ISSN 1810-3030 (Print) 2408-8684 (Online)
Journal of Bangladesh Agricultural University
Journal home page: http://baures.bau.edu.bd/jbau, www.banglajol.info/index.php/JBAU

Weed composition study on wheat and *boro* rice in research and farmers' fields

M. Huda, M. Begum, M. M. Rahman and F. Akter
Department of Agronomy, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

ARTICLE INFO

Article history:
Received: 17 October 2017
Accepted: 26 November 2017

Keywords:
Weed composition, Wheat, *Boro* rice, Research fields, Farmers' fields

Correspondence:
F. Akter
(fahmida@bau.edu.bd)

Abstract

A weed survey was conducted in Agronomy Field Laboratory, BAU Farm and farmers' fields of Sutiakhali Natunchar village in Mymensingh district during the period from December 2015 to March 2016 to study the weed vegetation in wheat and *boro* rice. Ten fields were selected for each crop from each location. A quadrat of 0.25 m^2 was placed randomly at four places in each plot and the weeds within the quadrat were identified and counted species-wise. The results revealed that the composition of weed species in two different crops was different and the composition of weed flora in each crop under different locations was also different. In wheat, a total number of 29 weed species belonging to 16 families were found from all three locations. The infesting weed species were 18 in Agronomy Field Laboratory, 16 species in BAU Farm and 19 species in farmers' fields. From the five most dominant species, *Polygonum hydropiper* had the highest relative abundance value in both Agronomy Field Laboratory and BAU Farm and on the other hand, in farmers' field, a new weed species, *Eleusine indica* was in the top most of the dominant list. The other weed species which were present in the dominant list of three locations were *Cynodon dactylon, Cyperus rotundus, Paspalum distichum, Chenopodium album, Marsilea quadrifolia* and *Leucas aspera.* In *boro* rice fields, among the three locations, 25 weed species were observed in total belonging to 13 families. Of which, 20 weed species were found in both Agronomy Field Laboratory and BAU Farm whereas in farmers' fields, 21 weed species were identified. In both Agronomy Field Laboratory and BAU Farm, *Eleocharis atropurpurea* had the highest abundance value but in farmers' field, *Cyperus difformis* occupied the highest value. The other dominant weed species were *Leersia hexandra, Monochoria vaginalis, Echinochloa crusgalli, Paspalum distichum* and *Alternanthera philoxeroides* found in three locations. Many common weeds were present in three locations in a crop but their frequency, uniformity, density and relative abundance value were different. The similarity index of weed species between wheat and *boro* rice indicated that the infesting weed species between the two crops was less associated. Thus the weed divergence in *boro* rice with wheat was high. From this study it was clear that the weed infestation was changed by crop and locations. In this study a little bit divergence and ranking of five most abundant weed species and low similarity index value of weed species in different crops under a specific area or among the area indicated that weed control measure should be adopted on crop basis in a specific area considering the dominant weed species.

Introduction

Most of the weeds compete more for their nourishment through rapid development and manifestation by quick root and shoot development than crop. Thus, weed isone of the most important agricultural pests that act as a limiting factor in crop production (Mamun *et al*., 1993). Globally, actual yield losses due to pests have been estimated approximately 40% of which weeds caused the highest loss (32%) (Rao, 2007). Favorable climatic and edaphic conditions as common in almost all of the field crops of Bangladesh encourage vigorous weed growth. Wheat and *boro* rice are the major *rabi* crops commonly grown in Bangladesh where weeds are considered as a major constraint among the various factors of lowering yield. Research findings have demonstrated that weed is one of the worst enemies of wheat (Appleby *et al.* 1976; Arnold and Dosland, 1967). *Boro* rice is infested by a broad spectrum of weeds causing severe yield loss. IRRI (2003) reported that yield loss of *boro* rice for weed is 48%. Weed vegetation means differences in weed composition under different agro-ecological conditions or in different crops. The weed vegetation of a specific area is determined by the environment as well as biological factors such as cropping system, weed control measures and field history. In a given environment, however, the weed vegetation is strongly affected by cultural practices such as irrigation, fertilizer management, cultivar, herbicide and crop rotation. Edaphic factors i.e. soil structure, pH, nutrients and moisture status also strongly affect the weed vegetation (Kim *et al*., 1983). The weed flora in a field changes throughout the year, and from year to year in response to changing environmental conditions (Holzner, 1982). Therefore, monitoring these temporal changes in weed species composition is important to formulate or reformulate appropriate weed management strategies to produce optimum crop yields. However, detailed information on the presence, composition, abundance, importance and ranking of weed species in different field crops are still lacking. Understanding the nature and extent of infestation of weed flora through weed survey in a particular field situation is much effective for planning and execution of effective weed control measures rather

than a countrywide blanket recommendation using standard herbicides and doses or other control measures. Therefore, the present study was undertaken to determine weed species composition and dominant weed species infested in *boro* rice and wheat and also to know the diversity of weed species in research and farmers' fields.

