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A SURVEY ON WEED DIVERSITY IN COASTAL RICE FIELDS OF SEBARANG PERAK IN PENINSULAR MALAYSIA

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ABSTRACT

A survey was conducted at 32 different rice fields in coastal zone of Sebarang Perak in West Malaysia to identify most common and prevalent weeds associated with rice. Fields surveyed were done according to the quantitative survey method by using 0.5m x 0.5m size quadrate with 20 samples from each field. Weeds present in each field were identified and the data were used to calculate frequency, field uniformity, density and relative abundance values for each species. A total of 40 different weed species belong to 16 families were identified of which 22 annual and 18 perennial; 12 grassy weeds, 10 sedges and 18 broadleaved weeds. On the basis of relative abundance the 13 most prevalent and abundant weed species were selected to determine their salt tolerance level as well as control method in the rice filed. Among the 13 most abundant weed species, there were five grasses viz. *Echinochloa crus-galli, Leptochloa chinensis, E. colona, Oryza sativa* L (weedy rice) and *Ischaemum regosum*; four sedges viz. *Fimbristylis miliacea, Cyperus. iria, C. difformi* and *Scirpus grossus* and four broadleaved weeds viz. *Sphenoclea zeylanica, Jussiaea linifolia, Monocharia hastata* and *Sagitaria guyanensis.* Based on relative abundance indicates that, annuals were more dominant than perennial.

Key words: Rice, Weed community, relative abundance, coastal zone, Malaysia

INTRODUCTION

Weed is a notorious pest for rice causing serious yield reduction in rice production worldwide. Annual worldwide rice yield loss by weed is 9.5% (Rabbani *et al*, 2011**)** and 10-35% in Malaysia (Karim *et al*., 2004). Losses caused by weeds vary from one location to another, depending on the predominant weed flora and on the control methods practiced by farmers. A crop loss due to weed competition varies with the duration of weed infestation of the crop. The crop is likely to experience yield reduction, unless weeds are kept free during a part of its growing period (Azmi *et al*., 2007) and uncontrolled *Fimbristylis miliacea* alone reduced grain yields by 42% (Begum, 2006). The main factors for which crops and weeds compete are light, water and nutrients. Weeds commonly absorb added nutrients as much and more rapidly than crops and also competing for nutrients, light, space and moisture throughout the growing season (Ramzan, 2003; Hayat, 2004; Hussain *et al*., 2008).

Salinity is another dramatic factor causing yield reduction in rice. At low concentrations salt suppresses plant growth and higher concentration can cause death (Michael *et al*, 2004). Due to anthropogenic contributions to global warming, the rate of sea-level rise is expected to increase and posses dramatic effect on rice production especially in coastal areas.

Weed succession and distribution patterns in rice fields are dynamic in nature. The composition of the weed flora may differ depending on location (Begum *et al*., 2008, Uddin *et al*., 2010). The information on the up-to-date presence, composition, abundance, importance and ranking of weed species is needed to formulate appropriate weed management strategies to produce optimum yields of rice (Begum *et al*., 2005). Surveys are commonly used to characterize weed populations in cropping systems (Uddin *et al*., 2010). In weed management program, a thorough survey is necessary to address the current weed problems in the rice field and survey information is absolutely important in building target oriented research programs (Boldt *et al*., 1998). The distribution and nature of the weeds of the coastal area could be different due to salinity. Specific sound knowledge on the nature and extent of infestation of weed flora in the coastal rice area through weed surveys is essential for planning of their control and to formulate recommendation of the standard herbicides and appropriate doses under saline environment. However, detailed information on the presence, composition, abundance, importance and ranking of weed species especially in coastal rice field area of Malaysia are rare. Therefore, the present study was undertaken to investigate the distribution and severity of weed flora prevailing in the coastal rice cultivated zone of Sebarang Perak in Peninsular Malaysia.

