Rice Research: Open Access
ISSN: 2375-4338

Research Article Open Access

Weed Detection in Rice Fields

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Abstract

Weeds are plants that compete for nutrients, space, and light and exert many harmful effects by reducing the quality and quantity of crops if the weed population is uncontrolled. The direct yield loss has been estimated to be within the range of 16–86%, depending on the type of rice culture, weed species, and environmental condition Multispectral imagery was used to identify the condition of the crops. It can be an indicator to determine weeds and paddy plants based on the spectral resolution in the imagery. or aerial data, an unmanned aerial vehicle (UAV) was used, attached with a multispectral camera, Micasense. Weed control is important to prevent losses in yield and production costs, and to preserve good grain quality. Specifically, weed decrease yields by direct competition for sunlight, nutrients, and water increase production costs e.g., higher labor or input cost, reduce grain quality and price weed seeds in grain can cause the buyer price to be reduced.

Keywords: Weed management; Unmanned aerial vehicles; NDVI

Introduction

Researches on aquaporins in rice largely targeted on PIPs. Cardinal genes for aquaporins in rice are known, of that six genes, together with OsPIP2;4 and OsPIP2;5, categorical preponderantly in roots. 14 genes, together with OsPIP2;7 and OsTIP1;2, square measure found in leaf blades. Eight genes, like OsPIP1; 1 and OsTIP4;1, categorical in leaf blades, roots and anthers. There square measure ten rice PIP genes (OsPIPs) that square measure classified into 2 subgroups (OsPIP1 and OsPIP2), of that 3 members OsPIP1–3, OsPIP2–2, and OsPIP2–7 square measure root specific in seedlings [1]. Since Hales administered root analysis with excavation methodology as early as 1727, variety of approaches, like root box, pin-board, minirhizotrons, CT scans, gel based imaging are improved for root studies. Recent years, laptop assistant image analyses are developed quickly. The cyclotron X-ray CT has been used as a non-invasive methodology to look at however aerenchyma develops from rice primary root [2]. A three-dimensional imaging technique permits to perform a quantitative morphological analysis and time-course, and additionally unchanged observations of aerenchyma formation to composition root traits throughout seedlings development. However, several ways square measure still long and grueling, and for the most part influenced by the complicated underground environments. Root sampling procedures square measure typically harmful [3-5]. It's not possible to sample intact system from plants in field environments. Soilless culture techniques have provided an easy and convenient ways with that the entire system might be extracted from the plants. However the soilless culture system couldn't utterly mimic the environments of rice paddy, so the knowledge obtained in soilless culture typically don't specifically mirror root feature below natural conditions. For characteristic and screening the basis traits, a lot of expedited and effective ways, particularly the large-scale screening techniques for root activity in rice paddy square measure desperately needed is one of the crops that played a critical role in rapidly reducing [6-9].

Data Analysis

In the 1960s through the Green Revolution shows the growth rate of rice area, production, and yield from 1962 to 2012 for the world and three rice-growing regions (Latin America, South and Southeast Asia and the Pacific, and sub-Saharan Africa). The figure shows that high growth was apparent during the Green Revolution Compared with QTL mapping, exploring useful genes with root mutants may be a lot of economical approach, and variety of genes rumored square measure explored through root mutants. Additionally, variety of genome wide large-scale studies is performed [10]. These give researches helpful techniques to unveil molecular mechanisms of root development. for instance, transcriptome analysis of rice mature root tissue and root tips at 2 time points known 1761 root-enriched transcripts and 306 tip-enriched transcripts concerned in several physiological processes. The review of selected ex-post impact assessment of the adoption of rice-based innovative technologies performed in this study showed that improved varieties, agronomic practices, post-harvest technologies, in-formation communication technologies and decision tools, training and institutions had a significant positive impact among smallholder rice producers in Asia, Africa, and Latin American countries. This review provides evidence of the benefits that smallholders accrued from the adoption of the promoted innovations. Although studies here show rice innovation's positive effects on income and yields, the impacts of several technologies are still largely unexplored [11-12]. These include, but are not limited to, newly released stress-tolerant rice varieties, hybrid rice, improvements in water management, pest management, mechanization, and seed systems. Moreover, several rice regions in Asia, Africa, and Latin America deserve further attention from ex-post impact assessment.

Result and Discussion

The lack of longitudinal data, particularly the absence of baseline in-formation and adoption figures for several innovations, has had major implications on the research methods and has caused limitations in area coverage for most impact assessment studies. Global Food Security 33 (2022) 100628 Thus, this review article contributes to documenting the reach and impacts of CGIAR-related rice technologies, whose contributions have not been updated since 2015. This review focuses

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Received: 01-Jul-2022, Manuscript No. rroa-22-71011; **Editor assigned:** 04-Jul-2022, PreQC No. rroa-22-71011 (PQ); **Reviewed:** 18- Jul-2022, QC No. rroa-22-71011; **Revised:** 22- Jul-2022, Manuscript No. rroa-22-71011(R); **Published:** 29-Jul-2022, DOI: 10.4172/2375-4338.1000313

Citation: Ibro G (2022) Weed Detection in Rice Fields. J Rice Res 10: 313.

