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Studies on weed infestation of some agricultural fields at Visakhapatnam district, Andhra Pradesh

G. GADDEYYA AND P. K. RATNA KUMAR

Centre of Advanced Study, Dept. of Botany, Andhra University
Visakhapatnam-530003, Andhra Pradesh

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ABSTRACT

A systematic field study was conducted in crop fields such as food crops, pulses, vegetable crops, oil crops and commercial crops at Visakhapatnam District. A total of 120 weed species belonging to 40 families were carefully studied and recorded. The weed species were grouped as sedges, grasses and broad laved weeds. The weed species belonging to the family Asteraceae (12 species) and Fabaceae (12 species) were more dominant fallowed by Euphorbiaceae (11 species), Amaranthaceae (10 species) and Poaceae (7 species), respectively. The species of Cyperus rotundus, Cyperus difformis, Cyperus iria, Cyperus diffuses, Echinochloa colona and Echinochloa crusgalli were recorded as more common and dominant weeds in all cereals crops and broad leaved weeds belonging to Asteraceae, Fabaceae, Euphorbiaceae and Amaranthaceae were recorded in vegetable and other field crops.

***Keywords*:** Bio-control, crop fields, Cyperus rotundus L, weed infestation, weed management.

Weeds are the oldest problem in agriculture since about 10000 B.C. and have represented one of the main limiting factors in profitable crop production (Avery, 1997). They are the most complex and serious problems in natural resource management. Weeds cause significant losses each year in the agriculture, forestry, aquaculture, water supply and a host of other human enterprises. They also affect the health and quality of life of people all over the world by causing allergies and other health hazards (Handerson and Anderson, 1996). Apart from quantitative losses caused by weeds due to competition for water, light, space, nutrients and to the antagonism (parasitism and allelopathy) they also cause qualitative indirect damage due to unitary seed reduction, contamination of seeds slowing of tillage and harvesting practices (Anderson, 1983; Asthon and Monaco, 1991).

A weed is a plant growing where it is not desired (Klingman and Noordhoff, 1961). Weeds are very common, dominant and wide spread in the crop fields. Weed interference is one of the most important factors to decrease the yields of all crops. Weeds are undesirable on account of their competitive and allelopathic behaviour and providing habitats for harmful organisms (Zaman *et al*., 2011). Weeds present in crop field that compete with crop plants for light, moisture and other essential nutrients, resulting reduce quality and yield of crops and increase the cost of production (Samad *et al*., 2008). These unwanted, unuseful, often prolific and persistent, competitive, harmful, even poisonous plants that are known as weed, interfere with agricultural operations, increase labour cost, reduce yield and detract from the comfort of life (Crafts and Robbins, 1962).

Email : mycology.au@gmail.com

Weed is a plant which is judged by man to be not of use and undesirable at a place where it flourishes (Patil *et al*., 2010).The unwanted plants which are growing in crop fields are competing with the crop plants have a short vegetative phase with high reproductive potential. Weed-crop competition is critical in obtaining crop yields because of greater competitive ability of weeds than the crops. Weeds deplete large quantities of mineral nutrients and moisture more efficiently than the crop plants and thrive better over the crops in drought conditions. Weeds have higher contents of nutrients than crop plants; they grow faster and absorb nutrients more efficiently and thus limiting the availability of the same to crop plants (Prayaga Murty and Venkaiah, 2011). Weeds not only compete with crop plants for nutrients, soil moisture, space and sunlight but also serve as an alternative hosts for several insect pest and diseases. Wider spacing, frequent irrigations and liberal use of manures and fertilizers provide favourable conditions for an early start of weeds (Mukherjee *et.al.*, 2012).

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).Competition between crops and weeds is maximum when available resources for crop growth become limiting. Competition between crops and weeds is most severe when the competing plants have similar vegetative habits and demands upon resources (Rao, 2000). The degree of weed competition is determined by the weed species infesting the area, density of infestation and duration of infestation. These weeds effectively compete with the crop for nutrients, water, and space reduce the yield ranging from 12 to 51 % (Rao and Singh, 1997; Mukharjee and

Singh, 2005; Halder and Patra, 2007). Weed flora and its composition in a crop is influenced by the type of cultivation, spacing, time or season of cultivation, soil type, soil PH, climatic conditions such as rainfall, temperature, cultivation practices like irrigation, tillage systems, application of fertilizer and weed management (Kiran and Rao,2013).