Materials and Methods

The weed survey was conducted in Agronomy Field Laboratory and Genetics and Plant Breeding Laboratory of BAU farm, and farmers' fields of Sutiakhali Natunchar village in Mymensingh district during December 2015 to March 2016. The distance between Agronomy Field Laboratory and Genetics and Plant Breeding Laboratory is about 0.5 km whereas Sutiakhali is 3.2 km away from the previous two sites. The study areas belong to Old Brahmaputra Floodplain Agro Ecological Zone (AEZ- 9) (UNDP and FAO, 1988) with non- calcareous dark grey floodplain soils. Ten fields were selected from each location randomly (how about the field or plot sizes?). From each field, four spots were selected at random. Field margins and headlands were identified and weed infestations at those positions were not recorded because they were usually not representative of the field as a whole. In each spot, a quadrat of 0.25 m^2 (50cm ×50cm) were placed and the number of weeds within the quadrat were recorded species-wise. Care was taken in the identification of weed species. As most grasses were in the flowering stage, assessments could be made quite readily. For annual grasses and other broadleaf species, a rooted individual was considered as single plant. In case of perennial grass species, the number of shoots was counted rather than the number of plants counted. Species that could not be identified in the field were tagged, pressed and transported for later identification (Chancellor and Froud-Williams, 1984). All weeds in each quadrat were identified, counted and recorded for subsequent data entry and analysis. In case of perennial grasses, numbers of culms were counted. Unidentified weed species in the field were catalogued and pressed for later identification by flora Iranica (Rechinger, 2007) and Turkey (Davis, 85). Collected data were summarized according to the following quantitative measures as described by Thomas (1985):

(i) Frequency
(ii) Field uniformity
(iii) Mean field density
(iv) Relative frequency
(v) Relative field uniformity
(vi) Relative mean field density
(vii) Relative abundance

Frequency

It is the number of fields in which a species occurred and expressed as a percentage of the total number of fields. The frequency (F) value was the percentage of fields infested by a species k, at least in one quadrate per field. It is expressed as follows:

$$F_k = \frac{\sum_{i=0}^{n} Y_i}{n} \times 100$$

Where,
F_k = Frequency value for species K
Y_i = Presence (1) or absence (0) of K in the field i
n = Number of field survey

Field uniformity (FU)

It is the sampling locations (4 quadrats per field) in which a species occurred, expressed as a percentage of the total number of samples. This measure was used to estimate the area infested with a species. It is expressed as follows:

$$U_k = \frac{\sum^{n}\sum^{4} X_{ij}}{4n} \times 100$$

Where,
U_k = field uniformity values for species K
X_{ij} = Presence (1) or absence (0) of the species K in quadrat J of the field i
n = Number of fields surveyed.

Density (D)

It is the number of individual of a species per square meter for each weed species.

$$D_{ki} = \frac{\sum^{4} Z_j}{n} \times 4$$

Where,
D_{ki} = Density (individuals per square meter) of species k in field i and
Z_j = Number of plants of each species in quadrate j (each quadrate is 0.25 m^2)

Mean field density (MFD)

The mean field density (MFD) value indicates the number of plants per square meter for each species averaged over all fields sampled. It is the value is obtained by totaling each field density (D) and dividing by the total number of fields.

$$MFD_k = \frac{\sum^{n} D_{ki}}{n}$$

Where,
MFD_k = Mean field value of species K
D_{ki} = density (numbers per square meter) of species k in field i,
n = Number of all fields surveyed.

Relative frequency for species K (RF_k)

$$\frac{\text{Frequency value of species 'K'}}{\text{Sum of frequency value for all species}} \times 100$$

Relative field uniformity for species K (RFU_k)

$$\frac{\text{Field uniformity value of species 'K'}}{\text{Sum of field uniformity value for all species}} \times 100$$

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

$$\frac{\text{Mean field density value of species 'K'}}{\text{Sum of mean field density value for all species}} \times 100$$

In order to summarise the abundance of a species, three of the above relative measures were combined into a single value, which is known as Relative Abundance (RA).

Therefore, Relative abundance for species K, RAk = RFk + RFUk+ RMFDk. The relative abundance value is 300. This calculation assumed that the frequency, field uniformity and mean field density were of equal importance in estimating the abundance of a species. If only one species occurred in a community, the relative abundance will be 300. If more than one species occur in the community the total value of 300 is shared by them. The greater the share of a species is recorded the greater the importance it marks. Thus the relative abundance of the infesting species would show their relative ecological importance in the community.

Similarity index (S)

The weed community growing in association with different crops as stated above was compared on the basis of similarity index value (Newsome and Dix, 1968). The mean field density of weeds common to the community for different topographical sequence was used. Similarity index is expressed by S and is calculated by the following formula:

$$S = \frac{2C}{A+B} \times 100$$

Where,

S = Similarity index

C = The sum of the lower values of two mean field densities for species common in two crops

A = The sum of mean field density values in crop A

B = The sum of mean field density values in crop B

Higher S value indicates close similarity in species composition between crops. Conversely, lower S value reflects divergence in species composition in the two crops.

Results and Discussions

Weed composition in Agronomy Field Laboratory

In Agronomy Field Laboratory, the infesting weed species were 18 belonging to 11 families in wheat crop (Table 1). Poaceae and Cyperaceae contributed seven and two weed species, respectively. Chenopodiaceae, Commelinaceae, Polygonaceae, Marsileaceae, Scrophulariaceae, Oxalidaceae, Compositae, Leguminosae and Rubiaceae represented only one weed species each. In descending order, the most dominant weeds based on relative abundance value were *Polygonum hydropiper* (52.5%) > *Cynodon dactylon (*46.2%) > *Cyperus rotundus* (39.5%) > *Paspalum distichum* (26.1%) >*Chenopodium album* (20.1%) and rest of the weed species contributed 115.6% of total relative abundance value (Fig. 1). Similar trend of weed vegetation was observed by Khatun *et al.,* (2014) at the unweeded plots of wheat where infested weed species were twelve. Of which the five most dominant weed species in descending order were *Polygonum orientale* > *Chenopodium album*> *Cynodon dactylon* > *Sonchus arvensis* > *Cyperus rotundus*. Broadleaves were dominant over grasses and sedges. The relative abundance values of broadleaf, grass and sedge were 134.0%, 122.3% and 43.7% respectively (Fig. 2).