mainly on rice innovations developed or scaled by CGIAR centers and partners during the implementation of the CGIAR research programs (Global Rice Science Partnership [GriSP] and Rice Agri-Food System Research Program or RICE) in rice and on an impact assessment of peer-reviewed studies completed from 2005 to 2012. We used the following criteria for selecting studies in this article. First, we included rice technologies developed in CGIAR, particularly at the International Rice Research Institute (IRRI), the International Center for Tropical Agriculture (CIAT), and Africa Rice, in collaboration with their partners; technologies that are mature and already being used by rice value chain actors; studies using quantitative or qualitative methods of evaluation in their assessment; and only ex-post adoption and impact assessment studies. Second, we excluded: technologies in the process of research and development or still being tested; technologies developed by the private sector; technologies developed or promoted outside of the international research centers listed above; and the impact of climate change and COVID-19 shocks. In reviewing a broad range of adoption and impact valuation studies in rice innovations developed by the CGIAR system, we hope to provide a roadmap for future studies. This article is not a comprehensive impact assessment of the whole range of rice research and development, novel technologies, and management practices of the CGIAR rice research. Instead, the study is a selection of impact studies conducted by CGIAR centers. The rest of this paper is organized as follows. Section 2 presents rice research in the CGIAR system. Section 3 reviews articles on the adoption and impacts of improved rice varieties. Section 4 offers the reviews of articles on the adoption and impact of improved natural resource management practices (such as crop establishment methods, postharvest technologies, information and communication technologies, and institution and training programs). Section 5 provides the limitations of this study and similarly, we see a negative growth rate in rice in Latin American countries bottom-right panel), where the decrease was more pronounced than in any other region. Remarkably, the average growth rate in rice yield in Latin America (about 2.5% in 2008–2010) was the highest of all the regions. In contrast, (bottom-left (1966–1985), with world rice production and yield increasing by 3% per year. However, the rice area increased by less than 1% in each period and has decreased in recent years. We observe a similar trend in South and Southeast Asia. In fact, over the past 20 years, the total area of land used for rice farming has been declining panel shows that growth in rice areas was highest in sub-Saharan Africa (7.3% during2008–2010) relative to other regions. However, the growth in rice yield in sub-Saharan Africa was reversed and turned negative in the later period (2008–2010), from 0.3% to Quantitative attribute loci (QTL) mapping may be a major approach for work complicated genetic traits like root as showed in table (Table1).

QTL weren't fine-mapped with applicable selectable markers, the specified sequence may need been lost within the choice method. To deal with this downside, association mapping (meta-analysis) as a promising methodology was introduced to genetic dissection of complicated traits. Victimization association mapping, it's potential to find QTLs with higher exactness than employing a mapping population. Among the big variety of root QTLs known in past decades, few major QTLs are cloned and intro grassed into another background Introduction of DRO1 into a shallow-rooting rice variety was a productive applies. It enabled the ensuing line to avoid drought by increasing deep growing, that maintained high yield performance below drought conditions relative to the recipient cultivar UBMERGENCE one (SUB1) may be a sturdy quantitative attribute locus from the submersion tolerant FR13A landrace. The marker-assisted introgression of the SUB1 region has with success improved submersion tolerance during a big selection of mega-varieties with none penalties on development, yield, and grain quality. Since 2016, several rice varieties have been developed and disseminated in Asia, Latin America, and Africa. The International Rice Research Institute has developed drought-tolerant varieties that have been released in several countries and now are being planted by farmers, such as the varieties Sahbhagi dhan in India, Sahod ulan in the Philippines, and Sookha dhan in Nepal. Field trials suggest that drought tolerant varieties have an average yield advantage over drought susceptible ones of 0.8–1.2 tons per hectare under drought conditions. In the Philippines, field trials of Salinas suggest a yield advantage of at least 2 tons per hectare over non-tolerant varieties. A gene for salinity tolerance, called Saltol, has been incorporated into popular rice varieties in countries.

Conclusion

The pest that causes decline in rice production the utilization of net house and mulching has played a major role to increases in rice production without insect infestation. The adult fruit fly preferred green mature fruits that are close to harvest for laying eggs where maggots decreased the quality of fruits by mining the fruits and declined in production of rice. The maximum infestation was observed in untreated plot outside the net house. The net house totally restricted the cucurbit fruit fly and least infestation was seen in chemical insecticide plot with black plastic mulch. The initial investment was higher for net house in

Table 1: QTL pesticides effect on weeds.

Treatments	Initial population (No. per plant)	3DASp	PROC	6DASp	PROC	9DASp	PROC
1. Untreated	0.45^{b} (0.97)	0.40^{ab} (0.95)		0.75^{a} (1.09)		0.55^{ab} (1.02)	
2. Black plastic mulch + Deltamethrin 1% EC + Trizophos 35% EC at a rate of 2 ml/lt	0.88^{a} (1.17)	0.00^{b} (0.71)	100	0.05^{b} (0.74)	96.59	0.25^{cd} (0.87)	76.76
3. Reflective plastic mulch only	0.50^{b} (1.00)	0.75^{a} (1.09)	-68.75	0.30^{ab} (0.88)	64	0.50^{bc} (0.99)	18.18
4. Black plastic mulch only	0.45^{b} (0.98)	0.40^{ab} (0.95)	0	0.50^{ab} (0.99)	33.33	0.80^{a} (1.13)	-45.45
5. Net + Black plastic mulch	0.00^{c} (0.71)	0.00^{b} (0.71)	100	0.00^{b} (0.71)	100	0.00^{d} (0.71)	100
F.Test	S	S		S		S	
F value, df	14.20,12	6.36,12		2.86,12		16.01,12	
S.E.m	0.004	0.008		0.018		0.003	
$LSD_{0.05}$	0.13	0.2		0.29		0.13	
C.V (%)	8.94	15.07		21.54		8.92	

comparison to reflective plastic mulch only, black mulch with chemical insecticide and black mulch only. So for short term, the black mulch with chemical insecticides seems suitable for reducing insect infestation but possess adverse effect to the consumer health and environment, however, the net house serves best followed by reflective plastic mulch only for higher yield and quality production for commercial farmer.

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