Weed infestation is one of major constraints affecting the production which is the most important for each crop. Although weeds have been eradicated using various cultural practices. Commonly used weed control strategies are water management, hand weeding, mechanical weeding and chemical herbicides. Water management can control certain weed species in irrigated lowland. Hand weeding is time-consuming and is becoming expensive, while the use of mechanical weeders is known to reduce yields. Chemical herbicides, on the other hand, not only are becoming more expensive, but also contribute to environmental pollution. Continuous use of chemical herbicides can result in the development of herbicide-tolerant weed populations (Bayot *et al.*, 1994).

The manual and mechanical methods of weed control, besides being less effective, are costly and time consuming. Mechanical weeding was partially effective due to non-removal of weeds in intra-rows (Satyanarayana *et al.,* 2013). Several pre-emergence herbicides like butachlor, thiobencarb, pendimethalin, oxyfluorfen and nitrofen either alone or in combination with hand weeding provide a fair degree of weed control. But use of same group of herbicide with similar mode of action over the period of time on a same piece of land leads to imbalance in weed flora, environmental contamination and development of resistance in weeds (Survase *et al.,* 2013). The development of herbicide resistance in weeds is an example of evolution in plant species as a consequence of environmental as well as cultural changes brought about by man (Bhowmik, 2010).

Biological weed control involves using living organisms, such as insects, nematodes, bacteria, or fungi, to reduce weed populations. Biological control of weeds using plant pathogens is a practical and environmentally sound method of weed management. A variety of herbaceous, woody, climbing, aquatic, and parasitic weeds have been shown to be capable of being controlled by plant pathogens (Charudattan, 1991). The study on weed infestation may helpful to agronomists and farmers for the development of weed control methods. The aim of the research is to identify the frequency of invasive weed flora for the effective weeding and weed eradication seasonally through the mechanical, cultural and chemical means. Use of biological control methods in field crops is being considered, but still not much in use.

MATERIALS AND METHODS

Visakhapatnam District is one of the North Eastern Coastal districts of Andhra Pradesh and it lies between 17° - 15' and 18°-32' Northern latitude and 18° - 54' and 83° - 30' in Eastern longitude. It is bounded on the North partly by the Orissa State and partly by Vizianagaram District, on the South by East Godavari District, on the West by Orissa State and on the East by Bay of Bengal. Agriculture is the main stray of nearly 70% of the households. Rice is a staple food of the people and Paddy is therefore the principal food crop of the district followed by Ragi, Bajra and Jowar and Cash crops such as Sugarcane, Groundnut, Sesamum and Chillies are important. The rest of the cultivated area is covered under dry crops depending upon the vagaries of the monsoon. The District receives annual normal rainfall of 1202 mm. Agency and inland Mandals receive larger rainfall from the South West Monsoon, while Coastal Mandals get similarly larger rainfall from North-East monsoon. Red Loamy soils predominate with coverage of 69.9% of the villages of the district and Sandy loamy soils come next with 19.2% village's coverage.

The exploration of the area under study includes the planned field trips to various study sites (crop fields) for weed observation, classification and collection. The random sampling method was adopted for this study to note down the presence of weed species among the crop fields. Each field trip includes 5-10 days covering a particular area, during the *kharif* season. Fields were surveyed at three to five weeks after planting. The study includes different agricultural crops classifieds as food crops, pulses, vegetable crops, oil crops and commercial crops in various agricultural regions of Vishakhapatnam District (Table 1, 2). All the weeds encountered in the field sites of the crop fields were carefully collected and identified during the *kharif* season (July - October 2013).

After completing the weed collection from the crop fields, the weed plants were correctly identified by the help of floras, monographs and other relevant literature and consequently the correct scientific and common names were provided to each plant. Each plant was critically studied and identified using the 'Flora of British India' (Hooker, 1872-1897); 'Flora of Presidency of Madras' (Gamble and Fischer, 1915-

