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Research Article

Study on Different Weed Flora Composition and Distribution Pattern in Mustard (Brassica Juncea L.) under Red-Lateritic Zone of West Bengal

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Abstract: The understanding of the diverse weed flora composition and weed shift in crop filed is important to identify suitable weed management component to increase agro-ecosystem sustainability. The present study explains phytosociological attributes and communities structure of weeds of mustard crop under edaphic variation. Phyto-sociological analysis of weed flora in rabi 2022-23 and 2023-24 was conducted in six different blocks of Jhargram district. A total of 15 families were recognized with 25 different type of weed flora, which interfere crop growth and reduce mustard yield in red-latertic soil. Among different group of weeds, Asteraceae family belongs to largest number of weed species, while Poaceae and Cyperaceae family ranked second in terms of number of weed species within the family. Twenty five weed communities were recognized on the basis of highest importance value of three leading weed category. For each community, importance values of weed species were measured based on density, frequency and relative abundance percent. With different weed flora composition, high relative density, abundance percentage and important value index observed with the Cynodon dactylon, Oxalis corniculata. Physalis minima. Euphorbia hirta Spermacoce alata in different block of Jhargram district. Among different sedges, Cyperus rotundus had high important value index. The lowest important value index represented by Poa annua, Cirsium arvensis D. aegyptium and Blumea lacera reflects that their population quite thin in different weed community and no need very critical control measures. Moreover, control of Cynodon dactylon, Oxalis corniculata. Physalis minima. Euphorbia hirta and Cyperus rotundus become very much essential for high productivity of mustard crop in red-latertic belt of west bengal.

Keywords: Dominance, Family, Mustard, Phytosociological, Weeds, Weed flora

Introduction

Agriculture is the major source of livelihood for nearly half of the Indian population. However, the productivity of crops is much lower than many countries and needs enhancement to produce ~400 million tons of food grains for meeting food demands of a population of 1.7 billion by 2050 [1]. Diverse climatic conditions in India favor the most adopted weeds to prevail and cause severe crop yield losses. Weeds also degrade quality of the produce, raise cost of production; harbor and serve as alternate hosts to several insect pests and diseases [2]. Parthenium hysterophorus, Leptochloa chinensis, Echinochloa spp; weedy rice, Lantana camara, Chromolaena odorata Anagallis arvensis, Argemon mexicana are a few of many major weeds of concern currently in India. Weed shifting and change in floral composition become very challenging nowadays. Weed flora in red-latertic belt of west bengal vary from region to region and they depend upon the type and intensity of weeds. The flora word derived from latin word means the plants of god and they grow automatically in wild or in crops. Weed management in this zone become very critical, because water is limiting factor and composition of weed vary from block to block to block due edaphic and soil moisture content [3].

Appropriate weed identification and its management become critical to improve crops productivity. This not only minimizing weeds caused crop yield losses but also help to alleviate other adverse effects in this ecosystems. In spite of the progress made in evolving weed management technologies for different crops and other ecosystems, weeds continue to be a concern in varying ecosystems [1]. In Jhargram block of west bengal, very scanty information available regarding composition of weed flora distribution in mustard field and its control measures. In mustard, critical period of weed competition is between 20-40 days after sowing. It reveals that the maximum loss in yield of mustard occurs when the weeding is not done during this period, likewise weed control during these period results in maximum yield advantage. Beyond this period, the crop becomes competitive and suppresses the weeds. The loss occurred during the critical period of weed competition can never be compensated by weed control measures adopted later.