MATERIALS AND METHODS

The surveys were conducted in some selected coastal rice field areas in Sebarang Perak (Figure 1) in Peninsular Malaysia to identify and evaluate the major weed species in rice fields during the period of 25 May to 8 June, 2010. Rice field surveyed covering eight blocks in rice scheme of Sebarang Perak. The age of rice plants was 60 days at the time of the survey and fields were flooded with 2-4 cm of water. The soil salinity was measured using a conductivity meter (Model: ECTestr, Spectrum Technologies, Inc.). A GIS value of each surveyed specific area was recorded by Global Positioning Satellite (GPS) (model: Value Buy~2nd Hand 2GB Sony Ericsson XPERIA X1 FULL BOX). A total 32 rice field was randomly selected within each surveyed area. The soil salinity levels and GIS vales of the surveyed area have been presented in table 1.

Table 1. Soil salinity levels and GIS values of surveyed area

Specific surveyed area	Salinity levels (dS m^{-1})	GIS values
Block A	1.21	40° 07' N and 101° 04.2' E
Block B	0.45	40° 08.3' N and 101° 7.1' E
Block C	1.02	39° 06.3' N and 100° 09' E
Block D	0.85	40°06.5' N and 101°03.4' E
Block E	2.23	41° 01' N and 101° 02.5' E
Block F	2.15	40° 01.8' N and 99° 09.4' E
Block G	2.01	38° 87' N and 102° 14' E
Block H	2.25	39° 26' N and 101° 34' E

Fields surveyed were done according to the quantitative survey method by using 0.5m x 0.5m size quadrate with 20 samples from each field (Fig.2).