In *boro* rice fields, 20 weed species belonging to 10 families were found (Table 2). The Poaceaeand Cyperaceae family had six and five weed species, respectively. Amaranthaceae family represented two weed species. Rests of the families Pontederiaceae, Commelinaceae, Marsileaceae, Compositae, Araceae, Azoliaceae, Polygonaceae, families represented one species each. The weeds of major importance were *Eleocharis atropurpurea* (46.2%) > *Cyperus difformis* (36.4%) >*Monochoria vaginalis (*29.0%) > *Echinochloa crus-galli* (28.0%) >*Leersia hexandra* (27.3%) in descending order and rest of the 15 species represented 133.1% of total relative abundance value (Fig. 3). Grasses were higher in number but the total relative abundance value of grasses was less than broadleaves and sedges. Sedges were dominant over broadleaves and grasses. The relative abundance value of sedge, broadleaf and grass was 103.4%, 101.9% and 94.8%, respectively (Fig. 4).

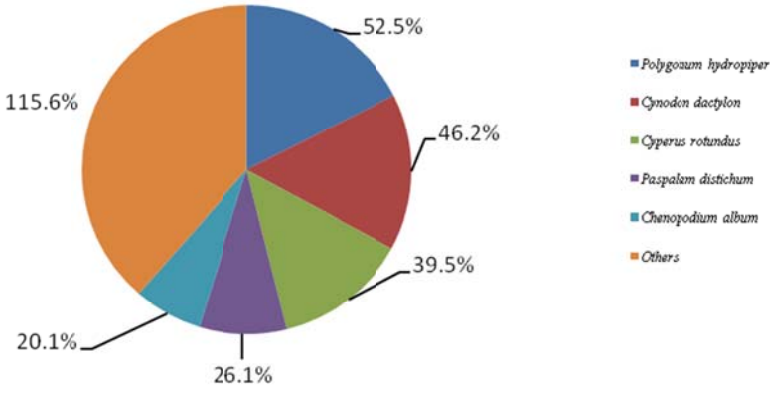

Fig. 1. The five most important weed species based on relative abundance value (%) in wheat at Agronomy Field Laboratory

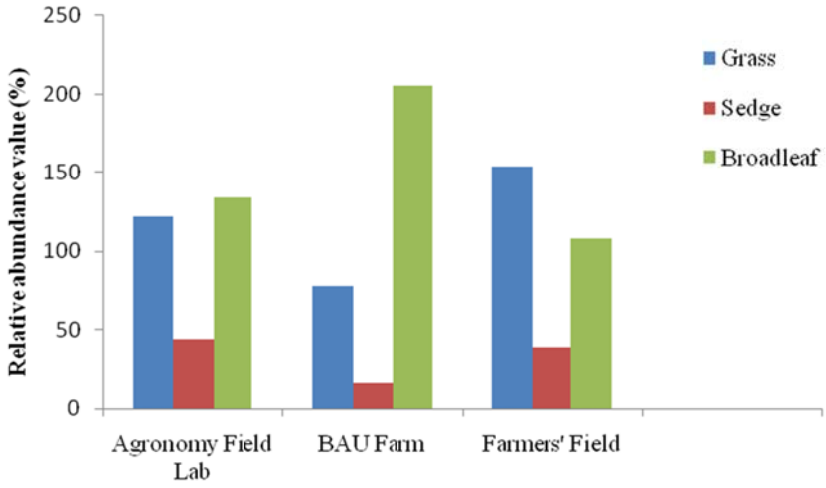

Fig. 2. Relative abundance value (%) of weed species based on weed types in wheat at three locations

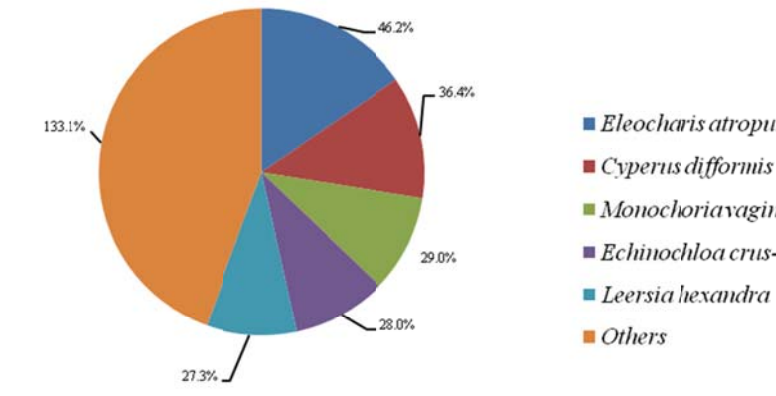

Fig. 3. The five most important weed species based on relative abundance value (%) in *boro* rice at Agronomy Field Laboratory

