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Full Length Research Paper

Major Weeds of Rice Fields: A Case Study of District Bankura, West Bengal, India

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Abstract
The present communication pertains to major weeds of Rice fields in district Bankura (W.B). The study was based on extensive and intensive fields surveys made during different months of rainy season 2012-2014. During the course of field study the authors have selected 6 important paddy growing blocks in district Bankura and divided them into two sites (S1 site containing the blocks Onda, Bishnupur, Sonamukhi in which irrigation facility is poor and S2 site containing blocks Bankura - I, Barjora, Chhatna which is facilitated with irrigation). Frequent field trips were made twice a month in each site for collection of weeds. During this period the authors have reported a total of 48 weed species belonging to 18 angiospermic and 01 pteridophytic families from both the sites. Out of 18 angiospermic families the predominance was shown by monocot families Cyperaceae and Poaceae having 11 and 10 weed species, respectively. The pteridophytic family Marsileaceae was represented by 01 weed species.

Keywords: *Rice, weeds, yield, Bankura.*

Introduction

Agriculture has been a forefront agenda at national and international level for food security and management of natural resources. Cereals are the most important part of our diet throughout the world and thus, play major role in our food security.Among cereals, rice has been staple food for more than 60 per cent of the world population, providing energy for about 40% of the world population where every third person on earth consumes rice every day in one form or other (Datta and Khushi, 2002). Therefore, crop paddy *(Oryza sativa* L.) has been an important crop which is extensively grown in tropical and subtropical regions of the world. It is cultivated in area of 44.0 million hectares with an annual production of 104.3 million tons in India. (GOI, 2012). Its production has been found to be distributed as 91.5 million tons in *kharif* and 12.8million tons in *rabi* season. However, its productivity in India is very low (2.37 t ha-1) as compared to other rice growing countries like Japan (6.35 t ha-1), Australia (6.22t ha-1), Spain (6.16 t ha-1), Egypt (5.0 t ha-1) and China (5.2 t ha-1). There are several reasons for its low productivity but the losses due to weeds are one of the most important. Paddy (*Oryza sativa* L.) is one of the most important food crops of the world and is the second emerging crop in India after wheat. India is the second largest producer of rice after China (Savary *et al*., 2005).Beside its use for human food, paddy is a source for number of industrial products like rice starch, rice branoil, flaked rice, puffed rice and rice husk etc.Being staple food it plays an important role in the economy of India hence occupies a central position in agricultural policy making (Dangwal *et al*., 2011). The average per hectare yield of paddy in India is less as compared to China due to many factors like shortage and high cost labor; lack of irrigation facilities, quality of germplasm, agricultural output and ecological conditions etc., but the problems of weed is the major contributor in the loss of production. 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 weeds that grow along with paddy crop results in low agricultural output. They are the major barriers to rice production because of their ability to compete for CO2, space, moisture, sunlight and nutrients.Weedy crop sometimes leads to complete failure (Singh *et al*., 2005). Out of total losses due to various biotic factors weeds are known to account for one third (Rao and Nagamani, 2007). The reduction in paddy yield due to weed composition ranges from 9-51 % (Mani *et al*., 1968). Uncontrolled growth of weeds in paddy reduced the grain yield by 75.8, 70.6 and 62.6% in dry seeded rice, wet seeded rice and transplanted rice, respectively (Singh *et al*., 2005). It has been observed that grain yield in paddy is drastically reduced if it is not deweeded at early stage of growth. On the north and north-east the study area is bounded by Bardhaman district, from which it is separated mostly by the Damodar River. On the south-east it is bounded by Hooghly district, on the south by Paschim Medinipur district and on the west by Purulia district. Bankura district has been described as the "connecting link between the plains of Bengal on the east and Chota Nagpur plateau on the west." The areas to the east and north-east are low lying alluvial plains, similar to predominating rice lands of Bengal. To the west the surface gradually rises, giving way to undulating country, interspersed with rocky hillocks. Much of the country is covered with jungles. It is situated between 22° 38' and 23° 38' north latitude and between 86° 36' and 87° 46' east longitude.

Materials and Methods

The present study deals with major weeds of paddy fields in district Bankura (W.B). The study was based on extensive and intensive fields surveys made during different months of rainy season 2012-2014.During the course of field study the authors have selected 6 important paddy growing blocks in district Bankura and divided them into two sites (S1 site containing the blocks Onda, Bishnupur, Sonamukhi in which irrigation facility is poor and S2 site containing blocks Bankura - I, Barjora, Chhatna which is facilitated with irrigation). Frequent field trips were made twice a month in each site for collection of weed species. During this course interviews were conducted from farmers and agriculturalists of each site about seasonal weed species and

important notes on flowering and fruiting seasons of weeds were reported.The collected weed plants were pressed, dried, preserved and properly identified with the help of available literature and monographs by Sharma and Kachroo (1983), Swami and Gupta (1998), Kaul (1986) and confirmed from the authentic regional herbaria at Botanical Survey of India.