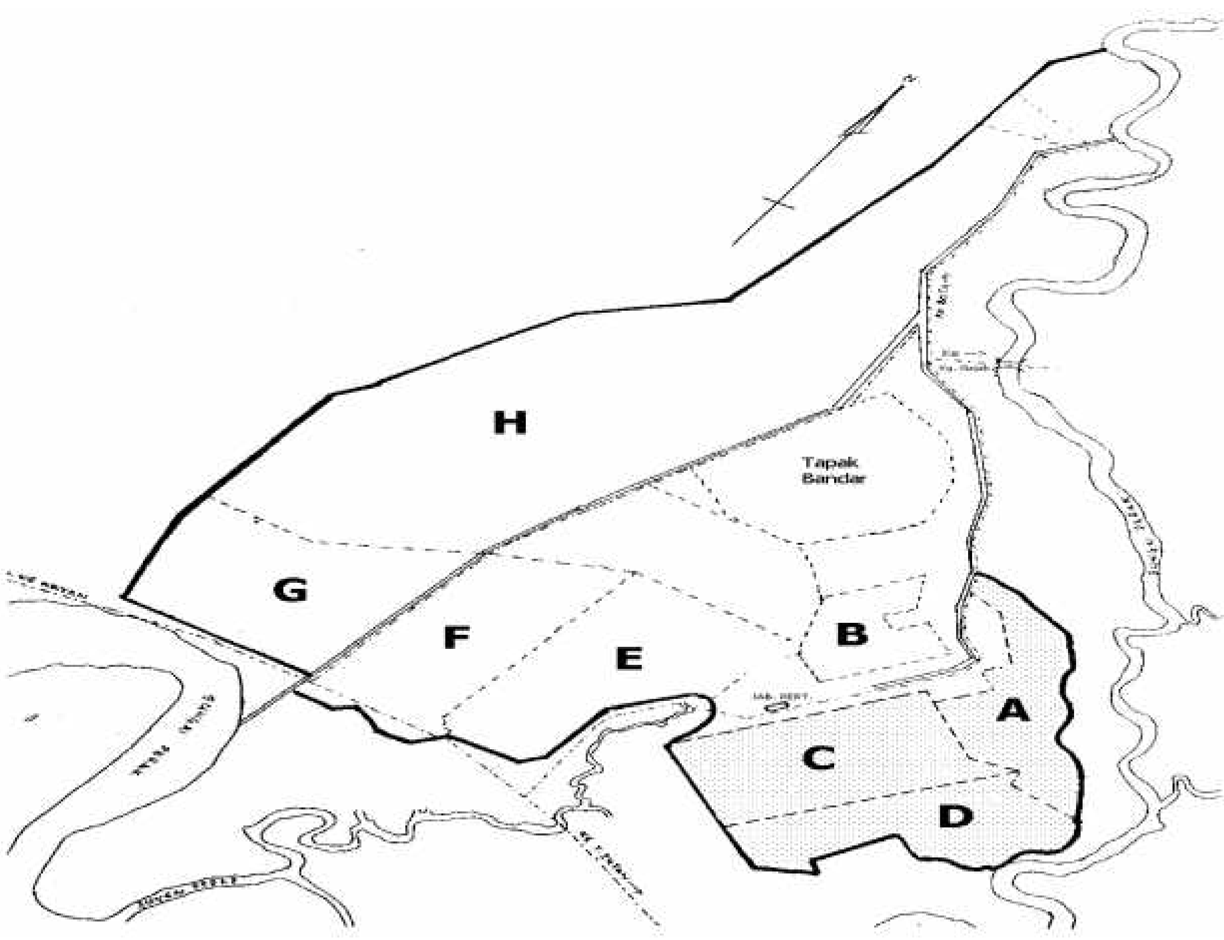


Figure 1. Map of Sebarang Perak rice growing area indicating surveyed zone.

In tropical countries like Malaysia weed species composition is consistent throughout the year due to the fact that temperature and day length do not fluctuate greatly from month-to-month. Average temperatures during the survey period ranged from 26 to 31^0 C, monthly average rainfall recorded 150 to 260 mm, and relative humidity averaged 74–77%. A total of 32 rice fields were surveyed and randomly selected from the coastal area. All weeds in each quadrate were identified, counted, and recorded. Species that was not identified in the field was tagged, and transported for later identification (Chancellor and Froud-Williams, 1982; 1984). Probable anomalies were carefully avoided such as, shoulder and foot slopes, potholes, ditches, bluffs, power lines, and paths were not sampled.

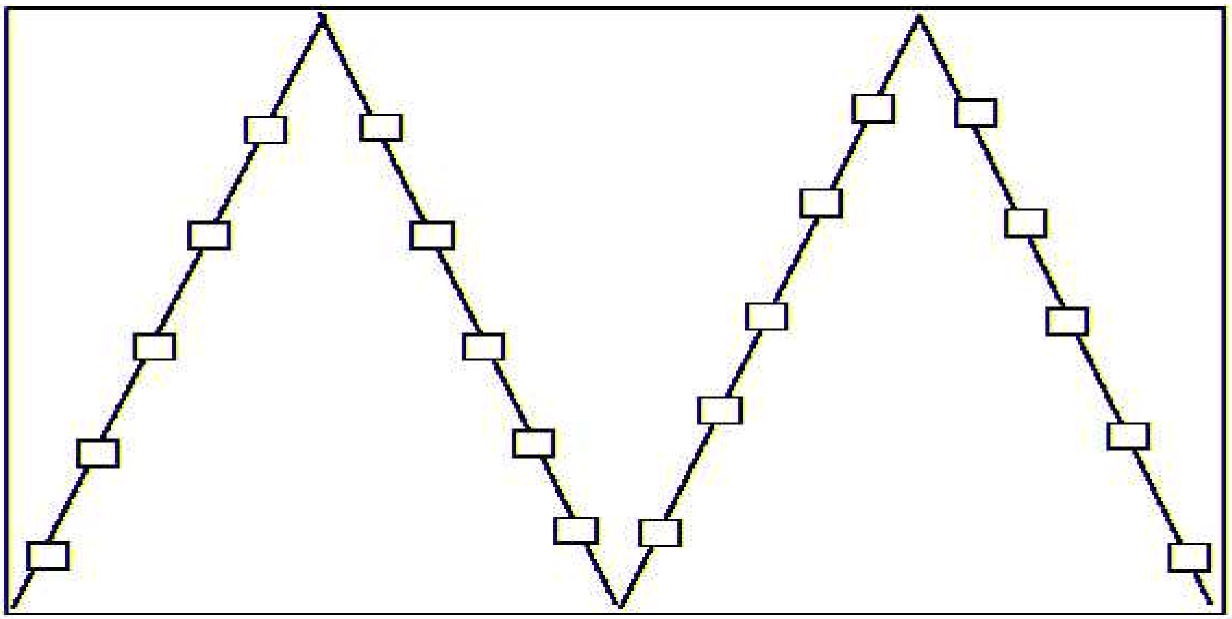


Figure 2. Sampling scheme used at each site surveyed. Sampling points ▭

The data were summarized using five quantitative measures as frequency, field uniformity over all fields, density over all fields, density occurrence fields and relative abundance (Thomas, 1985). Frequency (F) was calculated as the percentage of the total number of fields surveyed in which a species occurred in at least one quadrate.

$$F_k = \frac{\sum_{1}^{n} Yi}{n} \times 100$$

Where Fk = frequency value for species k

Y_i = presence (1) or absence (0) of species k in field i

n = number of fields surveyed.