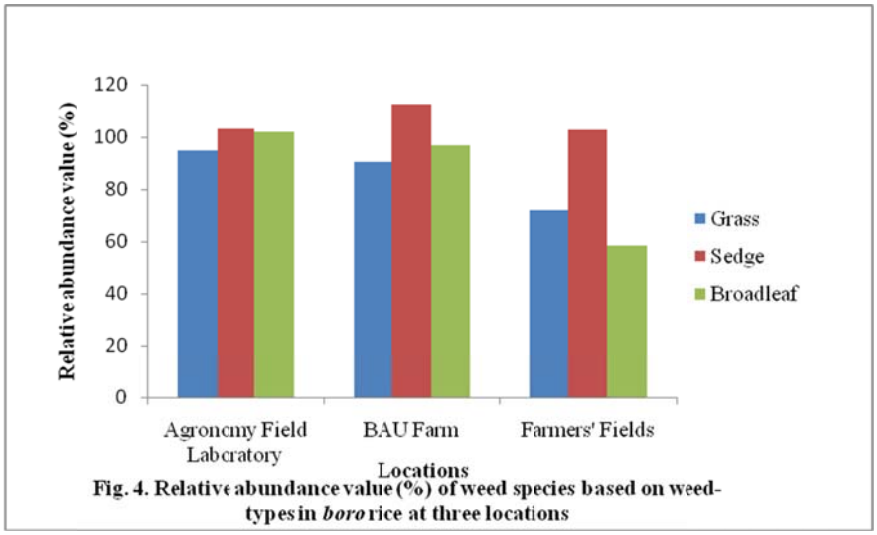

Fig. 4. Relative abundance value (%) of weed species based on weed-types in *boro* rice at three locations

Weed composition in BAU Farm

In wheat fields of BAU Farm, 16 weed species were emerged belonging to 10 families (Table 1). Five weed species from Poaceae, two species from each of the family Compositae and Amaranthaceae, only one species from each of the family Chenopodiaceae, Cyperaceae, Commelinaceae, Leguminosae, Polygonaceae, Marsileaceae and Pontederiaceae were identified. The five most important weeds which had higher relative abundance values in descending order were *Polygonum hydropiper* (82.2%) >*Paspalum distichum* (50.7%) >*Marsilea quadrifolia* (35.6%) >*Cynodon dactylon* (23.7%) >*Cyperus rotundus* (16.8%) and rest of the species represented 91.2% of total relative abundance value (Fig. 5). In 1989,Mamun and Salim observed eight weed species in wheat crop which were *Chenopodium album, Vicia sativa, Cynodon dactylon, Cyperus rotundus, Eleusine indica, Physalis heterophylla, Parapholis incurva* and *Eclipta prostrata.* The relative abundance value of broadleaves was much higher than grasses and sedges. The relative abundance value of broadleaf, grass and sedge were 205.1%, 78.1% and 16.8%, respectively (Fig. 2). In this study, temporal variation of weed species composition was observed.

In *boro* rice field, the number of infesting weed species was 20 belonging to 10 families (Table 2). Six weeds under Poaceae and five weeds under Cyperaceae family were present. Amaranthaceae had two types of weeds. Pontederiaceae, Marsileaceae, Compositae, Araceae, Azoliaceae, Commelinaceae, Polygonaceae families represented only one weed species. In BAU Farm, the weeds of major importance in descending order were *Eleocharis atropurpurea* (44.5%) >*Monochoria vaginalis* (36.5%) >*Paspalum distichum* (29.1%) >*Cyperus difformis* (27.2%) >*Leersia hexandra* (23.2%) and rest of the 139.4%, the other 15 species were represented according to relative abundance (Fig.6). Sedges were dominant to grasses and broadleaves. The relative abundance value of sedge, broadleaf and grass were 102.6%, 96.9% and 90.5% respectively (Fig. 4).

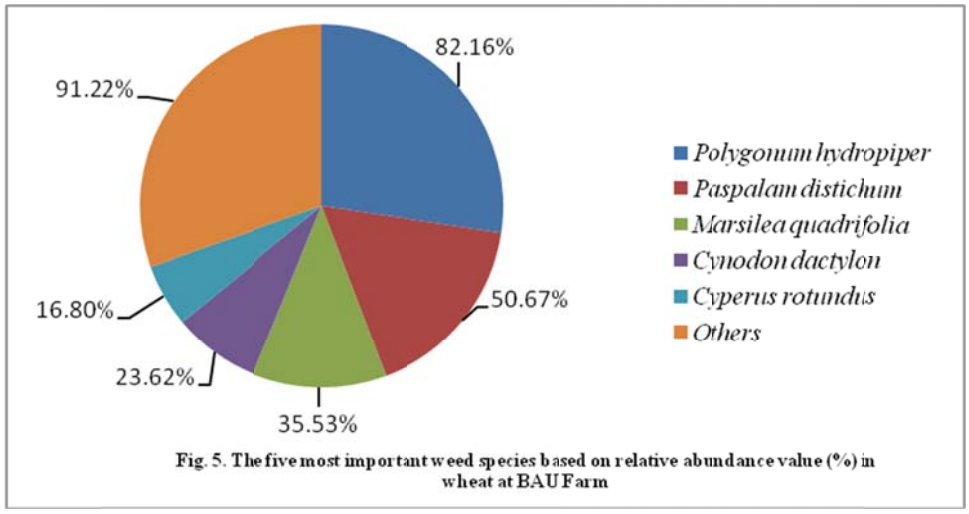

Fig. 5. The five most important weed species based on relative abundance value (%) in wheat at BAU Farm