Weeds are plants which compete with crop plants for essential growth factors like moisture, nutrients, space, light and exerts lot of harmful effects by releasing allele chemicals into the environment which reduce the quality as well as quantity of the crop. Persistence of weeds in a particular location is largely influenced by edaphic, biotic and abiotic factors which affect their occurrence, abundance, range and distribution. Variation of weed within and among different species become very significant and this can be only possible through location specific phytosociological studies. This help to evaluate the weeds population by means of indices that identify the most significant species of an infesting community for which management practices or changes in the system should be determined in order to facilitate their control. Phytosociology is the branch of botany which deals with the structure, composition and development of plant communities and the relationships between the species within them. This is a sub-branch of plant ecology which deals with the co-occurrence of plant species in communities. This help to identify particular type of weed problem in specific area or location. As we know, weeds also intensify the disease and insect pest problem by serving as alternative hosts, and uncontrolled weed growth reduced the yield by 31.6–53.6% in mustard [4]. The extent of damage depends upon the nature of weeds, their density, dominance, ecological success and their association with the crop and other biotic and edaphic factors. To understand the dynamics of weeds, it is necessary to identify them because all species are not equally important in the interference imposed on the crop [5]. Hence, there is a need of documentation of weed species, research aiming at prevention of loss of yield due to weeds in mustard and their management by most economic and feasible method. These objectives can be achieved through a better understanding of different weeds infesting the mustard crop.

Methodology

The present study deals with major weeds of mustard crop in Jhargram district of west bengal which lies 22.45^0 N 86.98^{0}E. Phyto-sociological analysis of weed flora in rabi 2022-23 and 2023-24 was conducted in 6 blocks viz. Binpur-I, Binpur-II, Jhargram, Gopiballavpur-I, Gopiballavpur-II and Nayagram under Jhargram district of West Bengal (Fig. 1). The average rainfall of zone is 1100 to 1200 mm, 80 to 85% of rain fall received during (June-Sep) and temperature varies from 15-46^{0}C in peak winter and summer. There are two major group of soil viz, red and lateritic are found in this zone. The soil varies in depth and in cases shallow in nature. Due to undulating terrine the soil are highly eroded in nature. The soil fertility levels very poor with low N, P and K as well as organic content. The soils are coarse in texture, poor water retention capacity, and erosion prone and PH varies from 4.7-6.7. The methodology employed in the study areas consisted of two stages, the initial information collected and formal survey. In this stage the initial information regarding the study area and the problems into focus were collected from different sources, like farmers and visual examination etc. The objective of the activity was to identify important issues and problems faced by the farmers with an emphasis on weeds to be later investigated during interview. The study was conducted in 6 block of district Jhargram. From each block three mustard field were randomly selected for weed flora composition study and faremer's were interview. During the survey, personal observations were also recorded, regarding the different weeds and distribution pattern. The data obtained from these questionnaires and personal observations are presented in the form of tables and discussed subsequently. In formal survey was conducted in order to get maximum information from the selected farmers that could help in improving the interview schedule. Data were collected through a comprehensive interview schedule by conducting formal survey. In addition to this, frequent field surveys were conducted at each site for collection of weed species at different growth stages (20 and 40 DAS). The collected weed plants were pressed, dried, preserved and properly identified with the help of available literature, monographs and experts on weed at Bidhan Chandra Krishi Viswavidayalaya, Random quadrate method was adopted for weed survey and studying phytosociological attributes of weeds.

Weeds associated with the crops as well as other habitats were identified. The size of the quadrate was taken as 1x1 m. Three spot were selected randomly in each field and they were pooled. Weeds from each quadrate were collected separately and identified. The phytosociological analysis such as abundance, density, frequency and their relative values as well as importance value index was obtained by parameters calculated according to Mueller-Dombois & Ellenberg [6], described below:

$$Frequency\ (Fre) = \frac{number\ of\ plots\ that\ contain\ the\ species}{total\ number\ of\ plots\ used}$$

$$Density\ (Den) = \frac{total\ number\ of\ individuals\ per\ species}{total\ area}$$

$$Abundance\ (Abu) = \frac{total\ number\ of\ individuals\ per\ species}{total\ number\ of\ plots\ that\ contain\ the\ species}$$

$$Relative\ frequency\ (Frer) = \frac{frequency\ of\ the\ species}{total\ frequency\ of\ all\ species} \times 100$$

$$Relative\ density\ (Denr) = \frac{density\ of\ the\ species}{total\ density\ of\ all\ species} \times 100$$

$$Relative\ abundance\ (Abur) = \frac{abundance\ of\ the\ species}{total\ abundance\ of\ all\ species} \times 100$$

$$Importance\ Value\ Index\ (IVI) = Frer + Denr + Abur$$

During interpretation of the results, relative density will tell about the comparative status of the population strength, relative frequency will tell about the status of distribution and important value index will tell about the overall dominance status of each species in the surveyed area.