Field uniformity (FU) was calculated as the percentage of the total number of quadrates sampled in which a species occurred.

$$FU_k = \frac{\sum_{1}^{n}\sum_{1}^{20} Xij}{20n} \times 100$$

Where FU_k = field uniformity value for species k

X_{ij} = presence (1) or absence (0) of species k in quadrate j in field i

n = number of fields surveyed.

The field density (D) of each species in a field was calculated by summing the number of plants in all quadrates and dividing by the area of 20 quadrates.

$$D_{ki} = \frac{\sum_{1}^{20} Zi}{Ai}$$

Where D_{ki} = density (in numbers m^{-2}) value of species k in field i

Z_i = number of plants of a species in quadrate j (a quadrate is 0.25^2 m).

A_i = area in m^2 of 20 quadrates in field i.

Mean field density (MFD) is the mean number of plants m^{-2} for each species averaged over all fields sampled.

$$MFD_k = \frac{\sum_{1}^{n} Dki}{n}$$

Where MFD_k = mean field density of species k

D_{ki} = density (in numbers m^{-2}) of species k in field i

n = number of fields surveyed.

Relative abundance (RA) was used to rank the weed species in the survey and it was assumed that the frequency, field uniformity, and mean field density measures were of equal importance in describing the relative importance of a weed species. This value has no units but the value for one species in comparison to another indicates the relative abundance of the species (Thomas and Wise, 1987). The relative frequency (*RF*), relative field uniformity (*RFU*), and relative mean field density (*RMFD*) was calculated by dividing the parameter by the sum of the values for that parameter for all species and multiplying by 100.

Relative frequency for species k (RF_k)

$$RFk = \frac{\text{Frequency value of species}}{\text{Sum of frequency values for all species}} \times 100$$

Relative field uniformity for species k (RFU_k)

$$RFUk = \frac{\text{Field uniformity value of species k}}{\text{Sum of field uniformity values for all species}} \times 100$$

Relative mean field density for species k ($RMFD_k$)

$$RMFDk = \frac{\text{Mean field density value of species k}}{\text{Sum of mean field density values for all species}} \times 100$$

The relative abundance of species k (RA_k) was calculated as the sum of relative frequency, relative field uniformity, and relative mean field density for that species;

$$RA_k = RF_k + RFU_k + RMFD_k$$

Relative abundance value is an index that was calculated using a combination of frequency, field uniformity, and field density for each species, as described by Thomas (1985). The sum of the combined relative abundance values for all species in a community is 300. Relative abundance allows for comparison of the overall abundance of one weed species versus another.

RESULTS AND DISCUSSION

Weed species taxonomy: A total of 40 different weed species including 22 were annuals and 18 perennials, comprising 12 grasses, 10 sedges and 18 broadleaved weeds were identified in different rice field of coastal area at Sebarang Perak (Table 2). The annual species was greater in number than perennial species and overall annual grasses were more prevalent than perennial grasses due to lack of satisfactory control measure either cultural or herbicide application. Similarly, Al-Gohary (2008) observed that annual weeds especially grasses were higher than perennial weeds in eleven wadis of Gebel Elba districts in Egypt. The weed species represented 16 families from surveyed area. Among which Poaceae family had the highest number of weed species (12), followed by Cyperecae (10), Pontederiaceae (2), Convolvulaceae (2), Rubiaceae (2), Onagraceae (2). Rests of the 10 families were represented by one species each (Table 2). Poaceae and Cyperaceae accounted together 55% of the species. Turki and Sheded (2002) observed that seventy-one weed species of rice field belonging to 28 families were recorded in the Delta costal region in Egypt and the most represented families were Gramineae (28%), Compositae (9%), Cyperaceae (7%), Malvaceae, Lythraceae, Chenopodiaceae, and Leguminosae (6%) and Convolvulaceae (4%). Generally, the weed vegetation of a particular area is determined not only by the environment but also edaphic and biological factors that include soil structure, pH, nutrients and moisture status, associated crops, weed control measures and field history especially in local geographical variation (Hakim, *et al*, 2010).