Table 1: Locastion and cultivated crops of study area at Visakhapatnam District

S.No	Location	Cultivated crops				
		Food crops	**Pulses**	**Vegetables**	**Oil crops**	**Commercial crops**
1	Anandapuram [a]	paddy, maize	green gram	brinjal, okra	sesamum	sugarcane
2	Boyapalem	paddy, jowar	green gram	brinjal, okra	sesamum	sugarcane
3	Palavalasa	paddy, maize	black gram	brinjal, okra	sesamum	sugarcane
4	Mukundapuram	paddy, maize	green gram	tomato	sesamum	sugarcane
5	Ramavaram	paddy, bajra	horse gram	tomato	sesamum	sugarcane
6	Chodavaram [a]	maize, paddy	black gram	tomato	sesamum	sugarcane
7	G.Jagannadhapuram	maize, paddy	black gram	tomato	sesamum	sugarcane
8	Gandhavaram	maize, bajra	green gram	brinjal, okra	sesamum	jute, cotton
9	Gavaravaram	maize, jowar	horse gram	brinjal, okra	sesamum	jute ,cotton
10	Govada	maize, ragi	black gram	brinjal	sunflower	jute ,cotton
11	Gowripatnam	maize, ragi	green gram	brinjal	sunflower	jute, cotton
12	Jannavaram	jowar, ragi	horse gram	brinjal	sunflower	jute ,cotton
13	Lakkavaram	paddy, bajrabajra, ragi,	red gramblack gram	tomato, okra, brinjal	sunflower sesamum	sugarcane, sunnhemp
14	Lakshmipuram	paddy, maize,bajra, ragi	red gram black gram	tomato, okra, brinjal	ground nut sesamum	sugarcane, sunnhemp
15	Rayapurajupeta	paddy, maize,jowar, ragi	green gram red gram	tomato, okra, brinjal	ground nut sesamum	sugarcane, sunnhemp
16	Devarapalle [a]	paddy, jowar, ragi, bajra	red gram black gram	tomato, okra, brinjal	ground nut sesamum	sugarcane, sunnhemp
17	M.Alamanda	paddy, maize	black gram	pepper, okra	ground nut	sugarcane
18	Kasipuram	paddy, maize	black gram	pepper, okra	ground nut	tobacco
19	Raiwada	paddy, maize	green gram	ridge gourd	ground nut	tobacco
20	Venkatrajupuram	maize, bajra	horse gram	ridge gourd	sesamum	tobacco
21	K.Kotapadu [a]	paddy	red gram	ridge gourd	sesamum	tobacco
22	Chandayyapeta	paddy	red gram	ridge gourd	castor	cotton
23	Ramayogi agraharam	maize, jowar	red gram	pepper	castor	cotton
24	Santhapalem	paddy	red gram	pepper	castor	cotton
25	Varada	paddy	red gram	pepper	castor	cotton

***'a'** Panchayat and Mandal headquarter*s

Table 2: Scentific and common names of crop plants of study area

Type of Crop	Scientific Name	Common Name	Local Name	Family
Food Crops	*Oryza sativa* L.	Paddy/Rice	Varidhanyamu	*Poaceae*
	Sorghum bicolor (L.) Moench	Jowar/Great millet	Jonna	*Poaceae*
	Pennisetum glaucum (L.) R.Br.	Bajra/Pearl millet	Sajja, gantulu	*Poaceae*
	Zea mays L.	Maize/Corn	Mokkajonna	*Poaceae*
	Eleusina coracana Gaertner	Ragi/Finger millet	Ragulu	*Poaceae*
Pulses	*Cajanus cajan* (L.) Millsp.	Red gram/Pigeon pea	Kandulu	*Fabaceae*
	Vigna mungo (L.) Hepper	Black gram	Minimulu	*Fabaceae*
	Vigna radiata (L.) Wilczek	Green gram	Pessalu	*Fabaceae*
	Macrotyloma uniflorum (Lam.) Verdc.	Horse gram	Ulavalu	*Fabaceae*
Vegetables	*Solanum melongena* L.	Brinjal/Egg plant	Vanga	*Solanaceae*
	Abelmoschus esculentus (L.) Moench	Okra/Ladies finger	Benda	*Malvaceae*
	Lycopersicon esculentum Miller.	Tomato	Tomato	*Solanaceae*
	Capsicum annuum L.	Pepper/Capsicum	Mirapakaya	*Solanaceae*
	Luffa acutangula(L.) Roxb.	Ridge gourd	Birakaya	*Cucurbitaceae*
Oil Crops	*Arachis hypogaea* L.	Ground nut/Pea nut	Verusenagalu	*Fabaceae*
	Sesamum indicum L.	Sesamum /Gingelly	Nuvvulu	*Pedaliaceae*
	Helianthus annuus L.	Sunflower	Prodduthirugudu	*Asteraceae*
	Ricinus communis L.	Castor	Amudamu	*Euphorbiaceae*
Commercial Crops	*Saccharum officinarum* L.	Sugarcane	Cheruku	*Poaceae*
	Gossypium arboreum L.	Cotton	Patthi	*Malvaceae*
	Nicotiana tabacum	Tobacco	Pogaku	*Solanaceae*
	Corchorus olitorius L.	Jute	Parintalakura	*Tiliaceae*
	Crotalaria juncea L.	Sunn hemp	Janumu	*Fabaceae*

