bridges 1995) as ruderals which are growing in waste places, along road sides or in rubbish and highly disturbed but potentially productive environment. Weed is a plant that forms population that are able to enter habitats cultivated, markedly disturbed or occupied by man and potentially depress or displace the resident plant population which are deliberately cultivated and are of ecological and aesthetic interest (Navas 1995). Weeds compete with crops for resources, lowering crop yield. They can contaminate the crop with their seeds thereby perpetuating the problems into subsequent growing seasons (TD Khanh and et.al 2006). Weeds are difficult to control due to their adaptability. Poor land preparation and uncontrolled soil moisture were the main reasons of weed problems (Rezaul and et.al). Agricultural fields have weeds in common. Weeds generally compete for water, nutrients, light and space which in turn reduces the crop growth and yield that are considered as a severe problem. Of the total annual loss of agricultural produce from various pests, weeds have a prominent share of over 45%. Weed plants grow more vigorously and regenerate quick because of the heat and light intensity. Herbicides resistance in weeds might develop due to repeated use of same herbicides, it may develop slowly or rapidly (Kim 1996). Some weed species have the ability to reproduce quickly, disperse widely, live in a variety of habitats, start a new population in strange places, succeed in disturbed ecosystem and resist eradication. Weeds are undesirable on act of their competition and allelopathic behaviour and provides habitats for harmful organisms (Zaman et.al 2011).

Weeds acts as host and vector for plant pathogens giving them opportunity to infect and degrade the desired plants. They also cause damage by blocking the streams and canals. Weeds are classified into three broad groups based on lifespan annuals, biennials and perennials. In each group there are both broad leaf weeds and grasses (Rao 2000). The commonly used weed controlling methods are hand weeding, chemical herbicides. Weeds also cause qualitative indirect damage due to unitary seed reduction, contamination of seeds, slowing of tillage and harvesting practices (Anderson1983, Asthon and Monaco 1991). Identification of weed species provide strategies for weed controlling methods.

MATERIAL AND METHODS

SITE AND LOCATION

Weed surveys are useful for determining the occurrence of weed species in crop productive system. An ecological survey of weeds was conducted in Paddy fields of Chelluru village of Rayavaram Mandal in East Godavari district, Andhra Pradesh. It lies at 16.82335 latitude and 81.9803. The district lies at northern latitude of 16°30' - 18°20' and between 81°30' -82°30' of the eastern longitudes. It covers an area of 12,805 sq kms. It is bounded by Visakhapatnam on North, Orissa state on East, Bay of Bengal on South, Khammam and west Godavari on west. Paddy (*Oryza sativa)* is the most cultivated crop.

A survey of weeds was conducted in the Paddy fields for the identification. The survey was mainly focused on the diseased weed plants. The weeds present in the field sites were identified and collected in polythene bags and are taken to the laboratory. Random quadrate method was followed for weed survey to know the Density, Frequency, Abundance, Relative Density, Relative Frequency, Relative Abundance and Important value index. Random sampling method was adapted to study the occurrence of weed pathogen and epidemiology of different weed species. Weeds that are infected with fungal disease symptoms

were noticed and diseased samples were brought to the laboratory for isolation of causal agents. The diseased plants are maintained at the laboratory of Department of Botany, Andhra University. Abundance, density, frequency and their relative values and important value index were calculated by applying the following principles of Curis and Mclntosh (1950), Misra (1968) and Muller-Dombois and Ellenbergh (1974) (Nagaraju et al., 2014).

$$\text{Frequency} = \frac{\text{Total number of quadrates in which the species occur}}{2a\text{Total number of quadrates studies}} * 100$$

$$\text{Density} = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of quadrates studied}}$$

$$\text{Abundance} = \frac{\text{Total number of individuals of a species in all quadrates}}{\text{Total number of species in which the species occurred}}$$

$$\text{Relative Frequency} = \frac{\text{Frequency of individuals of a species}}{\text{Total frequency of all species}} * 100$$

$$\text{Relative Density} = \frac{\text{Density of individuals of a species}}{\text{Total density of all species}} * 100$$

$$\text{Relative Abundance} = \frac{\text{Abundance of individuals of a species}}{\text{Total Abundance of all species}} * 100$$

$$\text{Important value index} = \text{Relative density} + \text{Relative frequency} + \text{Relative abundance}$$