Species frequency: Among the grasses the most common and frequent grass weed species was *Echinochola crus-galli* with 85.71% (Table 3). The next occurred in >50% frequencies were *E. colona*, *L. chinensis, O. sativa* L. (weedy rice), *P. veginatum* and *I. rogosum.* Among the sedges the most widespread weed species in terms of frequencies was *S. grossus* and *F. milicaea* both with 75% followed by *C. iria, C. deformis, C. distans* that occurred in >50% fields. Among the broadleaved weeds the most frequent weed species was *J. linifolia* (60.71%) along with the other weeds that frequencies >50% were *S. zeylanica*, *S. guyanensis* and *M. hastata*. Frequencies of the remaining grasses, sedges and broadleaved were 18 to 43%, 29 to 46% and 14 to 43%, respectively (Table 3). Begum (2006) reported that *F. milicaea* and *S. grossus* were the most frequent sedges, irrespective of the shift in cultural practice from transplanting to direct seeding in the Muda area in Peninsular Malaysia. The most frequent species occurring five species (> 30% frequency value) in each study block were *O. sativa* complex, *E. crus-galli*, *L. chinensis*, *L. hyssopifolia*, *F. miliace* (Begum *et al*., 2008). Most of common weeds in all regions were found in annual nature. The seeds of annual weeds survive in unfavorable conditions and they have able to complete their life cycle from seed to seed in one season (Singh *et al*., 2008).

Field uniformity: Uniformity is a quantitative measure of the spread of a weed species within a given field. Among grasses the highest field uniformity appeared in *E. crusgalli* (74.46%), *E. colona* (53.93%) and *L. chinensis* (49.64%) while the lowest field uniformity in *D. sangunalis* (5.18%) followed by *C. dactylon* (5.71%) and *P. congugatum* (7.32%) (Table 3). In sedges, *F. miliacea* showed highest field uniformity (67.14%) while other remaining species appeared in between 7.86 to 37.68%. In broadleaved weeds *J. linifolia* were showed the highest field uniformly (36.96%) but other species 2.68 to 20.18% distributed throughout the fields. Similar result was observed by Begum (2006) where weeds were generally uniformed distributed among the rice fields of four rice growing districts in MUDA, Kedah. Uddin *et al.* (2010) reported that *C. compressus* and *C. aromaticus* yielded the highest uniformity values of 16.7 and 43.6%, respectively.

Table 2. Weed species observed in a survey of coastal rice cultivated zone in Sebarang Perak of western Peninsular Malaysia