Table 3: The list of weed flora and their status in agricultural crops of study area

S.No	Name of the Species	Common name	Family	Weed status
1	*Abutilon crispum* (L.) Medik.	*Bladder mallow*	*Malvaceae*	*Common*
2	*Abutilon indicum* (L.) Sweet	Indian Mallow	*Malvaceae*	Frequent
3	*Acalypha indica* L.	Indian nettle	*Euphorbiaceae*	Common
4	*Acalypha alnifolia* Willd.	—	*Euphorbiaceae*	Frequent
5	*Acalypha lanceolata* Willd.	—	*Euphorbiaceae*	common
6	*Achyranthes aspera* L.	Devil's horsewhip	*Amaranthaceae*	Common
7	*Acanthospermum hispidum* DC	Bristly starbur	*Asteraceae*	Frequent
8	*Aerva lanata* L.	Mountain knotgrass	*Amaranthaceae*	Common
9	*Ageratum conyzoides* L.	Billy goat-weed	*Asteraceae*	Common
10	*Allmania nodiflora* R.Br.	—	*Amaranthaceae*	Common
11	*Alternanthera sessilis*	sessile joy weed	*Amaranthaceae*	Common
12	*Alternanthera pungens* Kunth	—	*Amaranthaceae*	Common
13	*Alysicarpus bupleurifolius* (L.) DC	Sweet alys	*Fabaceae*	Common
14	*Alysicarpus monilifera* (L.) DC	—	*Fabaceae*	Common
15	*Amaranthus spinosus* L.	Spiny amaranth	*Amaranthaceae*	Common
16	*Amaranthus viridis* L.	Slender Amaranth	*Amaranthaceae*	Common
17	*Aristolochia bracteolata* Lam.	Dutchman's pipe	*Aristolochiaceae*	Frequent
18	*Aristolochia indica* L.	Indian birthwort	*Aristolochiaceae*	Frequent
19	*Argemone mexicana* L.	Mexican poppy	*Papaveraceae*	Frequent
20	*Boerhavia diffusa* L.	Red spiderling	*Nyctaginaceae*	Common
21	*Cardiospermum halicacabum* L.	Balloon plant	*Sapindaceae*	Common
22	*Cassia auriculata* L.	Avaram senna	*Fabaceae*	Frequent
23	*Cassia occidentalis* L.	Coffee senna	*Fabaceae*	Frequent
24	*Centella asiatica* (L.) Urban	Indian pennywort	*Apiaceae*	Frequent
25	*Chloris barbata* (L.) Sw	Airport grass	*Poaceae*	Common
26	*Chrozophora rottleri*	Rottler's Chrozophora	*Euphorbiaceae*	Common
27	*Cleome aspera* DC	—	*Cleomaceae*	Common
28	*Cleome gynandra* L.	African cabbage	*Cleomaceae*	Common
29	*Cleome monophylla* L.	—	*Cleomaceae*	Common
30	*Cleome viscosa* L.	—	*Cleomaceae*	Common

Table 3.Continued...

