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Rice weed management in Bilaspur district CG

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Abstract:

Rice production is an important agricultural activity in the Bilaspur district of Chhattisgarh, and it makes a substantial contribution to the region's economy and food security. In spite of this, the spread of weeds is a significant obstacle to the production of rice, which ultimately results in significant yield losses. Rice farmers in Bilaspur have embraced various weed control strategies, and the purpose of this study is to evaluate the effectiveness of such practices and analyze their current state. For the purpose of gathering information on the presence of weed species, traditional and modern techniques of weed management, and the issues that are associated with them, field surveys and interviews with local farmers were carried out. According to the data, the most common species of weeds are among the following: Echinochloa crus-galli, also known as barnyard grass; Cyperus rotundus, also known as purple nutsedge; and Echinochloa colona, also known as jungle rice. The majority of farmers rely on mechanical weeding, chemical herbicides, and hand weeding. Mechanical weeding is something that is used to a lesser level. In spite of the extensive application of chemical herbicides, problems like as herbicide resistance, high prices, and adverse effects on the environment have been observed. In order to improve the effectiveness of weed control while decreasing the amount of harm done to the environment, the study stresses the necessity of integrated weed management (IWM) techniques. These strategies include chemical, cultural, and mechanical methods. Furthermore, the research highlights the significance of teacher training and extension services for farmers in the process of promoting environmentally responsible weed control techniques. It is possible that the use of IWM methods might lessen the reliance on chemical herbicides, bring down the costs of production, and increase rice yields, all of which would contribute to the overall sustainability of agriculture in the Bilaspur area.

keywords: *Rice weed, Bilaspur*

Introduction:

In the district of Bilaspur in Chhattisgarh, rice is considered a staple crop and serves as the major means of subsistence for a sizeable section of the local people. The socio-economic conditions of the local inhabitants are directly impacted by the productivity of rice fields in this region, which is characterized by an economy that is made up mostly of agricultural activities. On the other hand, the control of weeds is one of the ongoing issues that rice farmers in this region are confronted with. There is a significant amount of competition between rice plants and weeds for essential resources such as nutrients, water, and sunshine, which frequently results in a significant decrease in crop production. The control of weeds continues to be a significant challenge in Bilaspur, which is a city in which modern agricultural technology and ancient farming traditions coexist. There are a variety of methods that farmers use to battle weed infestations. These methods include human weeding, the application of chemical herbicides, and the utilization of automated instruments. In spite of these efforts, the success of weed control measures varies, and the problem is made more complicated by factors such as herbicide resistance, manpower shortages, and environmental deterioration. In light of these issues, there is a growing awareness of the necessity of administering weed control in a manner that is both effective and environmentally accountable. The intriguing answer that is Integrated Weed Management (IWM) is that it combines several ways of weed management in such a way that maximizes the advantages of each strategy while reducing the negative affects of each method. The adoption of IWM methods among farmers in Bilaspur, on the other hand, is restricted. This is frequently the result of a lack of knowledge, access to resources, and proper training. The purpose of this research is to investigate the existing methods of weed control when it comes to rice production in the Bilaspur area, assess how efficient these methods are, and determine the obstacles that prevent the use of more environmentally friendly methods. This project aims to give insights that can influence the creation of more effective techniques for weed control, ultimately leading to an increase in rice productivity and contributing to the overall sustainability of agriculture in the region. This will be accomplished by gaining an awareness of the local context and the issues that are present throughout the region.