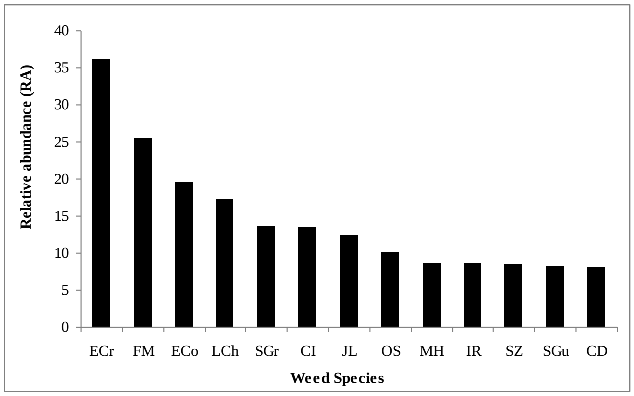
Family name	Scientific name	Common name	Life cycle
Grasses			
	Echinochloa crus-galli (L.) Beauv	Barnyard grass	A
	Echinochloa colona (L.) Link	Jungle rice	A
	Leptochloa chinensis (L.) Nees	Feather grass	A
	Oryza sativa complex (weedy rice)	weedy rice	A
Poaceae	*Paspalum conjugatum* Berg.	Buffallo grass	P
	Paspalum vaginatum Sw.	Water couch grass	P
	Paspalum commersonii Lan*k*	Bull paspalum	P
	*Ischaemum rugosum*Salisb.	Wrinkled grass	P
	Eleusine indica (L.) Gaertn.	Goose grass	A
	Cynodon dactylon (L.) Pers.	Bermuda grass	P
	Digitaria ischaemum (Schr.) Muhl	Smooth crabgrass	A
	Digitaria sanguinalis (L.) Scop.	Hairy crabgrass	A
Sedges			
	Fimbrystylis milliacea (L.) Vahl	Lesser fimbry	A
	Fimbristylis globulosa Kunth	Globular fimbristylis	P
	Cyperus iria L.	Grasshopper's cyperus	A
Cyperaceae	*Cyperus difformis* L.	Small-flowered umbrella plant	A
	Cyperus pilosus Vahl	Fuzzy flat sedge	A
	Cyperus aromaticus	Greater kyllingia	P
	Cyperus distans L.f.	Slender cyperus	P
	Scirpus grossus L. f.	Creater club-rush	P
	Scirpus mucronatus L	Bogbulrush	P
	Eleocharis variegata (nec.) Boeck.	Spikerush	P
Broad leaved			
Amarantaceae	*Amaranthus viridis*	Slender amaranth	A
Sphenocleaceae	*Sphenoclea zeylanica* Gaertn.	Gunda padi	A
Onagraceae	*Jussiaea linifolia*	Narrow leaved willow herb	A
	Jussiaea repens L.	Ludwigia peploides ssp. glabrescens	A
Euphorbiaceae	*Euphorbia hirta* L.	Hairy spurge	A
Alismataceae	*Sagitaria guyanensis* H.B.K. Bogin	Kelipokpadang	P
Butomaceae	*Limnocharis flava (*L.) Buchenan	Yellow sawah lettuce	P
Asteraceae	*Eclipta prostata* (L.) L.	White heads	A
Pontederiaceae	*Monochoria hastata* (L.) Solms	Arrow leaf False Pickerelweed	A
	Monochoria vaginalis (Burm.f.) Presl	Oval-Leaved pond weed	A
Scrophulariaceae	*Lindernia crustacea* (L.) F. Muell.	Malaysian false pimpernel, Round-fruited Lindernia	P
Convolvulaceae	*Ipomea triloba* L.	Little bell	P
	Ipomea aquatica L.	White-Flowering Kangkong	P
Rubiaceae	*Borreria laevicaulis* Ridl	Purple-leaved Button Weed	P
	Hedyotis corymbosa (L) Lamk.	Two flowered oldenlandia	A
Capparidaceae	*Oldenlandia dichotoma* var	Many flowered oldenlandia	A
Salviniaceae	*Salvinia molesta D.S.Mitchel*	Giant Salvinia, Water Fern	A
Marsileaceae	*Marsilea crenata* Presl.	Dwarf Four-leaf Clover	P

Note: P= perennial and A= annual

Table 3. Frequency (F), field uniformity (FU), Mean field density (MFD) and Relative abundance (RA) of weed species in rice fields of Sebarang Perak coastal zone.