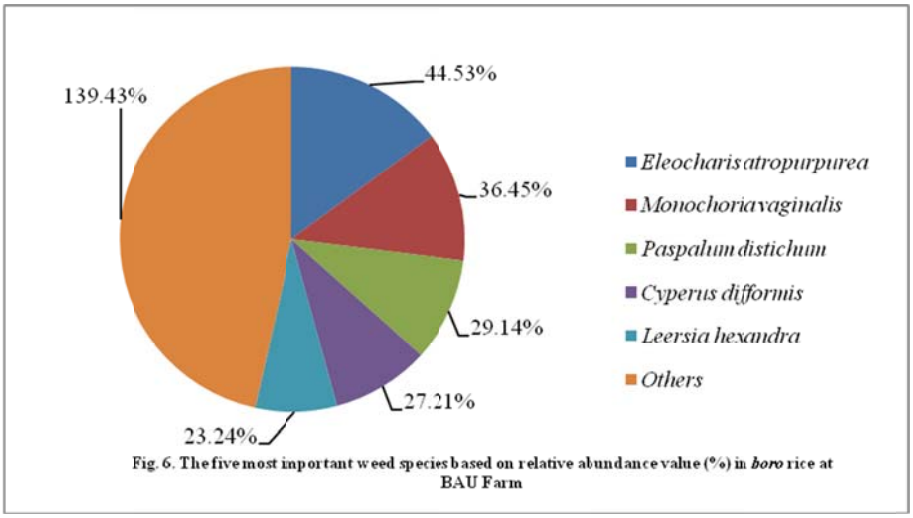

Fig. 6. The five most important weed species based on relative abundance value (%) in *boro* rice at BAU Farm

Weed composition in Farmers' fields

In Farmers' fields of Sutiakhali Natunchar, a total of 19 weed species belonging to 12 families were found in wheat field (Tables 1). The weeds of major importance were *Eleusine indica* (49.8%) >*Cynodon dactylon* (38.3%) >*Paspalum distichum* (32.1%) >*Leucasaspera* (25.2%) >*Cyperus rotundus* (20.6%) and rest of the species represented 134.1% of total relative abundance value (Fig. 7). Sultana (2012) observed in Sutiakhali Natunchar Farmers' fields, Mymensingh district that in wheat field, the number of infesting weed species was 8 belonging to 4 families of which 6 were annual and 2 were perennial which was far below than the present study. The family Cypraceae and Poaceae contributed to the higher number of weed species followed by Solanaceae and Labiatae. From the study she explained that annual were dominated over perennial. The hierarchial position of weed-type was grasses > sedges > broadleaves. She found that the weeds of major importance were *Cyperus rotundus, Cynodon dactylon, Digitaria sanguinalis, Echinochloa crus-galli* and *Leucas aspera*. The hierarchial position of weed-type was grasses > broadleaves > sedges. The relative abundance value of grass, broadleaf and sedge were 152.9%, 108.2% and 38.9% respectively (Fig. 2).

Boro rice fields were infested by 21 weed species which belonging to 12 families (Table 2). The Poaceae and Cyperaceae family had same number of weeds but the relative abundance value was very high in Cyperaceae family. Amaranthaceae family represented two weeds. Pontederiaceae, Marsileaceae, Compositae, Araceae, Azoliaceae, Onagraceae, Polygonaceae, Scrophulariaceae, Convolvulaceae families represented only one weed species. In Farmers' fields the five most important weeds were in descending order *Cyperus difformis* (39.5%) >*Alternanthera philoxeroides* (36.4%) > *Echinochloa crus-galli* (33.4%) > *Eleocharis atropurpurea* (27.5%) > *Leersia hexandra* (25.7%) and rest of the 137.6% the other 16 species were represented according to relative abundance value (Fig. 8). The relative abundance value of sedge, grass and broadleaf were 102.9%, 71.8% and 58.3% respectively (Fig.4).

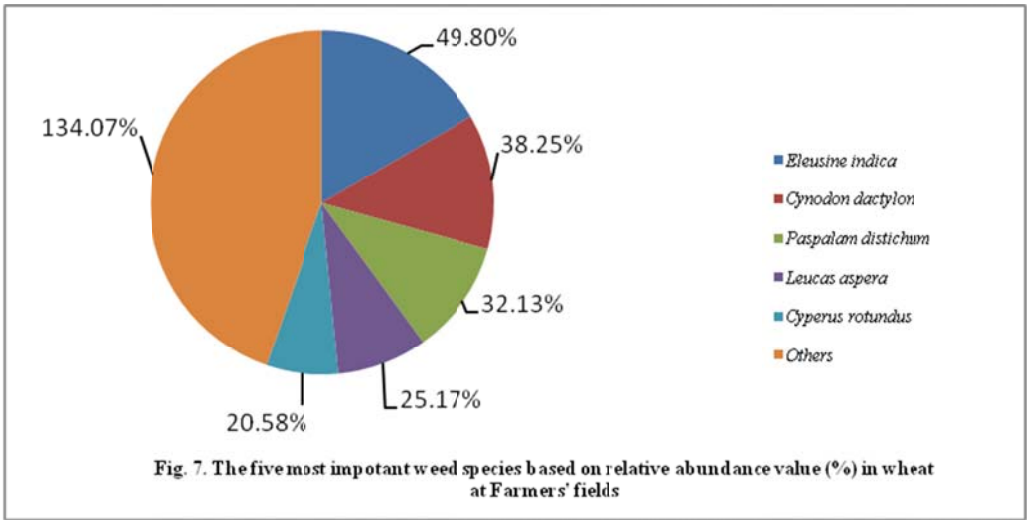

Fig. 7. The five most impotant weed species based on relative abundance value (%) in wheat at Farmers' fields