There are a number of elements that contribute to the difficulty of weed control in rice production in Bilaspur. These factors include the climatic conditions of the region, the kinds of soil, and the variety of weed species. The agricultural cycle in Chhattisgarh is driven by the monsoon, which further complicates the process of weed management. The state's climate, which is warm and humid, creates an excellent setting for the fast growth of weed varieties. Farmers in Bilaspur are confronted with the combined problem of ensuring timely weed management while also coping with the unpredictability of the monsoon rains, which can impair both the timing and efficiency of weed control efforts. This presents a twofold challenge for the farmers. Smallholder farmers in the region continue to engage in the labor-intensive technique of traditional manual weeding, despite the fact that it is a popular practice. Nevertheless, this strategy has become less practical as a result of the growing shortage of labor and the subsequent increase in its cost, particularly during peak agricultural seasons. As a consequence of this, a significant number of farmers have gravitated toward chemical herbicides as a more practical option. Although herbicides have the potential to be helpful, their overuse has resulted in a number of problems. These problems include the development of herbicide-resistant weed species, the possibility of harm to crops that are not the intended targets and beneficial creatures, and the polluting of water bodies. The use of mechanical weeding is an additional alternative; however, its implementation has been restricted due to the expensive cost of equipment and the small size of many agricultural plots, which renders large-scale automation problematic. In addition, the utilization of mechanical tools necessitates a particular degree of technical expertise and maintenance, both of which are areas in which many farmers tend to be lacking. Given these issues, there is a rising realization of the need for integrated weed management (IWM) systems, which incorporate several weed control strategies. These approaches are becoming increasingly apparent. IWM places an emphasis on the utilization of a variety of techniques, including biological, cultural, mechanical, and chemical approaches, which are adapted to the specific requirements of the area, with the intention of attaining sustainable weed control. The adoption of integrated water management (IWM) in Bilaspur is still in its early phases, despite the potential advantages that it may produce. This is due to a number of constraints, including inadequate access to information, resources, and extension services. Because it seeks to bridge the gap between the approaches that are now used for weed control and the potential benefits of integrated weed management (IWM), this study is particularly noteworthy. The research will highlight the strengths and limitations of various weed control strategies by giving a complete analysis of the existing situation in Bilaspur. It will also give ideas for enhancing weed management that are practical in nature. The insights that were gathered from this study might not only contribute to the larger objective of encouraging sustainable agriculture in Chhattisgarh and other locations that are comparable to it, but they could also help enhance rice yields and improve the livelihoods of farmers in Bilaspur.

Materials and Methods

Study area

Within the state of Chhattisgarh, the district of Bilaspur may be found in the northern part of the state. (Figure 1) Bilaspur is situated at an elevation of 260 meters above mean sea level. The study site is situated in a large rice production region and has a geographical position of 25 degrees and five minutes north latitude and 82 degrees and twelve minutes east longitude [5-9]. There were four separate locations inside the Bilaspur district where the survey was carried out. Masturi, Ghuru, Ratanpur, and Ganiyari are the locations of the sites. These locations are around 25 kilometers apart from one another according to the distance. Conditions that are climatic are typically described as being moist and humid. There is a rainfall of 5.8 millimeters in the month of August and 8.0 millimeters in the month of September. The lowest and highest temperatures in the district are 23.40 degrees Celsius and 31.50 degrees Celsius in the month of August, and 23.2 degrees Celsius and 31.5 degrees Celsius in the month of September. The climate department of Barrister Thakur Chhedilal college of Agriculture and Research Station in Bilaspur, Chhattisgarh, is the source of this information. Rice cultivation is particularly well-suited to the climate, which is suitable for agricultural growth [10,11].

Methodology

From the month of August to the month of September 2017, a general survey was carried out in the rice field using the quadrate method. The dimension of the quadrate is 50 meters by 50 meters. The weed plants that were obtained were identified with the assistance of the literature that was available and the standard flora (5).In addition to their flowering season, their botanical name, family, and local name are all identified.

Table 1: Flora of weeds found in rice fields at the research location in the district of Bilaspur (C.G.).