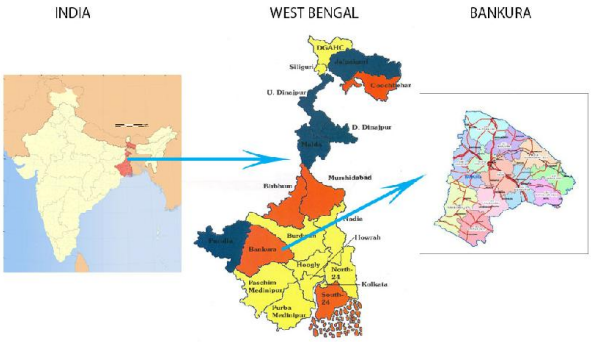

FIGURE 1. Bankura district, West Bengal of India (study area).

Results and Discussion

During the study period the authors have reported a total of 48 weeds belonging to 18 angiospermic and 01 pteridophytic families from both the sites (S1 and S2).Out of 18 angiospermic families the predominance was shown by monocot families Cyperaceae and Poaceae having 11 and 10 weed species, respectively followed by dicot families Amaranthaceae and Asteraceae each containing o5 and 03 weeds, respectively. The family Euphorbiaceae contained 04 weeds while Commelinaceae was represented by 01 weed. The family Scrophulariaceae, contained 02 weed species. The remaining families i.e., Polygonaceae, Convolvulaceae, Cuscutaceae, Malvaceae, Molluginaceae, Nyctaginaceae, Oxalidaceae, Portulacaceae, Rubiaceae, Solanaceae and Verbenaceae contained 01 weed species. The pteridophytic family i.e., Marsileaceae was represented by 01 weed species (Table-1.) similar to predominating rice lands of Bengal. To the west the surface gradually rises, giving way to undulating country, interspersed with rocky hillocks.

On the north and north-east the study area is bounded by Bardhaman district, from which it is separated mostly by the Damodar River. On the south-east it is bounded by Hooghly district, on the south by Paschim Medinipur district and on the west by Purulia district. Bankura district has been described as the "connecting link between the plains of Bengal on the east and Chota Nagpur plateau on the west." The areas to the east and north-east are low lying alluvial plains.

Most of the people of district Bankura rely on agriculture as a source of livelihood. The economy of this district revolves around production of its cash crops. Paddy is the important kharif crop grown in this district. Both the upland and lowland methods of paddy cultivation are practiced, but the per hector yield of paddy in this district is little less as compared to other parts of India due to many factors out of which the problem of weeds is of great concern. The persistent weed species give a severe competition to paddy crop and reduce the agricultural output. The weeds like *Echinochloa colona* and *Echinochloa crus-galli* show maximum infestation in lowland system and it is difficult to identify these weeds at early stage (Before flowering) because of their resemblance with crop plants. In upland system the members of family Cyperaceae i.e., *Cyperus rotundus*, *C. iria* and *C.difformis* etc. were dominant. The weeds like *Boerhaavia diffusa, Oxalis corniculata*, *Paspalidium flavidum*, *Physalis minima*, *Malvastrum coromandelianum* etc. were reported particularly from upland sites while the weeds like *Marselia quadrifolia*, *Echinochloa crusgalli*, *Scripus setaceus*, *Lippia nodiflora* were reported only from lowland sites.

However some of the weeds reported from the study area i.e., *Achyranthes aspera, Eclipta alba*, *Commelina benghalensis*, *Cynodon dactylon*, *Euphorbia hirta*, *Euphorbia prostrata* etc. are of medicinal importance, used in traditional medicines by vaidhyas of district Bankura. The weeds like *Amaranthus viridis*, *Boerhaavia diffusa, Portulaca oleracea*, *Oxalis corniculata etc.* are used in some cooking recepies of the study area.

Table-1. Showing 48 weeds of paddy fields in district Bankura along with their families, botanical names and flowering and fruiting seasons.