Results and Discussion

Phytosociological study of weed, which provide knowledge of the dynamics and relative importance of a species in a particular phytosocieties or across phytosocieties assume enough relevance in crop-weed ecosystem. It gives an appraisal of species through quantitative characters which allow effective weed management decision for Jhargram district of west bengal. From the results it appears that the total numbers of individual weeds vary among the different family (Table 1). The variable rate of frequency class distribution of weed flora of mustard fields of Jhargram district may be explained by a common biological explanation pattern which implies most dominant species appeared to colonize a new area appropriates a fraction of the available resources and by competitive interaction, preempts that fraction. The second species then preempts a similar fraction of the remaining resource and so on with further colonists. Data presented in Table 2 to 7 reveals the overall frequency distribution of the studied weed flora of the mustard fields at different block. The relative frequency distribution values represented in different table reflects distinct level of variation among the different observed weed species. Relative density reflects distinct level of variation among various available weed species of Jhargram District. Relative density value was found to be highest for few weeds in different blocks, which clearly reflects the single plant dominating feature among the weed community in the mustard fields. With different category of weeds, broad leaf weeds population quite high population compared to other available weed category (Fig. 2). This clearly indicate more relative dominance of different family of broad leaf weed species reflected higher values which therefore indicate their relative population strength among the diverse weed community (Fig. 3). The study site having different zones, like grass land, forest, degraded land, cultivated land, rice fallow land, highland, creaks, canals and low lying land which have been taken for weed association studies. The entire lateritic belt has a plantation of Acacia sp. and Eucalyptus mixed with Cashew Nut (Anacardium sp.). So, the sites with low fluctuations and high eco-niche have been omitted to avoid the biasness of the data. From the findings, it appears that the total number of individual weeds vary with species. A total of 15 families were recognized. Among them Asteraceae family belongs to largest number of weed species while Poaceae and Cyperaceae family ranked second in terms of number of weed species within the family. Most of the weeds were broad leaf weeds followed by grassy and sedges, which were categorized as annual weeds and occasionally as biennial and perennial weeds (Table 1).

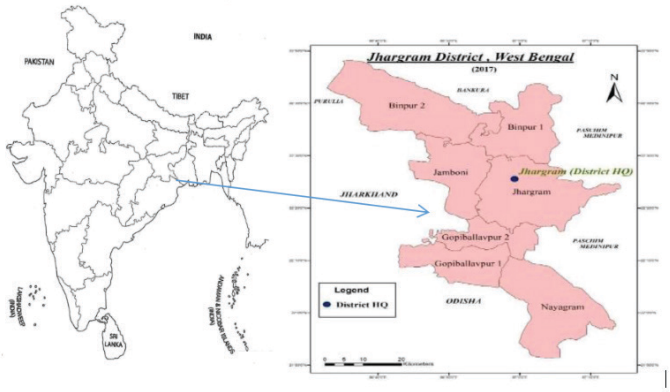

Figure 1: Different block in Jhargram District (West Bengal, India)