SOIL ANALYSIS

The soil was collected from the agricultural fields in Chelluru village and sent for the laboratory for its analysis. The physical and chemical properties like colour, type, pH and some nutrients were analysed. Due to the abundance of weeds, analysis of soil was conducted to know the nutrients and properties present in it. The properties of the soil are listed in the below **Table1.**

TABLE 1. Properties of Soil Sample

Characters of soil	Value
Colour	Dark Brown
Type	Sandy Clay Loam
P^H	7.0
Salinity	0.66
Organic Carbon	High
Nitrogen	--
Phosphorus (Kg/h)	34 -medium
Potassium (Kg/h)	67 -high
Sulphur	--
Zinc(ppm)	1.48
Iron(ppm)	19.12
Manganese(ppm)	10.46
Copper(ppm)	3.36
Boron	--

Kg/h: Kilogram per hectare

Ppm: Parts per million

ISOLATION OF THE PATHOGEN

The fungal pathogen was grown on solid nutrient medium Potato Dextrose Agar (extract from potatoes 250gms boiled and filtered, dextrose 20gms, agar 15gms and distilled water 1000ml).

STERILIZATION

The glassware (Petri plates, test tubes), distilled water and medium were sterilized by using Autoclave at 121°C at 15lbs pressure for 15 mins.

INOCULATION AND INCUBATION

The diseased plant parts (leaf, stem, root) are isolated onto Potato dextrose agar (PDA) provided with antibiotics like streptomycin and incubated for the production of mycelium and spores. The growth and colour of the mycelium is observed. After two days of inoculation the mycelium is re-inoculated for the production of pure culture and sporulation.

RESULTS AND DISCUSSIONS

Weeds are the major problem facing by the farmers. They cause serious loss to the agriculture system. weeding is a laborious process. Although different types of techniques are being used for weeding, they are of much cost. Ecological studies help to understand the crop losses caused by weeds and interaction among weeds and crops. The present study given an overview of the diseased weed plants in Paddy fields present at Chelluru village. In the present study about 16 diseased weed plants were identified from 10 quadrates belonging to 7 different families. The brief description of the plants can be seen in Table.2. These are the weed plants with diseases seen most prominently in that area. Among those 10 species are dicots and 6 belongs to monocots. The dicots consist of families Amaranthaceae, Asteraceae, Euphorbiaceae, Onagraceae, Polygoneaceae and Urticaceae.Only a single family Poaceae was seen in monocots as it is the most dominant family. In dicotyledons among the families 2 species belongs to Amaranthaceae,4 species belongs to Asteraceae and families Euphorbiaceae, Onagraceae, Polygonaceae and Urticaceae each have 1 species. While in monocotyledons Poaceae is the family which contains 6 species. The data about the Frequency, density, abundance, Relative frequency, Relative density, Relative abundance and Important Value Index(IVI) of the diseased weed plants were given in Table.3.The diseased weed plant that is most frequent is *Echinochloa crusgalli (70%) followed by Pouzolzia zeylanica(50%), Achyranthus aspera(40%), Digitaria sanguinalis(40%), Euphorbia hirta(40%), Ischaemum indicum(40%), Synedrella nodiflora(40%). Chloris barbata* is the abundant weed. The Important Value Index (IVI) of the individual species is calculated, the important species is *Euphorbia hirta* (25.8) followed by *Echinochloa crusgalli* (25.3), *Echinochloa colona* (24.8), *Synedrella nodiflora* (24.3). The diagrammatic representation of these can be seen in the below **figure.1.**

Among the 16 diseased weed plants 4 plants are pre dominant and they were isolated for the pathogen. The isolation of the diseased plant pathogen showed the growth of the mycelium, which was monitored frequently, after sporulation the colour and structure of the spores are identified.

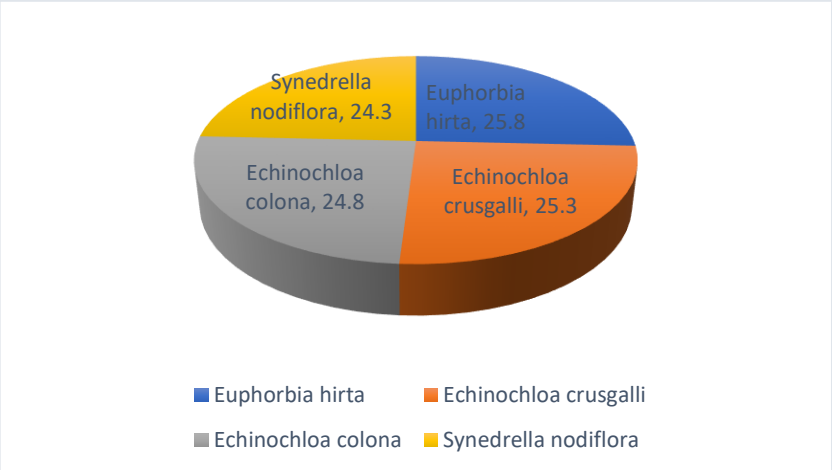


Figure.1.Pie chart of important weed species in the Paddy fields of the study area