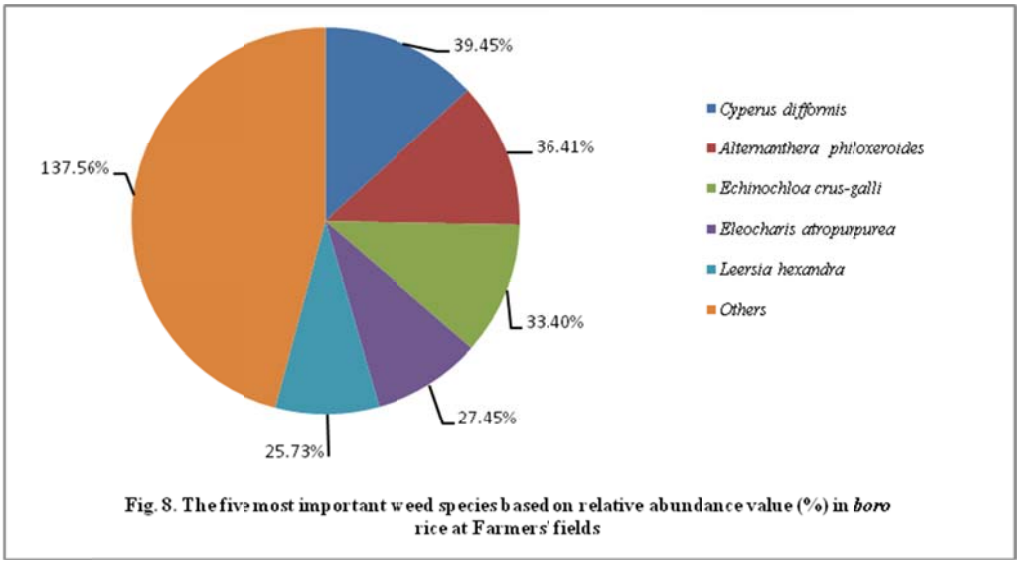

Fig. 8. The five most important weed species based on relative abundance value (%) in *boro* rice at Farmers' fields

Comparison of infesting weed species in wheat between Agronomy Field Laboratory, BAU Farm and Farmers' fields

In three locations i.e. Agronomy Field Laboratory, BAU Farm and Sutiakhali Natunchar Farmers' fields, wheat fields were infested by total 29 weed species belonging to 16 families (Table 1). Poaceae represented seven weed species and Compositae had four weed species. Amaranthaceae family contributed three weed species. Cyperaceae and Leguminosae family represented two weed species. Chenopodiaceae, Commelinaceae, Polygonaceae, Marsileaceae, Scrophulariaceae, Oxalidaceae, Pontederiaceae, Portulaceae, Euphorbiaceae, Labiatae, Rubiaceae families represented only one weed species. The most common weed species infested in all three locations were *Cyperus rotundus*, *Cynodon dactylon*, *Paspalum distichum, Digitaria sanguinalis, Polygonum hydropiper, Xanthium italicum* and *Chenopodium album. Eleusine indica, Echinochloa colonum, Oxalis europaea, Cyperus nemoralis, Mazus rugosus* were present in both Agronomy Field Laboratory and Farmers' fields. *Echinochloa crusgalli, Leersia hexandra, Commelina diffusa, Marsilea quadrifolia* and *Vicia sativa* were present in Agronomy Field Laboratory and BAU Farm and absent in Farmers' fields. Only one weed species *Alternanthera sessilis* was common between BAU Farm and Farmers' fields. Rest of the 12 weed species was present in only one location. This revealed that some weeds were closely associated with specific crop and weed species varied from locations to locations. In wheat fields, the annual weeds were dominant over the perennial weeds in three locations. The hierarchical position of weed-type in Sutiakhali Natunchar Farmers' fields was grasses > broadleaves > sedges whereas in Agronomy Field Laboratory and BAU Farm, it was broadleaves > grasses > sedges (Fig.2). Differences were found by locations and species. It showed that changes of locations changed the diversity of weed species. The dominant species also changed by locations. The relative abundance value (%) of grasses, sedges and broadleaves were also different by their locations. *Cynodon dactylon, Cyperus rotundus*and *Paspalum distichum* were the most dominant weed species which were common in three locations but their relative abundance value was different (Table 1). *Polygonum hydropiper, Cynodon dactylon, Cyperus rotundus, Paspalum distichum* were common in both Agronomy Field Laboratory and BAU Farm in the dominant list. In that list, *Chenopodium album* was present in Agronomy Field Laboratory whereas *Marsilea quadrifolia* in BAU Farm, but in Farmers' fields, two new types of weeds were found as dominant species and they were *Eleusine indica* and *Leucas aspera* (Fig. 1, 5 and 7). Because of improper tillage operations and weeding management, these two new types of weed were dominant in Farmers' fields in wheat. Finally it was clear that the weed frequency, density, uniformity and relative abundance value were different from locations to and thus the weed composition was also different.

Table 1. Relative abundance value of weed species in wheat at different locations