	F (%)	FU (%)	MFD (plant m^{-2})	RA
Grasses				
Echinochloa crus-galli	85.71	74.46	5.10	36.24
Echinochloa colona	67.86	53.93	4.02	19.63
Leptochloa chinensis	67.86	49.64	3.60	17.26
Oryza sativa L. *(*weedy rice*)*	57.14	20.89	1.85	10.16
Paspalam conjugatum	28.57	7.32	0.55	3.04
Paspalam vegenatum	53.57	19.11	1.16	7.06
Paspalam commersonii	32.14	9.11	0.71	3.64
Ischaemum regosum	57.14	20.00	1.53	8.63
Eleusin indica	42.86	17.32	1.12	5.89
Cynodon dactylon	25.00	5.71	0.53	2.58
Digitaria ischaeum	39.29	9.64	0.70	4.18
Digitaria sangunalis	17.86	5.18	0.51	2.07
Sedges				
Fimbrystylis melliacea	75.00	67.14	5.09	25.60
Fimbristylis globulosa	35.71	17.50	1.54	5.78
Cyperus iria	64.29	35.89	3.02	13.55
Cyperus difformis	53.57	25.89	1.85	8.13
Cyperus pilosus	39.29	19.72	1.18	5.97
Cyperus aromaticus	28.57	7.86	0.51	3.07
Cyperus distans	50.00	15.36	1.18	6.27
Scirpus grossus	75.0	37.68	3.02	13.70
Scirpus mucronatus	28.57	9.46	0.80	3.54
Eleocharis variegate	46.43	12.68	1.02	5.44
Broadleaved				
Amaranthus viridis	35.71	11.25	0.76	4.21
Sphenoclea zeylanica	57.14	18.93	1.35	8.58
Jussiaea linifolia	60.71	36.96	2.69	12.49
Jussia repens L.	35.71	8.93	0.69	7.38
Euphorbia hirta	17.86	3.75	0.37	1.77
Sagitaria guyanensis	57.14	17.14	1.22	8.31
Limnocharis flava	35.71	9.64	0.80	4.03
Eclipta prostata	32.14	5.89	0.72	3.13
Monochoria hastata	53.57	20.18	1.45	8.63
Monochoria vaginalis	25.00	8.57	0.67	3.08
Lindernia rotundifolia	42.86	7.50	0.81	3.32
Ipomea triloba	14.29	2.68	0.22	1.31
Ipomea aquatic	39.29	10.00	0.73	4.25
Borreria laevicaulis	25.00	5.36	0.62	2.61
Hedyotis corymbosa	42.86	10.00	0.79	4.57
Oldenlandia dichotoma	21.43	3.04	0.41	0.90
Salvania molesta	25.00	4.11	0.39	2.26
Marsila crenata	39.29	17.32	1.34	7.50

Field density: *Echinochloa crusgalli* was the most abundant weed with a density of 5.10 plants m^{-2}. *Fimbristylis miliacea* was second most abundant weed with a density of 5.09 plants m^{-2}. *Leptochloa chinensis, E. colona*, *C. iria*, *S. grossus* and *J. linifolia* were the other weed species with densities over 2 plants m^{-2} (Table 3) while other weed species carried field density ranges from 0.22 to 1.85 plants m^{-2}. The weeds which appeared the highest frequencies, field uniformities and mean field densities, indicating that these weeds were the more difficult to control. So, these species should be carefully monitored. On the other hand, all types of weeds that have field frequencies <50%, field uniformities <35% and mean field densities <2 plants m^{-2} may either less competitive with rice or may be effectively controlled by current weed management practice in the studied area. Weed density is an important factor in the control of weed species. Wicks *et al*. (2003) reported where the average density of the species was <9 weeds/m^2 but some species were found greater density within the specific field. Similar results were reported by Uddin *et al*. (2009) who found that the density of most species increased compared to densities obtained from all of the fields. These results are also in accordance with findings of Javaid *et al.* (2009) where they observed that the highest density and coverage was shown by the most common grass *C. dactylon* and *P. hysterophorous* L. was the second most densely populated weed species in grazing lands of Lahore**.**



Notes: ECr=*Echinochloa crus-galli,* FM= *Fimbrystylis melliacea,* ECo=*Echinochloa colona,* LCh=*Leptochloa chinensis,* SGr=*Scirpus grossus,* CI=*Cyperus iria,* JL=*Jussiaea linifolia*, OS=*Oryza sativa* L. *(*weedy rice*)*, MH=*Monochoria hastata,* IR=*Ischaemum regosum, SZ= Sphenoclea zeylanica*, SGu= *Sagitaria guyanensis*, CD= *Cyperus difformis*

Figure 3. Relative abundance of the 13 most prevalent weed species observed in a survey of coastal rice cultivated zone of Sebarang Perak.

Relative abundance: Relative abundance values quantify the predominance of a given weed species in an environment by calculating the frequency, field uniformity, and density of a particular weed species relative to all other species observed. *Echinochloa crus-galli* (36.24) and *F. miliacea* (25.60) yielded greatest relative abundance in all over the weed species in this surveyed area (Table 3). Among the grasses the most relative abundant was found in species of *E. crus-galli* followed by *E. colona, L. chinensis* and *O. sativa* L. In sedges, the highest relative abundance appeared in *F. miliacea* followed by *C. iria, S. grossus, C. difformis* while among the broadleaved, the species *J. linifolia* appeared most relative abundance followed by *S. zeylanica*, *S. guyanensis* and *M. hastata* (Table 3).