Weed	Family	Common name	Life span
Grasses			
Avena fatua	Poaceae	Wild oats	Annual
Cyanodon dactylon	Poaceae	Bermuda grass, dhoob	Perennial
Dactyloctenium aegyptium	Poaceae	Crowfoot Grass, makorjali	Annual/Short-lived perennial grass
Digitaria sanguinalis	Poaceae	Hairy crabgrass, hairy finger-grass, large crabgrass	
Poa annua	Poaceae	Annual bluegrass	Annual
Braod leave weeds (BLWs)			
Alternanthera echinata	Amaranthaceae	Khaki burrweed, shalinche / sanche	Annual
Amaranthus spinosus	Amaranthaceae	Pigweed	Annual
Anagallis arvensis	Primulaceae	Scarlet pimpernel	Annual
Argemon mexicana	Papaveraceae	Mexican poppy, barashil-kantal, satyanashi	Annual
Blumea lacera	Asteraceae	Lettuce-leaf Blumea, Karanda jangli muli, kukkuradru	Annual
Chenopodium album	Amaranthaceae	Wild spinach, bathua	Annual
Chenopodium murale	Chinopodaceae	Nettle-leaved goosefoot, dhimu sag.	Annual
Cirsium arvense	Asteraceae	Canada thistle and field thistle	
Convolvulus arvensis	Convolvulaceae	Field bindweed	Perennial
Euphorbia hirta	Euphorbiaceae	Asthma weed, snake weed, bara dudhi, dudhiya ful	Annual
Fumaria parviflora	Fumariaceae	Fine leaf fumitory, shotara, pipapapra	Annual
Lepidium sativum	Brassicaceae	Garden cress, pepper grass, chansur	Annual
Melilotus alba	Leguminosae	Sweet clover, ban methi	Annual
Oxalis corniculata	Oxalidaceae	Yellow wood sorrel, peepal baba, amrul shak, chukatripati	Annual/Perennial
Parthenium hysterophorus	Asteraceae	Carrot grass, congress grass or gajar ghas	Annual/ Biennial
Physalis minima L.	Solanaceae	Wild cape gooseberry, bon tapary	Annual
Portulaca oleracea	Portulacaceae	Little hogweed, baro lonia	Annual
Rumex retroflexus	Polygonaceae	Curley dock	Annual/Biennial
Solanum nigrum	Solanaceae	Black nightshade or blackberry nightshade,kakamachi	Annual/ Biennial
Sonchus oleraceus	Asteraceae	wow thistle/ milk thistle, Jungali dudhi	Annual/Biennial
Spermacoce alata	Rubiaceae	Winged false buttonweed	Annual/ Perennial
Vicia hirsuta	Leguminosae	Hairy vetch, tiny vetch	Annual
Sedges			
Cyperus esculentus	Cyperaceae	Yellow nut-grass, nutsedge	Annual/ Perennial
Cyperus iria	Cyperaceae	Rice flat sedge, tufted sedge	Annual/ Perennial
Cyperus rotundus	Cyperaceae	Nut sedge, mutha	Perennial

Table 1: Characterization of weeds species collected from Jhargram district of under red-latertic belt of West Bengal.

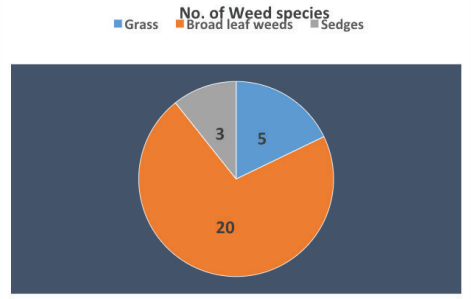

Figure 2: Dominant family of weeds in mustard fields of study area

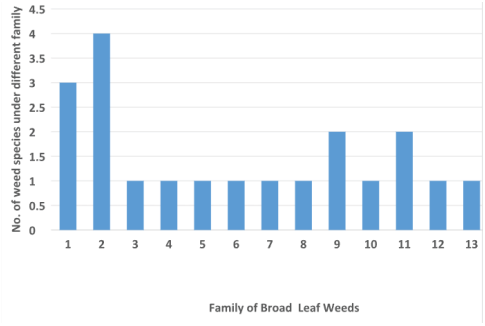

Figure 3: Distribution of various weeds under different family of BLWs.