S.No.	Family	Botanical name	Local Name	Flowering Time	Dicot / Monocot
1.		*Brchiariaramose*(L.)Stapf	Singalgrass	November-February	Monocot
2.		*Cynodondactylon*L.	Dub grass	January-December	Monocot
3.		*Digetariaciliaris*Retz.	Tropicalfingergrass	August-November	Monocot
4.		*Digitariasanguinalis*(L.)Scop.	Hairycrabgrass	January- April	Monocot
5.		*Echinochloacolona*L.	Junglerice	July- October	Monocot

6.	Poaceae	*Echinocholacrus-galli*L.	Barnyardgrass	August-September	Monocot
7.		*Eleusineindica*L.	Indiangoosegrass	July- November	Monocot
8.		*Laptochloachinensis*(L.)Nees	Sprangletop	August- October	Monocot
9.		*Paspalum Conjugatum* Berg.	Buffallograss	May- September	Monocot
10.		*Paspalum distichum* Auct.	Knot grass	March– December	Monocot
11.		*Paspalidum flavidum* Retz.	Yellowwatercrowngrass	July- November	Monocot
12.		*Paspalum scrobiculatum* L.	Kodomillet	July- December	Monocot
13.	Cyperaceae	*Cyperus sanguinolentus*Vahl.	Flat sedge	November – April	Monocot
14.		*Cyperusdifformis*L.	Motha	August-November	Monocot
15.		*Cyperus distans* L. F.	Slender cyperus	July- August	Monocot
16		*Cyperus esculentus*L.	Earthalmond	July- December	Monocot
17.		*Cyperus pilosus* Vahl.	Fuzzy flat sedge	February- June	Monocot
18.		*Cyperus rotundus* L.	Nut grass	July- December	Monocot
19.	Asteraceae	*Ageratum conyzoides* L.	Goat weed	January-December	Dicot
20.		*Bidensbipinnata*L.	Spanishneedles	March- December	Dicot
21.		*Bidenspilosa*L.	Tharwad	September-November	Dicot
22.		*Cosmos caudatus* Kunth	King's salad	June- November	Dicot
23.		*Cyanthillium cinereum* (Linn.) H.Rob	Littleirion weed	November-February	Dicot
24.		*Ecliptaprostrata*(L.)	Whiteheads	August-September	Dicot
25.		*Parthenium hysterophorus*L.	Carrot grass	Throughouttheyear	Dicot
26.		*Sphaeranthus indicus* L.	Gorakhmundi	November- March	Dicot
27.		*Tridex procumbens*L.	Khalmuriya	June- September	Dicot

28.	Amaranthaceae	*Achyranthesaspera*L.	Pricklychaffflower	March-December	Dicot
29.		*Alternantherasessilis*(L.)DC.	Matsyakshi	February- October	Dicot
30.		*Amaranthus viridis* L.	Slender amaranth	December-April	Dicot
31.	Euphorbiaceae	*Crotonbonplandianum*L.	Bon Tulshi	September-November	Dicot
32.		*Euphorbiahirta*L.	Snake weed	January-December	Dicot
33.		*Euphorbiaprostrata*Aiton	Prostratespurge	March- November	Dicot
34.		*Phyllanthusurinaria*L.	Chamber bitter	January-December	Dicot
35.	Oxalidaceae	*Oxaliscorniculata*L.	Creepingwood	Throughouttheyear	Dicot
36.	Malvaceae	*Sidaacuta*Burm. f.(1)	Wireweed/Bala	Throughouttheyear	Dicot
37.		*Sidacordifolia*L.	Flannelweed	October-December	Dicot
38.	Fabaceae	*Cassiatora*L.	Charota	October-February	Dicot
39.		*Desmodium triflorum* L.	Beggar weed	January-December	Dicot
40.	Rubiaceae	*Oldenlandiacorymbosa*L.	Diamondflower	July- November	Dicot
41.	Verbenaceae	*Lippianodiflora*L.	Mokana	Throughouttheyear	Dicot

Table 2: Plants that predominate in rice fields at the research location in the district of Bilaspur (C.G.).