Relative abundance provides an indication of the overall weed problem posed by a species. In descending order the top most 13 species viz. *E. crus-galli*, *F. miliacea*, *E. colona*, *L. chinensis*, *S. grossus*, *C. iria*, *J. linifolia*, *O. sativa* L., *I. regosum*, *M. hastata*, *S. zeylanica*, *S. guyanensis* and *C. defformis* that had the higher RA values were 36.24, 25.60, 19.63, 17.26, 13.70, 13.55, 12.49, 10.16, 8.63, 8.63, 8.58, 8.31 and 8.13 respectively (Fig.3). In this study most of the abundant weeds were annual in nature. Uddin *et al.*(2009) found that two sedges *C. aromaticus* and *F. dichotoma*, two grases *E. indica* and *C. aciculate;* two broad leaved *D. triflorum*, *B. repens* were equally impotant abundant species containing frequency ≥ 50% and RA value ≥ 12.

The ranking of weed species differed in the lists based on frequency (F), field uniformity (FU) and mean field density (MFD) but, within the weed type, the higher RA value reflects its respective higher values of frequency (F), field uniformity (FU) and means field density (MFD) (Tables 3). However, *E. crussgalli*, *F. miliacea*, *E. colona* and *L. chinensis* were top abundant species irrespective of frequency (F), field uniformity (FU) and mean field density (MFD). This result indicates that *E. crussgalli, F. miliacea*, *E. colona* and *L. chinensis* is clearly the most serious weed in rice growing areas in Sebarang Perak. The two other grasses, *I. regosum*, *O. sativa* L. (weedy rice) three sedges *S. grossus*, *C. iria*, *C. defformis* and three broadleaved *J. linifolia*, *M. hastate*, *S. zeylanica* and *S. guyanensis* were equally important abundant species having frequency ≥ 50% and RA value ≥8.

The result is supported by Azmi and Baki (2002) that almost similar pattern of weed dominance ranking they observed in Muda area and in the descending order of importance were the *E. crus-galli* complex, *L. chinensis*, *O. sativa* (weedy rice), *L. hyssopifolia, F. miliacea*, *S. zeylanica* and *S. grossus*. Thomas (1985) presented a weed survey report where the relative abundance value clearly indicated a very few dominated weed species. In 2008 however, *Oryza sativa* complex ranked top in the Muda rice granary in peninsular Malaysia, followed by *E. crus-galli*, *L. chinensis*, *L. hyssopifolia* and *F. miliacea* (Begum *et al*., 2008). Similarly, Xing *et al.* (2000) also observed that two species, *C. rotundus* and *D. sanguinalis*, were more dominant out of 10 most dominant species. Uddin *et al.* (2009) found that two sedges *C. aromaticus* and *F. dichotoma*, two grasses *E. indica* and *C. aciculatus*, and two broadleaved weeds *D. triflorum* and *B. repens*, were most abundant species out of 28 species with a frequency ≥ 50% and RA value ≥ 12. Lowe *et al*. (2000) reported 2-5 fold increase in the abundance of *K. brevifolia* mowed at 2.5 cm compared to 5.0 cm.

Conclusion: The results of the survey provide a quantitative comparison of the common weed species in coastal rice fields of Sebarang Perak in West Peninsular Malaysia. On the basis of relative abundance the most prevalent and abundant weed species were selected to determine their salt tolerance level as well as control method in the rice filed. Among the 13 abundant weed species five grasses viz. *E. crusgalli, E. colona, L. chinensis, O. sativa* L. (weedy rice), *I. rogosum*; four sedges viz. *F. miliacea, C. iria, S. grossus, C. defformis* and four broadleaved viz. *J. linifolia, M. hastata* and *S. zeylanica* and *S. guyanensis* were found in the rice growing cultivated coastal zone of Sebarang Perak. Overall, more survey work is needed on a regular basis to identify possible problematic weed and weed population shifts and direct research toward new or improved control measures.

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