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PADDY CULTIVATION SYSTEM IN KAYATHAR, THOOTHUKUDI (DT)

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Abstract

The ecosystems around paddy fields in Kayathar,Thoothukudi(DT) are varied, owing to differences in climate, altitude and traditional farming varies across villages. The main objectives of the present study were 1) to examine the diversity and composition of weed communities in paddy fields and their relation to environmental factors, agricultural practice and cultivation season; 2) to examine the effects of different types of surrounding vegetation on the plant diversity in paddy fields; and 3) to evaluate the productivity and nutrient potential of rice weeds as ruminant feed.

1.Introduction

The largest area for rice farming in Tamilnadu is on the place of Kayathar,Thoothukudi(DT), which has over 5.4 million hectares of paddy fields. From the lowlands to mid-altitudes, rice is grown on both irrigated and rainfed fields. Kayathar,Thoothukudi(DT)nese farmers cultivate rice plants in one or up to three times each year, depending on the region, irrigation method, and water supplies. divides the year into three cropping seasons: the first is known as the rainy season,.Farmers often grow short-term food crops like maize, soybeans, and horticulture plants when there is not enough water available to grow rice during the dry season. Most of Kayathar,Thoothukudi(DT)'s lowland and mid-elevation rice fields are farmed under damp circumstances. Earthen barriers (bunds) around the fields are how farmers manage the water. Terraced paddy field systems with conventional irrigation management can be found in hilly regions. Direct weed control measures include in paddy fields in highland and lowland parts of Kayathar,Thoothukudi(DT), we conducted a study of the weed communities and characterised the species composition and distribution of communities. We also looked at how weed growth in paddy fields during the cultivation season was impacted by altitude, herbicide use, and water level gradients.

2.Environmental variables

Environmental variables influence the variety in plant species composition and richness in Kayathar,Thoothukudi(DT)'s paddy fields.Weed control alters the plant ecosystems in rice fields.Based on the complexity of the environment around rice fields, such as semi-natural vegetation, intercropping, and multi-cropping, we compared the number of weed species in paddy fields and bunds.Our primary predictions were Weed species abundance and composition vary between bunds and paddy fields.The weed populations are influenced by the crops and semi-natural vegetation nearby.We looked at the suitability of rice fields' weeds as ruminant feed and examined their nutritional composition.Different elevations and varying environmental circumstances imply various cropping seasons, weed control strategies, and agricultural practises. Before ploughing and harrowing, the paddy field is initially prepared by puddling, which involves adding water till it is 1 to 5 cm above the soil's surface.

Puddling makes it easier to transplant rice seedlings and suppress weeds. Plows are used to prepare the ground in dry fields, and herbicides are commonly used as well. Weeds on rice fields are crucial to Kayathar,Thoothukudi(DT)n agriculture and may significantly increase the diet of domestic animals. Less competitive weeds were shown to have no impact on the rice crop, however dominant weeds may have an impact on rice biomass depending on water and field management, such as land levelling, puddling, and preparation Strong rice growth may also have an impact on the species and biomass of weeds. Farmers in Kayathar,Thoothukudi(DT) can directly control weed development on paddy fields by using herbicides and human or mechanical weeding in addition to indirect control through crop management, water management, fertilisation, and land preparation. species diversity

We found 171 plant species in 198 paddy field plots from 40 different families, with Poaceae (23.2%), Asteraceae (14.0%), Rubiaceae (4.8%), and Fabaceae (4.3%) being the most prevalent. In the fields at mid-elevation, we counted 134 plant species, whereas in the lowlands, we counted 109 species. The most prevalent plants were Ludwigia hyssopifolia (71 plots), Alternanthera philoxeroides (87 plots), and Fimbristylis littoralis (61). In the western, central, and eastern regions, species richness per plot rose by 21–39% with elevation. During the dry season, lowland and certain mid-elevation crops occasionally went fallow. The majority of mid-elevation fields had year-round access to water, and they were reflooded after harvesting. predominated in dry fallow fields, while broadleaved weeds like Ludwigia octovalvis, A. conyzoides, and Eclipta prostrata were also prevalent. On moist fallow fields, Pistia stratiotes and M. vaginalis were widespread and numerous. Although common in wet fallows, Myriophyllum aquaticum and Dopatrium junceum made minimal contributions to the overall vegetation cover. In fields with enough water resources at a mid-elevation, post-harvest flooding inhibits weed development. Thus, the majority of mid-elevation paddy fields were not treated with herbicides, but the majority of fields in the lowlands were . Thus, herbicide spraying had a far greater impact on lowland field plant groups than on mid-elevation vegetation. Some plant species, including Andrographis sp., Alternanthera pungens, Sonchus arvensis, Spilanthes sp., Brassica sp., Hippobroma longiflora, Drymaria sp., and other Fimbristylis species, were exclusively found in paddy fields without herbicide use.