S.No	Name of the Species	Common name	Family	Weed status
31	*Clitoria ternatea* L.	Butterfly-pea	*Fabaceae*	Frequent
32	*Coccinia grandis* (L.)Voigt	Baby watermelon	*Cucurbitaceae*	Frequent
33	*Commelina benghalensis* L.	Bengal dayflower	*Commelinaceae*	Common
34	*Commelina erecta* L.	Whitemouth dayflower	*Commelinaceae*	Common
35	*Commelina longifolia* Lamk	longleaf dayflower	*Commelinaceae*	Common
36	*Corchorus aestuans* L.	—	*Tiliaceae*	Frequent
37	*Corchorus trilocularis* L.	—	*Tiliaceae*	Frequent
38	*Croton banplandianum* Bail	Bon Tulshi	*Euphorbiaceae*	Common
39	*Crotalaria medicaginea*	Rattle pod	*Fabaceae*	Frequent
40	*Crotalaria verrucosa*	Blue rattle pod	*Fabaceae*	Common
41	*Cuscuta reflexa*	Giant dodder	*Cuscutaceae*	Frequent
42	*Cyanotis cristata*	Nabhali	*Commelinaceae*	Common
43	*Cynodon dactylon* (L.) Pers	Bermuda grass	*Poaceae*	Common
44	*Cyperus difformis* L.	Umbrella sedge	*Cyperaceae*	Common
45	*Cyperus rotundus* L.	Purple nut sedge	*Cyperaceae*	Common
46	*Cyperus iria* L.	Rice flat sedge	*Cyperaceae*	Common
47	*Cyperus diffusus Vahl*	Dwarf umbrella grass	*Cyperaceae*	Common
48	*Cymbopogon coloratus*(Hook.f)Stapf	lemongrass	*Poaceae*	Common
49	*Digera muricata* (L.) Mart	False Amaranth	*Amaranthaceae*	Frequent
50	*Datura stramonium* L.	Jimson weed	*Solanaceae*	Frequent
51	*Dentella repens* (L.)Forst.&Forst.f	Creeping lick stoop	*Rubiaceae*	Rare
52	*Desmodium triflorum* (L.) DC	Beggar weed	*Fabaceae*	common
53	*Digitaria ciliaris (Retz.) Koel*	Crabgrass	*Poaceae*	Common
54	*Echinochloa colona* (L.) Link.	Jungle rice	*Poaceae*	Common
55	*Echinochloa crusgalli* (L.)Beauv	Barnyard millet	*Poaceae*	Common
56	*Eclipta prostrata* (L.)L.	False daisy.	*Asteraceae.*	Frequent
57	*Emilia sonchifolia* (L.) DC	Lilac tassel flower	*Asteraceae.*	Frequent
58	*Euphorbia hirta* L.	Snake weed	*Euphorbiaceae*	Common
59	*Evolvulus alsinoides* (L.) L.	Little Glory	*Convolvulaceae*	Common
60	*Evolvulus nummularius* (L.) L.f	Agracejo rastrero	*Convolvulaceae*	Common

Table 3.Continued...

S.No	Name of the Species	Common name	Family	Weed status
61	*Fimbristylis cymosa* R. Br.	Fimbry	*Cyperaceae*	Common
62	*Gisekia pharnaceoides* L.	Sand Herbage	*Gisekiaceae*	Rare
63	*Gomphrena serrata* L.	Prostrate Gomphrena	*Amaranthaceae*	Frequent
64	*Heliotropium indicum* L.	Indian heliotrope	*Boraginaceae*	Common
65	*Hybanthus ennaespermus* (L.) F.V.Muell	Orithalthamara	*Violaceae*	Common
66	*Hygrophila auriculata* (Schum.)Heine	Marsh barbel	*Acanthaceae*	Rare
67	*Indigofera aspalathoides* Vahl	Wiry Indigo	*Fabaceae*	Common
68	*Indigofera hirsuta* L.	Hairy Indigo	*Fabaceae*	Common
69	*Ipomoea aquatic* Forsk	Water spinach	*convolvulaceae*	Common
70	*Ipomoea pestigridis* L.	Morning glory	*convolvulaceae*	Frequent
71	*Lantana camara* L.	Wild sage	*Verbenaceae*	Common
72	*Lemna gibba* L.	Gibbous duckweed	*Araceae*	Rare
73	*Limnophila indica* (L.)Druce	Indian marsh weed	*Scrophulariaceae*	Rare
74	*Lindernia antipoda* (L.)Alston	fart weed	*Linderniaceae*	Rare
75	*Leucas aspera* (Willd.) Link	Common leucas	*Lamiaceae*	Common
76	*Marsilia quadrifolia* L.	Water clover	*Marsileaceae*	Common
77	*Melochia corchorifolia*	Chocolate weed,	*Sterculiaceae*	Frequent
78	*Merremia tridentata* (L.) Hallier.f	Arrow leaf morning glory	*Convolvulaceae*	Common
79	*Merremia gangetica* (L.) Cub	Kidney Leaf Morning glory	*Convolvulaceae*	Common
80	*Mimosa pudica* L.	Sleepy plant ,	*Mimosaceae*	Common
81	*Mollugo cerviana* (L.) Ser	Thread stem carpetweed	*Molluginaceae*	Frequent
82	*Mollugo nudicaulis* Lam.	Daisy-leaved chickweed	*Molluginaceae*	Frequent
83	*Oxalis corniculata*	Creeping wood sorrel	*Oxalidaceae*	Common
84	*Oxalis latifolia*	Garden pink-sorrel	*Oxalidaceae*	Common
85	*Ocimum gratissimum* L.	Clove Basil	*Lamiaceae*	Common
86	*Panicum repens* L.	Torpedo grass,	*Poaceae*	Frequent
87	*Parthenium hysterophorus* L.	White top Weed	*Asteraceae*	Common
88	*Passiflora foetida* L.	Wild water lemon	*Passifloraceae*	Frequent
89	*Pedalium murex* L.	Large Caltrops	*Pedaliaceae*	Common
90	*Phyla nodiflora* (L.) Greene	frog fruit	*Verbenaceae*	Frequent