SL. No.	Common name	Scientific name	Family	Relative abundance value		
				Agronomy Field Laboratory	BAU Farm	Farmers' fields
1	Durba	*Cynodon dactylon* L.	Poaceae	46.2	23.6	38.3
2	Arail	*Leersia hexandra* L.	Poaceae	3.7	1.9	-
3	Angta	*Paspalum distichum* L.	Poaceae	26.1	50.7	32.1
4	Chapra	*Eleusine indica* L.	Poaceae	14.6	-	49.8
5	Anguli	*Digitaria sanguinalis* L.	Poaceae	6.1	1.9	11.4
6	Khude shama	*Echinochloa colonum* L.	Poaceae	17.7	-	21.4
7	Shama	*Echinochloa crusgalli* L.	Poaceae	7.8	-	-
8	Gucchomutha	*Cyperus nemoralis* L.	Cyperaceae	4.3	-	18.3
9	Mutha	*Cyperus rotundus* L.	Cyperaceae	39.5	16.8	20.6
10	Chanchi	*Alternanthera sessilis* L.	Amaranthaceae	-	16.1	11.8
11	Malancha	*Alternanthera philoxeroides* L.	Amaranthaceae	-	1.9	-
12	Katanotey	*Amaranthus spinosus* L.	Amaranthaceae	-	-	9.0
13	Bathua	*Chenopodium album* L.	Chenopodiaceae	20.1	16.0	13.4
14	Monaayna	*Commelina diffusa* L.	Commelinaceae	10.8	26.9	-
15	Keshuti	*Eclipta alba* L.	Compositae	-	1.9	-
16	Bonkopi	*Gnaphalium affine* L.	Compositae	-	2.7	-
17	Ghagra	*Xanthium italicum* L.	Compositae	5.1	12.0	3.4
18	Shetlumi	*Gnaphalium luteo-album* L.	Compositae	-	-	2.6
19	Choto dudia	*Euphorbia parviflora* L.	Euphorbiaceae	-	-	7.4
20	Shetodrone	*Leucas aspera* L.	Labiatae	-	-	25.2
21	Tripatri shak	*Desmodium triflorum* L.	Leguminosae	-	-	2.7
22	Bonmasur	*Vicia sativa* L.	Leguminosae	20.0	8.1	-
23	Sushni shak	*Marsilea quadrifolia* L.	Marsileaceae	6.8	35.5	-
24	Amrul shak	*Oxalis europaea* L.	Oxalidaceae	3.3	-	3.3
25	Bishkatali	*Polygonum hydropiper* L.	Polygonaceae	52.5	82.2	13.7
26	Panikachu	*Monochoria vaginalis* L.	Pontederiaceae	-	1.9	-
27	Nunia shak	*Portulaca oleracea* L.	Portulaceae	-	-	6.9
28	Khetpapri	*Hedyotis corymbosa (*L) Lamk	Rubiaceae	4.4	-	-
29	Bonpalong	*Mazus rugosus* L.	Scrophulariaceae	11.1	-	8.7

Comparison of infesting weed species in *boro* rice between Agronomy Field Laboratory, BAU Farm and Farmers' fields

A total number of weed species infested in *boro* rice fields were 25 from 13 families irrespective of all three locations (Table 2). Seventeen common weed species infested in all locations were *Cyperus difformis, Cyperusiria, Fimbristylis miliacea, Eleocharis atropurpurea* under Cyperacea family, under Poaceae family, *Leersia hexandra, Echinochloa crus-galli, Paspalum commersoni, Cynodon dactylon, Paspalum distichum* were present in all fields and broad leaf weeds *Monochoria vaginalis, Marsilea quadrifolia, Eclipta alba, Alternanthera philoxeroides, Pistia stratiotes, Alternanthera sessilis* and *Azolla pinnata* under different families (Table 2). In both Agronomy Field Laboratory and BAU Farm, *Cyperus rotundus* and *Commelina diffusa* were present. *Hemarthrina sp, Digitaria sanguinalis, Cyperus nemoralis, Jussiaea repens, Mazus rugosus, Ipomoea aquatica* each of the species were. present in only one location. In *boro* rice field it was observed that in Agronomy Field Laboratory and BAU Farm there was sedges > broadleaves > grasses (Fig. 4). But in Sutiakhali Natunchar farmers' fields, broadleaves were dominant over sedges and grasses. Some weeds were closely associated with specific crop and weed species were varied from locations to locations. It showed that changes of locations were changed the diversity of weed species and the dominant species also changed. *Eleocharis atropurpurea, Cyperus difformis, Leersia hexandra* were the three most dominant weed species which were common in all three locations having different relative abundance value (Table 2). The other dominant weed species among the three locations were *Monochoria vaginalis, Eleocharis atropurpurea, Alternanthera philoxeroides, Paspalum distichum* (Fig. 3, 6 and 8). It was clear that the weed frequency, density, uniformity and relative abundance were different with their locations and thus the composition of weeds was different.

Table 2. Relative abundance value of weed species in *boro* rice at different locations

SL. No.	Common name	Scientific name	Family	Relative abundance value		
				Agronomy Field Laboratory	BAU Farm	Farmers' fields
1	Arail	*Leersia hexandra* L.	Poaceae	27.3	23.2	25.7
2	Shama	*Echinochloa crus-galli* L.	Poaceae	28.0	19.7	33.4
3	Gaicha	*Paspalum commersonii* L.	Poaceae	3.6	5.0	3.17
4	Chela ghas	*Hemarthrina sp.*L.	Poaceae	-	1.3	-
5	Angta	*Paspalum distichum* L.	Poaceae	15.3	29.1	3.8
6	Durba	*Cynodon dactylon* L.	Poaceae	6.3	12.1	5.8
7	Anguli	*Digitaria sanguinalis* L.	Poaceae	14.4	-	-
8	Panichase	*Eleocharis atropurpurea* (Retz.)	Cyperaceae	46.2	44.5	27.5
9	Sobuj nakful	*Cyperus difformis* L.	Cyperaceae	36.4	27.2	39.5
10	Borochucha	*Cyperus iria* L.	Cyperaceae	2.3	9.3	24.3
11	Joyna	*Fimbristylis miliacea* L.	Cyperaceae	16.3	11.5	10.1
12	Gucchomutha	*Cyperus nemoralis* l.	Cyperaceae	-	-	1.6
13	Mutha	*Cyperus rotundus* L.	Cyperaceae	2.1	20.0	-
14	Malancha	*Alternanthera philoxeroides* L.	Amaranthaceae	8.1	12.9	36.4
15	Chanchi	*Alternanthera sessilis* L.	Amaranthaceae	3.3	2.4	7.6
16	Topapana	*Pistia stratiotes* L.	Araceae	8.3	4.8	2.2
17	Khudepana	*Azolla pinnata* L.	Azoliaceae	10.9	7.4	4.9
18	Monaayna	*Commelina diffusa* L.	Commelinaceae	12.4	2.5	-
19	Keshuti	*Eclipta alba* L.	Compositae	23.6	9.1	5.5
20	Kalmilata	*Ipomoea aquatica* L.	Convolvulaceae	-	-	1.6
21	Sushni shak	*Marsilea quadrifolia* L.	Marsileaceae	5.1	20.2	10.7
22	Helencha	*Jussiaea repens* L.	Onagraceae	-	-	14.2
23	Bishkatali	*Polygonum hydropiper* L.	Polygonaceae	1.3	1.2	17.5
24	Panikachu	*Monochoria vaginalis* L.	Pontederiaceae	29.0	36.45	20.1
25	Bonpalong	*Mazus rugosus* L.	Scrophulariaceae	-	-	4.6