TABLE.2. Plant Description of Diseased Weed Plants in Paddy Fields

Si no	Botanical name	Common name	Family	Plant description	Method of propagation	Weed status
1	*Achyranthus aspera*	Devils horse whip	Amaranthaceae	Erect or prostrate, annual or perennial herb	Vegetative	Common
2	*Acmella paniculata*	Toothache plant	Asteraceae	Annual herb	Seeds	Rare
3	*Alternanthera philoxeroides*	Alligator weed	Amaranthaceae	Prostrate herb	Vegetative	Rare
4	*Chloris barbata*	Finger Grass	Poaceae	Tufted annual grass	Seeds	Common
5	*Digitaria sanguinalis*	Crab grass	Poaceae	Annual, prostrate	Seeds	Common
6	*Echinochloa crusgalli*	Barnyard grass,cockspur grass	Poaceae	Tufted annual	Seeds	Common
7	*Echinochloa colona*	Jungle rice,deccan grass	Poaceae	Annual, tufted	Seeds	Common
8	*Euphorbia hirta*	Asthma plant	Euphorbiaceae	Erect or prostrate annual hairy herb	Seeds	Common
9	*Elusine indica*	Indian goose grass	Poaceae	Annual grass	Seeds	Common
10	*Ischaemum indicum*	Indian muraina grass	Poaceae	Annual grass	Seeds	Common
11	*Ludwiga parviflora*	Water prime rose	Onagraceae	Perennial erect herb	Seeds	Frequent
12	*Polygonum perfoliatum*	Asiatic tearthumb, devil's tail tearthumb	Polygonaceae	Annual climbing herb	Seeds	Rare
13	*Pouzolzia zeylanica*	Graceful pouzolz'sbush	Urticaceae	Perennial erect herb	Seeds/ vegetative	Rare
14	*Synedrella nodiflora*	Node weed	Asteraceae	Erect annual herb	Seeds	Common
15	*Tridax procumbens*	Coat buttons, Tridax daisy	Asteraceae	Annual or perennial prostrate to ascending herb	Seeds	Common
16	*Vernonia cinera*	Iron weed	Asteraceae	Annual herb	Seeds	Frequent

TABLE.3. Phytosociological Studies of Diseased Weeds In Paddy Fields

Name of the diseased weeds	TNI	TOI	F	D	A	RF	RD	RA	IVI
Achyranthus aspera	7	4	40	0.7	1.7	7	7	4.9	18.9
Acmella paniculata	3	3	30	0.3	1.0	5.2	3	2.9	11.1
Alternanthera philoxeroides	4	3	30	0.3	1.3	5.2	3	3.8	12
Chloris barbata	7	2	20	0.2	3.5	3.5	2	10.2	15.7
Digitaria sanguinalis	13	4	40	0.4	3.2	7	4	9.3	20.3

Echinochloa crusgalli	15	7	70	0.7	2.1	12.2	7	6.1	25.3
Echinochloa colona	10	3	30	1.0	3.3	5.2	10	9.6	24.8
Euphorbia hirta	11	4	40	1.1	2.7	7	11	7.8	25.8
Elusine indica	5	3	30	0.5	1.6	5.2	5	4.6	14.8
Ischaemum indicum	9	4	40	0.9	2.2	7	9	6.4	22.4
Ludwiga parviflora	8	3	30	0.8	2.6	5.2	8	7.6	20.8
Polygonum perfoliatum	3	2	20	0.3	1.5	3.5	3	4.3	10.8
Pouzolzia zeylanica	7	5	50	0.7	1.4	8.7	7	4	19.7
Synedrella nodiflora	10	4	40	1.0	2.5	7	10	7.3	24.3
Tridax procumbens	7	3	30	0.7	2.3	5.2	7	6.7	18.9
Vernonia cinera	4	3	30	0.4	1.3	5.2	4	3.8	13
	123	57	570	10	34.2				