In Jhargram, among different grasses more density was observed with the Cynodon dactylon. This has high relative density and relative abundance percentage (Table 2). With different BLWs. more weed density per meter square observed with the Oxalis corniculata. This had more relative density and relative abundance percentage. With different sedges more relative frequency and abundance seen with Cyperus rotundus. The highest important value index of Cynodon dactylon (29.7) among grasses, Oxalis corniculata (55.6) among BLWs and Cyperus rotundus (17.4) among sedges. These were most dominant among the observed weed assemblage in this region. The lowest important value index values represented by Digitaria sanguinalis, Physalis minima,Cyperus esculentus reflects that they are the rarest species in the weed community among grasses, BLWs and sedges, respectively. Thus Oxalis corniculata was the dominant weed species of the concerned study site. The important value index ranged between 14 to 55.6. The concept of 'Important Value Index (IVI)' has been developed for expressing the dominance and ecological success of any species, with a single value [7]. This index utilizes three characteristics, they are (i) Relative frequency, (ii) Relative density and (iii) Relative abundance. In Jhargram dominence of BLWs particularly Oxalis corniculata, Chenopodium album and Physalis minima more observed in different rabi season crop. Among sedges Cyperus rotundus become very prominent in most of the crops.

With different grass species in Binpur I, among BLWs prominent weed species was Oxalis corniculata. This was followed by Physalis minima, which become very much harmful to rabi season crop in this region of west bengal (Table 3). Cyperus rotundus was most dominent sedges with important value index of 30.1 and become invariably available throughout the survey region of rabi field. Thus Oxalis corniculata was the paramount weed species in this region and was followed by Physalis minima of the concerned study site. The important value index ranged between 12.9 to 56.0. Pala et al. [8] reported that change in important value index might be due to change in climate, nature of soil and management factors.

In Binpur II, with various grasses Cynodon dactylon become very prominent and was followed by Avena fatua (Table 4). However, more relative density and frequency observed with Cynodon dactylon with maximum important value index of 35.7. In BLWs, more density and abundance percentage seen with Spermacoce alata followed by Chenopodiurm album. Among sedges, Cyperus iria become quite frequently seen due to early rice cultivated field. This has more relative density and relative abundance percentage. The highest important value index observed with Cynodon dactylon (35.7) among grasses, Spermacoce alata (40.1) among BLWs and Cyperus rotundus (18.6) among sedges. These were most dominant among the observed weed community in this region. The lowest important value index values represented by D. aegyptium, Portulaca oleracea,Cyperus iria show that they are limited number in the weed community with various grasses, BLWs and sedges, respectively. Thus Spermacoce alata was the dominant weed species of the concerned study site. The important value index ranged between 12.9 to 40.1.

In Gopiballavpur-I, among grasses Cynodon dactylon gave higher important value index and was followed by E. colona (Table 5). With different BLWs. Oxalis corniculata gave more relative density and relative abundance percent and closely followed by Amaranthus spinosus for important value index. These were most dominant among the observed weed community in this region. The lowest important value index represented by Echinochloa colona, sanguinalis, Fumaria parviflora reflects that they are the rarest species in the weed community among the grasses and BLWs. Thus Oxalis corniculata was the dominant weed species of the concerned study site. The important value index ranged between 13.8 to 59.8.

In Gopiballavpur-II, the floristic composition of the different field pooled data revealed that, most field were dominated by Cynodon dactylon among grasses with high relative density and abundance percentage. With different broad leaf weeds presence of Physalis minima followed by Oxalis corniculata and Chenopodium album were more seen in different field in this block (Table 6). They have registered more phytosociological attributes and ultimately higher important value index. Dominant sedge was Cyperus rotundus followed by Cyperus iria, this might be due to typical rice belt. The highest important value index of Cynodon dactylon (31.1) among grasses, Physalis minima (40.8) among BLWs and Cyperus rotundus (20.1) among sedges. These were most dominant among the observed weed community in this region. The lowest important value index values represented by Poa annua and Cirsium arvensis reflects that their population quite thin in different weed community of grasses, BLWs and sedges, respectively. Thus Physalis minima was the dominant weed species of the concerned study site. The important value index ranged between 20 to 40.8. Our observation revealed that, attention should be given on better control of high abundance weed in an effective manner for higher crop productivity through climate smart strategies [9]. More and improved management option should be use for better control of dominent weed in this zone.