Table 3.Continued...

S.No	Name of the Species	Common name	Family	Weed status
91	*Phyllanthus niruri* L.	Stone breaker	*Euphorbiaceae*	Common
92	*Phyllanthus amarus* Schum. & Thonn	Carry me seed,	*Euphorbiaceae*	Common
93	*Phyllanthus debilis* L.	Niruri	*Euphorbiaceae*	Common
94	*Phyllanthus maderaspatensis* L.	Canoe weed	*Euphorbiaceae*	Common
95	*Physalis minima* L.	Native gooseberry,	*Solanaceae*	Common
96	*Pistia stratiotes* L.	Water cabbage	*Araceae*	Rare
97	*Polygonum barbatum* L.	Joint weed	*Polygonaceae*	Rare
98	*Polygonum glabrum* Willd.	Common Marsh	*Polygonaceae*	Rare
99	*Portulaca oleracea*	Pigweed,	*Portulacaceae*	Common
100	*Portulaca quadrifida* L.	Ten o'clock plant	*Portulacaceae*	Common
101	*Pupalia lappacea* (L.) Juss.	Creeping cock's comb,	*Amaranthaceae*	Frequent
102	*Ruellia tuberosa* L.	Minnie Root	*Acanthaceae*	Common
103	*Sebastiania chamaelea* (L.) Muell. Arg	—	*Euphorbiaceae*	Frequent
104	*Sida cordata* (Burm. f.) Waalkes	Country-mallow	*Malvaceae*	Frequent
105	*Sida acuta* Burm.f	Broom weed	*Malvaceae*	Frequent
106	*Sida cordifolia* L.	Flannel sida	*Malvaceae*	Frequent
107	*Solanum anguivi* Lam.	—	*Solanaceae*	Rare
108	*Solanum nigrum* L.	Garden nightshade	*Solanaceae*	Frequent
109	*Sphaeranthus indicus* L.	—	*Asteraceae*	Common
110	*Synedrella nodiflora* (L.) Gaertn	Pig Grass	*Asteraceae*	Frequent
111	*Tephrosia purpurea* (L.) Pers.	Wild indigo	*Fabaceae*	Frequent
112	*Tephrosia villosa* (L.) Pers.	—	*Fabaceae*	frequent
113	*Trianthema portulacastrum* L.	Desert horse purslane	*Aizoaceae*	Common
114	*Tribulus terrestris* L.	Bullhead	*Zygophyllaceae*	Common
115	*Trichodesma indicum* (L.) R.Br.	Borago indica	*Boraginaceae*	Common
116	*Tridax procumbens* L.	Mexican daisy	*Asteraceae*	Common
117	*Vernonia albicans*	Little iron wood	*Asteraceae*	Common
118	*Vernonia cinerea* (L.) Less.	Purple fleabane,	*Asteraceae*	Common
119	*Wolffia globosa* (Roxb.)Hartog& Plas	Asian water meal.	*Araceae*	Frequent
120	*Xanthium strumarium* L.	Rough cocklebur	*Asteraceae*	Common

1935); The grasses of Burma, Ceylone, India and Pakistan (Bor, 1960); 'Flora of Andhra Pradesh' (Pullaiah and Chennaiah, 1997); and district floras of Srikakulam (Rao and Sriramualu, 1986), Visakhapatnam (Rao and Kumari, 2002) and Vizianagaram (Venkaiah, 2004).