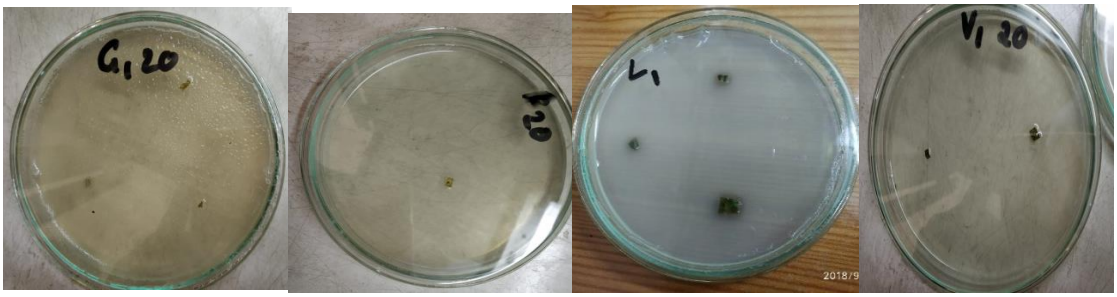
TNI- Total number of individuals., TOI-Total occurrence of individuals., F-Frequency., D-density.,A-abundance., RF-Relative frequency., RD-Relative density., RA-Relative abundance.,IVI-Important value index.

Among the 16 diseased weed plants the 4 most prominent weeds are isolated for the disease pathogen .They were shown in the **figure 2.**

FIGURE .2. ISOLATION OF FUNGAL PATHOGENS

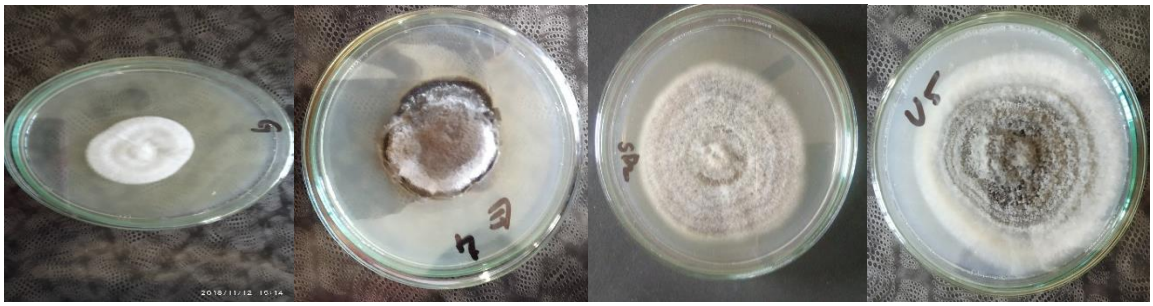
A B C D

Infected leaf spots on the diseased weed plants



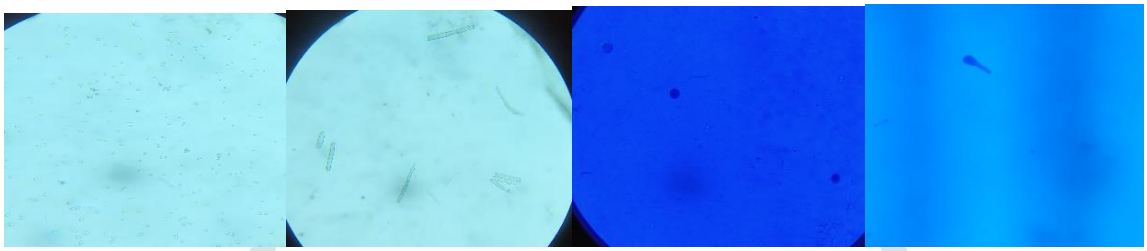
A1 B1 C1 D1

Isolation of the diseased leaf spots



A2 B2 C2 D2

Pure cultures obtained from the isolated leaf spots



A3 B3 C3 D3

Spores obtained from the isolated diseased weed plant

A,A1,A2,A3- *Echinochloa crusgalli;* B,B1,B2,B3-*Euphorbia hirta;*C,C1,C2,C3-*Ludwiga parviflora;* D,D1,D2,D3- *Vernonia cine*

CONCLUSION

Ecological studies help to understand the crop losses caused by weeds and interaction among weeds and crops. The present study was conducted to explore and identify the diseased weeds and their casual pathogen. The spores obtained can be used as mycoherbicides, in the further future research to achieve maximum effectiveness through biological approach, which are weed specific and are of low cost. They also help in the weed management.

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