Observation from Nayagram block of Jhargram district revealed that, high density of Cynodon dactylon observed in most of the field and pooled data of three field revealed that, this has more relative abundance percent and relative density (Table 7). With different BLWs, density of Medicago denticulata, Vicia hirsuta and Phyllanthus niruri have more relative frequency and abundance percent. The relative frequency distribution represented in Table 2 reflects lower values for grasses and sedges, as compared to BLWs. This indicates that relative proportion of occurrence of species to each other is very low. This corroborate with the earlier finding of Mukherjee [10] The highest important value index amongst various BLWs observed with Euphorbia hirta followed by Vicia hirsuta and Medicago denticulata, however with sedges Cyperus rotundus (29.1) have more this value. These were most dominant weed flora composition among different weed community in this region. The lowest important value index values represented by D. aegyptium and Blumea lacera reflects that their population quite thin in different weed community of grasses and BLWs, respectively. Thus Cynodon dactylon Euphorbia hirta and Cyperus rotundus were the dominant weed species among different category of weed community. The important value index ranged between 12.1 to 37.1.

Weed species	Weed density (m^{-2})	Relative density (%)	Relative frequency (%)	Relative abundance (%)	Important value index
Grasses					
Cynodon dactylon	16	10.5	10.0	9.2	29.7
D. aegyptium	5	3.3	5.0	5.7	14.0
D. sanguinalis	6	3.9	7.5	4.6	16.1
BLWs					
Amaranthus spinosus	9	5.9	10.0	5.9	21.1
Anagalis arvense	7	4.6	7.5	5.4	17.5
Chenopodium album	18	11.8	7.5	13.8	33.2
Oxalis corniculata	37	24.3	10.0	21.3	55.6
Phyllanthus niruri	22	14.5	10.0	12.7	37.1
Spermacoce alata	10	6.57	7.5	7.7	21.8
Physalis minima	3	1.97	5.0	3.5	10.4
Sedges					
Cyperus esculentus	6	3.94	10.0	3.4	17.4
Cyperus rotundus	13	8.55	10.0	7.8	26.0

Table 2: Phytosociological attributes of weeds of mustard crop in Jhargram block of West Bengal (Pooled value of two year)

Weed species	Weed density (m^{-2})	Relative density (%)	Relative frequency (%)	Relative abundance (%)	Important value index
Grasses					
Cynodon dactylon	16	15.7	11.8	13.9	41.2
D. sanguinalis	7	6.9	8.8	8.0	23.7
BLWs					
Oxalis corniculata	24	23.5	11.8	20.6	56.0
Physalis minima	12	11.8	11.8	10.3	33.9
Vicia hirsuta	4	3.9	8.8	4.59	17.3
Spergulla arvensis	10	9.8	8.8	11.9	30.1
Spermacoce alata	5	4.9	8.8	5.7	19.5
Anagalis arvense	6	5.9	8.8	6.8	21.6
Amarantus spinosus	8	7.8	11.8	6.9	26.5
Sedges					
Cyperus rotundus	10	9.8	8.8	11.9	30.1

Table 3: Phytosociological attributes of weeds of mustard crop in Binpur-I block (Pooled value of two years)

Weed species	Weed density (m^{-2})	Relative density (%)	Relative frequency (%)	Relative abundance (%)	Important value index
Grasses					
Cynodon dactylon	13	14.3	6.7	14.7	35.7
D. aegyptium	3	3.3	4.4	5.1	12.9
Avena fatua	4	4.4	6.7	4.4	15.6
BLWs					
Spermacoce alata	16	17.6	8.9	13.6	40.1
Physalis minima	4	4.4	6.7	4.5	15.6
Alternanthera echinata	7	7.7	8.9	5.9	22.5
Chenopodium album	14	15.4	8.9	11.9	36.2
Portulaca oleracea	4	4.4	6.7	4.4	15.6
Melilotus indica	3	3.3	8.9	5.1	17.3
Sonchus oleraceus	4	4.4	6.7	6.8	17.9
Euphorbia sp.	6	6.6	8.9	5.1	20.6
Sedges					
Cyperus rotundus	8	8.8	8.9	13.3	31.3
Cyperus iria	5	5.5	8.9	4.2	18.6