S. No.	Family	Botanical Name	Local Name	Flowering Period
1.	Poaceae	*Cynodondactylon*(L.)	Dub grass	January- December
2.		*Echinochloacolona*L.	Junglerice	July- October
3.		*Eleusineindica*L.	Indiangoosegrass	July- November
4.		*Paspalum scrobiculatum* L.	Kodomillet	July- December
5.		*Echinocholacrus-galli*L.	Barnyardgrass	August- September

6.		*Paspalum distichum* Auct.	Knot grass	March– December
7.	Cyperaceae	*Cyperus pilosus* Vahl.	Fuzzy flat sedge	February- June
8.		*Cyperus distans* L. F.	Slender cyperus	July- August
9.		*Cyperus sanguinolentus*Vahl.	Flat sedge	November - April
10.		*Cyperus rotundus* L.	Nut grass	July- December
11.	Asteraceae	*Ageratum conyzoides* L.	Jangalipudina	January- December
12.		*Ecliptaprostrata*(L.)	Whiteheads	August- September
13.	Amaranthaceae	*Alternantherasessilis*(L.)DC.	Matsyakshi	February- October
14.	Euphorbiaceae	*Phyllanthusurinaria*L.	Chamber bitter	January- December
15.		*Euphorbiahirta*L.	Snake weed	January- December
16.	Oxalidaceae	*Oxaliscorniculata*L.	Creepingwood	Throughouttheyear

Table 3: What is the ratio of weed flora in rice fields, broken down by families, genera, and species?

S.No.	Family	Genera	Species
1.	Poaceae	8	12
2.	Cyperaceae	1	6
3.	Asteraceae	8	9
4.	Euphorbiaceae	3	4
5.	Amaranthaceae	3	3
6.	Fabaceae	2	2
7.	Malvaceae	1	2
8.	Oxalidaceae	1	1
9.	Rubiaceae	1	1
10.	Verbenaceae	1	1

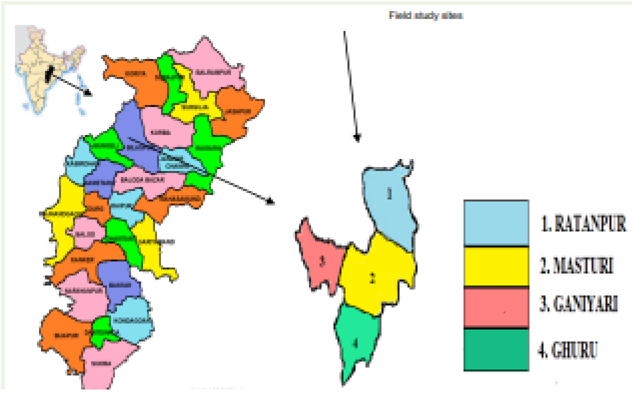

Figure 1: The state of Chhattisgarh, the location of Chhattisgarh in India, and the district of Bilaspur have all been depicted on the map of Chhattisgarh, not to mention the four research sites that have been depicted on the map.

Result & Discussion

During the course of the research and survey of weeds plants in rice fields in the Bilaspur district, more than 41 different kinds of weeds were collected, which were classified into ten different families and 29 different genera. The proportion of dicots to monocots among weed species is 23/18, while the proportion of genera to species is 29/41. The Poaceae, Cyperaceae, Asteraceae, Amaranthaceae, Euphorbiaceae, and Oxalidaceae families together with the genera Echinochloa, Cynodon, and Oxalidaceae are the most prominent families of weeds, as shown in table 2.