RESULTS AND DISCUSSION

The field crops classifieds as food crops, pulses, vegetable crops, oil crops and commercial crops in various agricultural regions of Vishakhapatnam District were heavily infested with numerous weed species. The weed infestation was carefully studied by random sampling method and certain rank was allotted to each weed depending on their frequency in study area. A total of 120 weed species belonging to 40 families were carefully studied and recorded (Table 3). The weed infestation was affected by the irrigation or water resources, agricultural practises and climatic conditions. The weed species belonging to the family Asteraceae (12 species) and Fabaceae (12 species) were more dominant fallowed by Euphorbiaceae (11 species), Amaranthaceae (10 species) and Poaceae(7) respectively. The genera Cyperus was most dominant weed among all the weed plants and the species of *Cyperus rotundus, Cyperus difformis, Cyperus iria* and *Cyperus diffuses* were recorded as more common and dominant weeds in cereals crops such as paddy, maize, jowar and the plantation crop sugarcane and all vegetable crops. The weed species of *Echinochloa colona, Echinochloa crusgalli, Cynodon dactylon, Chloris barbata and Digitaria ciliaris* were the common sedges of agricultural crops of study area.

The crop plants were heavily infested with broad leaved weed plants during pre monsoon, monsoon and post monsoon seaseons. The weed species belonging to the family Asteraceae, Euphorbiaceae and Amaranthaceae were more common in all vegetable crops, pulses and other crops. The species of *Physalis minima, Pedalium murex, Chrozophora rottleri, Argemone mexicana, Boerhavia diffusa, Ruellia tuberosa, Trianthema portulacastrum, Portulaca oleracea, Sphaeranthus indicus, Solanum anguivi, Tribulus terrestris, Tridax procumbens, Ipomoea pestigridis, Evolvulus alsinoides, Marsilia quadrifolia, Ageratum conyzoides, Cleome viscosa, Cleome chelidonii, Clitoria ternatea, Digera muricata, Eclipta prostrate, Borreria hispida, Phyla nodiflora, Parthenium hysterophorus, Tephrosia villosa, Tephrosia purpurea, Aerva lanata, Crotalaria verrucosa, Mimosa pudica, Alternanthera sessilis* and *Xanthium strumarium* were identified and recorded as the common broad leaved weeds of agricultural fields.

The weed infestation in crop fields was affected by seasonal variations, type of crop, type of soil, availability of nutrients and water resources. The habitat, the life span and the seed germination of weed plants were playing the vital role in weed infestation. Hence the knowledge of weed flora of agricultural crops became very crucial since the last few years to manage these unwanted plants. Nowadays the data on weed infestation of crop fields is very important to plant breeders, farmers and agronomist for the control of weed plants which are treated as *energy drains* of field crops.

Numerous plant species are considered as weeds in agronomic cropping systems due to their harmful effects in agricultural fields. Weeds have many attributes undesirable to crop producers, not the least being the ability to reduce crop yields through competition for resources such as sunlight, water, nutrients, and space. Weeds also may harbor insects and provide a host for certain plant pathogens. Eliminating or reducing the deleterious effects of weeds on agronomic crops is the ultimate goal of weed management. Successful weed management requires identifying relevant species and understanding their biological characteristics so that management can be tailored to the weeds present in individual fields.

In modern agriculture system the effective methods for weed management through various methods are indispensable for high yield of a particular crop. Besides the harmful effects the Effective management of weed biomass can have a beneficial effect on soil fertility through the addition of organic matter and plant nutrients, and improvement in soil condition (Munda *et al.,* 2006; Singh, 2003; Sidhu and Beri 1989; Srivastava *et al.,* 1988).The supplementary or complementary use of these on farm weed biomass besides improving soil physical, chemical and biological properties, also improve fertilizer use efficiency (Bera and Ghosh., 2013).The weeds can be checked by adopting various methods like eco-physical, biological, chemical and recently through combining direct and indirect approach i.e. integrated weed management (Kundu *et al*., 2009).

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