Sl no.	Family	Botanical name	Flowering and Fruiting season
1.	I.Amaranthaceae	*Alternanthera sessilis* (L.) DC.	February- October
2.		*Amaranthus viridis* L.	January- December
3.		*Amaranths spinosus* L.	July- December
4.		*Achyranthes aspera* L.	March- December
5.		*Celosia argentea* L.	August- December
6.	II. Asteraceae	*Ageratum conyzoides* L.	January- December

7.		*Eclipta alba* L.	January- December
8.		*Parthenium hysterophorus* L.	Throughout the year
9.	*III.*Commelinaceae	*Commelina benghalensis* L.	July- November
10.	IV.Convolvulaceae	*Ipomoea eriocarpa* R.BR.	July- October
11.	V. Cuscutaceae	*Cuscuta reflexa* Roxb.	June- December
12.	VI. Cyperaceae	*Cyperus cuspidatus* Kunth.	August- November
13.		*Cyperus sanguinolentus* Vahl.	August November
14.		*Cyperus rotundus* L.	July- December
15.		*Cyperus difformis* L.	August- November
16.		*Cyperus esculentus* L.	July- December
17.		*Cyperus corymbosus* Rottboell	July- December
18.		*Fimbristylis complanata (*Retz.) Link.	March- June
19.		*Fimbristylis falcata* (Vahl.) Kunth.	June- November
20.		*Fimbristylis ferruginea* (L.) Vahl	July- November
21.		*Fimbristylis quincuangularis* (Vahl.)Kunth	July- November
22.		*Scripus setaceus* L.	June- November
23.	VII.Euphorbiaceae	*Euphorbia hirta* L.	January- December
24.		*Croton bonplandianum* L.	September- November
25.		*Euphorbia prostrate* Aiton.	March- November
26.		*Phyllanthus urinaria* L.	Throughout the year
27.	VIII. Malvaceae	*Sida acuta* L.	Throughout the year
28.	IX. Marsileaceae	*Marselia minuta* L.	
29.	X. Molluginaceae	*Mollugo pentaphylla* L.	August- November
30.	XI. Nyctaginaceae	*Boerhaavia diffusa* L.	August- December
31.	XII.Oxalidaceae	*Oxalis corniculata* L.	Throughout the year
32.	XIII.Poaceae	*Paspalidium flavidum* Retz.	July- November
33.		*Saccharum spontaneum* L.	September- November
34.		*Setaria glauca* L.	August- November
35.		*Cynodon dactylon* L.	January- December
36.		*Digitaria ciliaris* Retz.	August- November
37.		*Echinochloa colona* L.	July- October
38.		*Echinochloa crus-galli* L.	August- September
39.		*Eleusine indica* L.	July-November
40.		*Paspalum distichum Auct.*	March- December
41.		*Paspalum scrobiculatum L.*	July- December
42.	XIV.Polygonaceae	*Polygonum hydropiper* L.	January- December
43.	XV. Portulacaceae	*Portulaca oleracea* L.	April- September
44.	XVI. Pteridaceae	*Ceratopteris thalictroides* (L.) *Brongen.*	
45.	XVII. Rubiaceae	*Oldenlandia corymbosa* L.	July- November

46.	XVIII. Scrophulariaceae	*Mazus pumilus* (Burm F.) Van Steen.	March- November
47.		*Lindernia ciliata* L.	July- October
48.	XIX. Solanaceae	*Solanum sisymbriifolium* L.	July- November
49.	XX.Verbenaceae	*Lippia nodiflora* L.	February- November

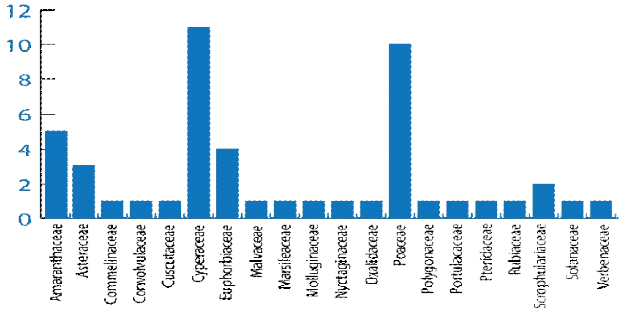

Fig 2. Number of weed species in families.

Conclusion

Weed flora in paddy are dynamic in nature and varies with time and place. Weeds compete effectively with the crop plants and reduce grain yields ranging from 10 to 83 per cent. Chemical weed control is getting popularity, particularly in areas where labour is scarce and costly. Some of the herbicides either alone or their combinations at lower dose have been proved economically viable alternative to hand weeding in management of weeds in paddy field. However in the present era of integrated weed management use of all suitable management technique are utilized in such a compatible way so as to reduce weed population below economic threshold levels without deteriorating environment quality.

The present study was conducted as a first ever attempt from the study area to explore and identify the weeds of paddy crop. This will help the farmers and agriculturists of the study area to identify the weeds and thus help in planning a suitable strategy for their control as these weeds compete with paddy crop for resources and hence reduce its yield. They also affect the quality of germplasm and cause enormous loss to the farmers.

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