More than half of Tamilnadu's population relies nearly entirely on rice as their main source of food, making it the mainstay of their diet. Over 11.5 million hectares of the archipelago are under rice production, with Kayathar,Thoothukudi(DT) accounting for the majority at 5.4 million.hectares .Year-round rice cultivation is possible, but water shortages The methods for growing rice and for managing the soil and crops that have been passed down via tradition are intricate and special. Numerous variables, including abiotic ones like climate, agrohydrology, soil characteristics, water availability, nutrient-fertilizer, and drought risk, influence rice output. The availability and management of water are essential to the productivity of rice field, particularly when high-yield seed types are used. Numbers of tillers, panicles, and rice grain yields were

higher in water-sufficient areas than in dry fields According to Lu et al. (2000), water stress caused by inconsistent water availability lowers dry matter production and grain yield. there are four primary rice-growing systems in Tamilnadu that are based on the water regime . Paddy fields that are irrigated and rain-fed are two examples. paddy fields, deep water paddy fields, barren paddy fields, and tidal wetlands fields. There were paddy fields that were irrigated, rain-fed, and dry in both lowland and upland areas. In 2003, there were around 10,5 million hectares of land used for rice production in wet fields.The most productive paddy fields are those that are irrigated and grow more than one crop. Yearly growth and high yields. Every year, irrigated paddy over 12 times as productive as a dry paddy field, and sometimes 100 times as productive. than paddy fields in deep water, More than 70% of rice is produced using irrigation and lowland rain-fed systems, therefore even slight productivity increases have a significant impact on overall production. The diversity of domesticated plant and animal species, the diversity of wild species, and the diversity of ecosystems generated by species populations associated to various types of agricultural systems all play a role in the biodiversity of paddy field ecosystems .Although certain species influenced agricultural activities and may endanger or destroy the systems, species variety is vital to maintain agriculture production systems such soil microorganisms, earthworms, and native plants. Oryza sativa L, a member of the tribe Oryzeae and the subfamily Pooideae of the grass family Gramineae (Poaceae), is the most prevalent species of rice in Kayathar,Thoothukudi(DT). Because rice is acclimated to an aquatic environment, it is typically classified as a semiaquatic annual grass. Rice plants go through three stages of development: the vegetative, reproductive, and ripening periods. Direct seeding and transplanting are the two ways that farmers use to grow rice, depending on manpower and water availability. Varied rice farming techniques have different effects on how rice plants are managed. Farmer operations were impacted by rice growing techniques, particularly in terms of timing, key tasks in paddy fields, and water management. In dry fields, direct sowing is typically used by farmers.

After enough rain fell during the wet season to sufficiently moisten the soil, the farmer begins to prepare the ground. Two actions are taken by the farmer to prepare the paddy field: harrowing/ploughing and herbicide-based weed control.A farmer plants rice on a paddy field about a week after applying herbicide. The primary field is prepared under moist circumstances when using transplanted cultivation techniques. Soaking, ploughing, and puddling (harrowing or spinning under shallow submerged circumstances) are the methods used to prepare the soil Prior to transplantation, the field is typically fallowed and flooded for 1 to 4 weeks after puddling. Rice is planted in nursery beds, grown there for two to three weeks, and then moved to the rice field. Which weed is the most significant biological barrier to the rice plant's ability to compete depends heavily on biotic parameters. Weed and rice ht for water, sunshine, and nutrients.. Uncontrolled weed growth reduced rice quality and grade and decreased yield. According to Inamura et al. (2003), weed competition reduced the quantity of nitrogen (N) in rice as well as the number of panicles and seeds per square metre.The management of rice cultivation must include weed control. According to Pane et alresearch .'s from 2002, weeds in Karawang caused a rice production loss of between 8 and 12 percent. In rainfed fields, weed clearance boosted the output of rough rice There are a variety of secondary impacts of weeds, including decreased efficiency in harvesting and processing, worsening pest and disease severity, and higher production costs .

Numerous variables, including as planting date, species type, spatial conurations, and relative time of establishment, affect crop-weed competition hierarchy . Weeds begin to grow about the same time that rice seeds do, and as wet seeding becomes more popular, yield losses brought on by weeds will get worse. there are three distinct seasonal patterns of weed infestations in Thailand, including infestations for the entire rice-growing season, the first half of the season, and the second half of the season. All field types had generally consistent weed coverage throughout the season, however the number of weed species rose in September and

fell in November. In a previous research, indirect and direct approaches were used to categorise weed control strategies in Kayathar,Thoothukudi(DT).