Table 4: Phytosociological attributes of weeds of mustard crop in Binpur-II block (Pooled value of two years)

Weed species	Weed density (m^{-2})	Relative density (%)	Relative frequency (%)	Relative abundance (%)	Important value index
Grasses					
Echinochloa colona	3	2.8	6.1	4.9	13.8
Cynodon dactylon	15	14.2	12.1	12.3	38.6
BLWs					
Amaranthus spinosus	14	13.2	12.1	11.5	36.9
Chenopodium album	6	5.7	9.1	6.5	21.3
Blumea lacera	7	6.6	9.1	7.6	23.4
Vicia sativa	8	7.5	12.1	6.5	26.3
Fumaria parviflora	4	3.8	6.1	6.5	16.4
Euphorbia hirta	10	9.4	12.1	8.2	29.8
Oxalis corniculata	27	25.5	12.1	22.3	59.8
Sedges					
Cyperus rotundus	12	11.3	9.1	13.9	33.6

Table 5: Phytosociological attributes of weeds of mustard crop in Gopiballavpur-I block (Pooled value of two years)

Weed species	Weed density (m^{-2})	Relative density (%)	Relative frequency (%)	Relative abundance (%)	Important value index
Grasses					
Poa annua	4	5.0	8.7	5.9	20.0
Cynodon dactylon	8	10.0	11.5	8.9	31.1
BLWs					
Oxalis corniculata	11	13.8	11.6	12.5	38.4
Potulaca olerecea	9	11.3	8.9	13.4	34.0
Chenopodium album	11	13.8	11.8	12.5	38.3
Physalis minima	12	15.0	11.8	13.4	40.8
Fumaria parviflora	7	8.8	8.7	10.4	28.4
Solanum nigrum	7	8.7	11.8	7.8	28.7
Cirsium arvensis	4	5.1	8.8	5.9	20.0
Sedges					
Cyperus rotundus	7	5.2	5.9	8.8	20.1

Table 6: Phytosociological attributes of weeds of mustard crop in Gopiballavpur-II block (Pooled value of two years)

Weed species	Weed density (m^{-2})	Relative density (%)	Relative frequency (%)	Relative abundance (%)	Important value index
Grasses					
Cynodon dactylon	14	13.6	8.9	14.5	37.1
D. sanguinalis	6	5.8	6.7	4.7	17.2
D. aegyptium	4	3.9	6.7	4.1	14.7
BLWs					
Euphorbia hirta	10	9.7	8.9	10.4	29.1
Parthenium hysterophorus	9	8.7	8.9	7.3	24.7
Argemon mexicana	10	9.7	8.9	7.8	26.5
Vicia hirsuta	9	8.7	8.9	9.4	27.1
Alternanthera echinata	5	4.9	6.7	3.9	15.4
Blumea lacera	4	3.9	4.4	4.1	12.5
Phyllanthus niruri	9	8.7	8.9	9.4	27.1
Medicago denticulata	9	8.8	8.9	9.4	27.1
Sedges					
Cyperus rotundus	10	9.0	8.9	10.4	29.1
Cyperus iria	4	3.8	4.4	4.2	12.5

Table 7: Phytosociological attributes of weeds of mustard crop in Nayagram block (Pooled value of two years)

Conclusion

Among the broad-leaved, the most predominant species were Physalis minima, Chenopodium album, Blumea lacera, Anagallis arvensis, Oxalis corniculata, Euphorbia hirta and Solanum nigrum. It is concluded that the study of the weed flora of mustard fields gives us important information about the weed flora of different block in the Jhargram district of West Bengal. The weed flora was found to be dominated by the family Amaranthaceae, Asteraceae, Cyperaceae and Poaceae. The result of the present study is very useful for the designing of the weed management programs.

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