Similarity Index (S)

In Agronomy Field Laboratory, the similarity index of weed infestation in wheat with *boro* rice was 22% and in farmers' field, it was 20% (Table 3).These low value of similarity index indicates that in both Agronomy field and farmers' field, the association of weed species between wheat and *boro* rice were very low whereas, the similarity index value of 37% in BAU farm indicates slightly high association of weeds between these two crops. From the result, it was clear that the weed composition and similarity index also changed by the locations.

Table 3. Similarity index of infesting weed species in different *rabi* crops at different locations

Crops	Similarity index (%)		
	Agronomy Field Laboratory	BAU Farm	Farmers' fields
Wheat and *Boro* rice	22	37	20

Conclusion

Results of this study indicated that there was a little bit divergence in the number and ranking of five most dominant weed species in wheat and *boro* rice in Agronomy Field Laboratory, BAU Farm and farmers' field of Sutiakhali Natunchar. Variation of weed composition was also seen in the same crop under different locations. In wheat, *Cynodon dactylon, Cyperus rotundus* and *Paspalum distichum* and in *boro* rice, *Eleocharis atropurpurea, Cyperus difformis*, *Leersia hexandra,* were the three most dominant weed species which were common in all three locations but their relative abundance values were different. The similarity index indicated weed composition in wheat and *boro* rice was lowly associated which means the diversity was higher. The diversity of changes of weed species was changed by the crops, time and locations. It helps to select proper herbicide according to dominant weeds present in crop and also helps to promote appropriate weed management strategies and use of standard herbicide along with any integrated weed control measures. Therefore, effective weed control measures can be taken based on weed infestation on a specific location rather than any blanket control measures.

References

Appleby, A.P., Olso, P.D., Colbert, D.R. 1976. Winter wheat yield reduction from interference by Italian rye grass. *Agron. J.* **68:** 463–466.

Arnold, J.D., Dosland, J.D. 1967. Effects of density and duration of competition of wild buck wheat with spring wheat in pot culture Proc. North. Cent. Weed Cont. Conf. pp. 42.

Chancellor, R.J. and Froud-Williams, R.J. 1984. A second survey of cereal weeds in Central Southern England. *Weed Res*. **24:** 29–36.

Davis, P.H. 1985. Flora of Turkey. Edinburgh at the University of Press. **1–10**.

Holzner, W. 1982. Weeds as indicators. In Biology and Ecology of weeds, eds. Junk Publ. pp. 187–190.

IRRI (International Rice Research Institute) 2003: Main weeds of rice in Asia. http://www.knowledgebank.irri.org. Accessed on July 2011.

Khatun, M.J., Begum, M.**,** Hossain, M.M. 2014. Effect of tillage method and weeding regime on soil weed seed bank status and yield performance of wheat. *Progressive Agriculture* **27:** 9**–**19

Kim, S.C., Park, R.K. and Moody, K. 1983. Changes in the weed flora in transplanted rice as affected by introduction of improved rice cultivars and the relationship between weed communities and soil chemical properties. Res. Rept. ORD. **25**(1): 90**–**97.

Mamun, A.A., Karim, S.M.R., Hoque, A.K.M., Begum, M., Kamal, M., Uddin, I. 1993.Survey of weeds in jute, aus rice, transplant aman rice, boro rice, wheat, lentil and mustard fields under Old Brahmaputra Floodplain, Young Brahmaputra and Jamuna Floodplain and Madhupur Tract agro-ecological zones. BAURES Ann. Prog. Report: 22–77

Mamun, A.A. and Salim, M. 1989. Evaluation of isoproturan, a selective herbicide for weed control in wheat, *Bangladesh J. Agril. Sci.* **16**(1): 93–99.

Newsome, R.D., Dix, R.L, 1968. The Forests of the Cypess Hills, Alberta and Saskatchewan, Canada. The American Midland Naturalist **80**(1) pp 137.

Rao, A.N., Johnson, D.E., Sivaprasad, B., Ladha, J.K. and Mortimer, A.M. 2007. Weed management in direct seeded rice. Adv. Agron. **93:** 153–255.

Rechinger, K.H. 2007. Flora Iranica. Akademische Durck-U.Verlagsanstalt Graz-Austria.pp 178.

Sultana Y 2012: Study on Weed Vegetation in Different Field Crops of Rabi Season in Mymensingh District, MS Thesis, Department of Agronomy, Bangladesh Agricultural University, Mymensingh.

Thomas, A.G. 1985. Weed survey system used in Saskatchewan for cereal and oilseed crops. Weed Science**. 33:** 34–43.

UNDP and FAO, 1988. Land resources appraisal of Bangladesh for Agricultural Development, Report 2. Agro-ecological regions of Bangladesh. BARC. UNDP. New Airport Road, Farmgate, Dhaka 1215.