Land preparation, fertilisation technique, preferred rice types, plant population, plant spacing, cultivation techniques, plant rotation, and biological control were all examples of indirect weed management. Puddling and rice transplanting reduced weed concentrations along rice growth in both the wet and dry seasons by a factor of several . Organic fertiliser was added to rice fields, which greatly enhanced weed ground cover and species diversity. The composition and diversity of weed species are significantly impacted by different cultivation techniques, particularly in moist areas .Our primary predictions were that: (1) Some weeds in rice fields have a high nutritional value for ruminant feed; and (2) The prospective weed for ruminant feed may vary depending on the research region.

3.strategies for managing water

Large amounts of water are used to flood paddy fields in order to prevent weed development. The main method used to control weeds in irrigated paddy fields is flooding since water suppresses their growth, especially annual grass sedges . Flooding with water that is 10- to 15-cm deep has been proven to be helpful in farmed paddy fields for controlling Echinochloa sp. and other hygrophytic weed species. On average, weed biomass in flooded paddy fields was approximately half that of a dry field . According to other studies, reducing weed seed community diversity was correlated with increased watering frequency.

4.By hand weeding

The most popular manual weeding technique is to handweed or hoe the weeds out. between 21 and 42 days after transplanting, Kayathar,Thoothukudi(DT)nese farmers often handweed twice: first at 2 to 4 and again at 6 to 7 weeks after transplanting Flooding with water that is 10- to 15-cm deep has been proven to be helpful in farmed paddy fields for controlling Echinochloa sp. and other hygrophytic weed species (Shibayama, 2001). On average, weed biomass in flooded paddy fields was approximately half that of a dry field (Singh at al., 2011). According to other studies, reducing weed seed community diversity was correlated with increased watering frequency. By hand weedingThe most popular manual weeding technique is to handweed or hoe the weeds out. Farmers in Kayathar,Thoothukudi(DT) typically handweed twice, first between 2:00 and 4:00 and again between 6:00 and 7:00.weeks following transplant Between 21 and 42 days following transplantation 2010. According to Baloch et al. (2005), handweeding is a more efficient weed management strategy in Pakistan than floods. According to other studies, handweeding can reduce output losses by up to 16 percent. Due of manpower constraints and the drought-like conditions in lowland areas of Kayathar,Thoothukudi(DT), handweeding is progressively being substituted with herbicide application. application of herbicide Herbicide use has significantly changed how people think about and approach weed control. Herbicide use has grown while the significance of mechanical weed control has decreased during the 1970s. Depending on the production techniques, herbicide treatment times vary. Herbicide is often administered 14 or 21 days after transplanting paddy fields. stated that around 21 days after transplanting is the ideal period to apply herbicides. Herbicide was sprayed to direct seeded rice one week before to sowing, and in certain places, farmers applied a second application enhances rice production by 17–37.7% when used in paddy fields .Herbicides have traditionally been used to treat weeds as a problem rather than as a crop management tool. Because more herbicides and/or higher dosages are needed for effective control as a result of herbicide resistance, herbicide use can readily grow.

A considerable part of the herbicide used to control weeds will wind up in the environment, whether it is soil, water, the atmosphere, or the product that has been harvested According to Chairul et al. (2000), the yield of rice varied from 3.16 to 4.24 x 10-3 depending on the soil condition and pesticide residues increased with time in different areas of the rice plant. Farmers may experience issues if the resistant biotype appears in a paddy. The use of herbicides to manage weeds was not always advised. A recent study revealed that the use of herbicides altered the makeup of weeds. Depending on the ecosystem, there are a large variety of dominating or harmful weeds. Poaceae weed species are more prevalent in paddy fields than Cyperaceae and other broad-leaved families. According to studies, the three main weed families in Tobelo are Poaceae, Passifloraceae, and Euphorbiaceae. As a pest trap, weeds also provide a number of benefits. Cynodon dactylon, Leersia hexandra, Paspalum vaginalis, Digitaria sp., and Echinocloa gruscalli have the potential to be pest traps and hosts for the planthopper predator Cyrtorhinus, Other weed species including Drymoria villosa, Digitaria sp., Panicum repens, Paspalum paspoledes, Leersia hexandra, and Paspalum paspoledes may be used as hosts for the parasitoid Anagrus sp. The presence of predatory, parasitic, and host species such as weeds is crucial for the implementation of biological pest control management. Another use for rice weed is as ruminant fodder (Bakrie, 1996). Grass harvested from fallow fields or bunds made up the majority of the feed taken by ruminants in paddy fields. This study offers a chance to examine how the environment and rice cultivation management impact the variety, composition, and distribution of weeds in paddy fields, as well as whether certain weed species are suitable for ruminant feed.

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