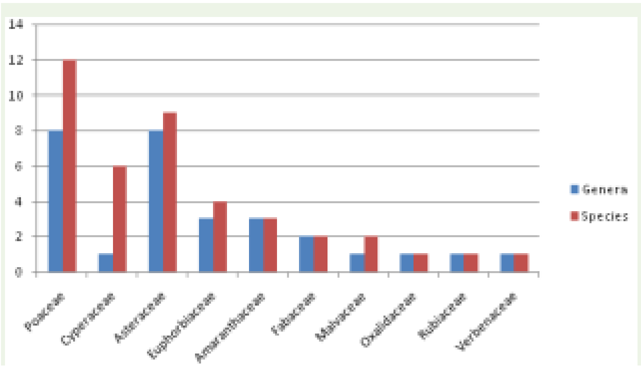

Figure 2: Graph Showing Genera and Species ratio of different families.

In addition to the genera Paspalum, Eleusine, Cyperus, Ageratum, Eclipta, Alternanthera, Phylanthus, Euphorbia, and Oxalis, the species that belong to this genus include colona, crusgalli, dactylon, scrobiculatum, distichum, indica, rotundus, pilosus, distans, sanguinolentus, conyzoides, prostrata, sessilis, urinaria, hirta, and corniculata (Figures 2 and 3). Table 3 presents the families, genera, and species ratios of the weed flora that are found in rice fields belonging to the research region. This information is derived from table 1. The most dominant families in this table are those belonging to the monocot Poaceae family, which includes eight genera and twelve species. In the dicot Asteraceae family, the most dominant families are those belonging to eight genera and nine species. The majority of the weed species come from the Oxalidaceae, Rubiaceae, and Verbenaceae families, which each have one species and one genera. The graph illustrates this relationship. The same finding was achieved by a number of researchers, including Sharma R.P. and Dubey V. (2009) in the Bilaspur district of Chhattisgarh, Sinha M.K. (2017) in the Koria district of

Chhattisgarh, Karim S.M.R. (2004) in Malaysia, and L.R. Dangwal (2012) in the Rajouri district of Jammu and Kashmir [12-15]. A discussion on the issue of weeds in the paddy field is included in the report that contains all of these. Agricultural production systems continue to face a chronic challenge in the form of weeds, which has led to an increase in production costs and caused significant economic losses.

Figure 3: Photographs of rice field in Bilaspur District (C.G.).

Conclusion:

For the purpose of preserving and boosting rice production in the Bilaspur area of Chhattisgarh, it is very important to implement efficient weed management. Traditional and chemical techniques of weed management are extensively used, according to the findings of the study; however, these approaches frequently face limitations due to variables such as a lack of available manpower, resistance to herbicides, and worries about the environment. According to the findings of the study, there is an urgent requirement for the implementation of Integrated Weed Management (IWM) strategies. These strategies integrate the benefits of a variety of weed management approaches while minimizing the negatives of each specific method. Based on the findings, it appears that a customized integrated water management (IWM) strategy, which is backed by the agricultural expertise and resources of the local community, might provide a sustainable solution to the issues that rice farmers in Bilaspur are facing. Through the incorporation of manual, chemical, mechanical, and cultural approaches, integrated weed management (IWM) not only improves the efficiency of weed control but also makes a contribution to the preservation of the environment and the resilience of agriculture over the long term. However, in order to successfully implement IWM, it is necessary to overcome substantial obstacles, such as a lack of knowledge, restricted access to resources, and an inadequate number of extension services. In order to effectively address these difficulties, it will be necessary for government agencies, agricultural institutions, and local communities to collaborate their efforts closely. There are a number of important initiatives that need to be taken in order to facilitate the broad adoption of sustainable weed management techniques in the region. These include the creation of supporting legislation, the implementation of farmer education programs, and expanded access to IWM resources. As a conclusion, the study emphasizes the significance of embracing integrated and sustainable techniques of weed management in addition to conventional methods of weed control in order to fulfill the requirements of modern rice production in Bilaspur. If this is done, it will be able to increase rice yields, improve the livelihoods of farmers, and boost the general sustainability of agriculture in Chhattisgarh. The insights that were gathered from this research provide a platform for future studies and interventions that are targeted at increasing weed control methods in agroecological situations that are comparable to those where this research was conducted.

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