RESEARCH ARTICLE

REVISED Evaluation of cropping method for perennial ratoon rice: Adaptation of SALIBU to triple-cropping in Vietnam [version 2; peer review: 4 approved with reservations]

Previously titled: Evaluation of cropping method for perennial ratoon rice (SALIBU)

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Abstract

Background: Generally, the yield of ratoon rice is at most 50% of the main crop. However, a cropping method "SALIBU" achieved more yield than the main crop and enables the perennial cropping. Although the SALIBU method is implementing 10 additional management practices to conventional method in Indonesia, the effect of each management practice is unclear.
Methodology: We evaluated the effect size using an L_{16} orthogonal array design pot experiment in triple-cropping rice in Vietnam. The robustness was checked by duplicating the experiment under standard and poor conditions.
Results: Positive large effects were shown in the poor conditions only. Cutting twice most affected the number of ratoon tillers. Importantly, the effect was positive under poor conditions but negative under standard conditions. Late irrigation had a robust negative effect.
Discussion: No treatment is effective in the triple-cropping of standard conditions. The SALIBU includes practices with unstable, negative, or minimal effects. The unstable effects show the interaction with the condition. The practices that have negative effects should exclude. Using practice on small effect size should depend on a cost-benefit analysis.
Conclusions: No additional practice is effective for changing the triple-cropping to perennial ratoon cropping except harvesting near the ground. However, further work will be conducted to clarify the interaction between cutting twice and the cultivation condition.

Keywords

The Mekong Delta, Triple rice cropping, Methane mitigation, Row input, Sustainable, Taguchi method, Effect size

Open Peer Review

Reviewer Status ? ? ? ?

	Invited Reviewers			
	1	**2**	**3**	**4**
version 3 (revision) 30 Sep 2020				
version 2 (revision) 23 Dec 2019	? report		? report	? report
version 1 30 Oct 2019	? report	? report		

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Any reports and responses or comments on the article can be found at the end of the article.

Corresponding author: Masato Oda (oda.masato@affrc.go.jp)

Author roles: Oda M: Conceptualization, Data Curation, Formal Analysis, Investigation, Methodology, Writing – Original Draft Preparation; **Nguyen HC**: Writing – Review & Editing; **Huynh VT**: Data Curation, Investigation, Methodology, Resources, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

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REVISED **Amendments from Version 1**

1. The title was changed to show the work clearly.
2. Ununified words (bad condition -> poor condition, late cutting -> cutting twice, triple rice cropping -> triple-cropping rice) are corrected.
3. Figure 1– Figure 3 and Table 1 were added the statistical analysis.
4. The first paragraph of the discussion improved to show the direction of the following discussion clearer.
5. The discussion about the cause of the reversed effect of the cutting twice is added.
6. The conclusion expressed more precisely according to the results.
7. A mistaken citation was corrected (Pasaribu *et al.*, 2018).

Any further responses from the reviewers can be found at the end of the article

Introduction

Ratoon rice

Rice is usually an annual crop but can be renewed using the ratoon cropping method. Perennial cropping of rice requires less labor and water, while reducing climate risk and greenhouse gas emissions. Perennial rice cropping is a traditional cropping method but is rarely used because of the low yield. However, the additional yield achieved after harvesting the main crop has allowed its successful commercial application in the southern region of the United States of America and parts of southern China (Sacks, 2013). Most studies on ratoon rice have focused on additional yield, and the yield is at most 50% of the main crop (Negalur *et al.*, 2017). A previous study reported a yield of up to 90% of the main crop using a special variety (PR23), but the fluctuations in yield were very large (Zhang *et al.*, 2014).

New approach using lower node

Recently, a breakthrough in increasing yield was achieved in Indonesia. Rice has limited growth period during winter; therefore, rapid growth is the key to success of ratoon cropping. Moreover, ratoon cropping from higher nodes of rice is important, because the carbon can be accessible to the main crop culm (Balasubramanian *et al.*, 1992). However, because tropical regions have no winter, the method used can be different. Fitri *et al.* (2019) looked at an updated method of traditional perennial rice cropping developed by Mr. Erdiman in 2010. The method was named "SALIBU," a portmanteau of the Indonesian words "SALIN" (replication) and "IBU" (mother). Using SALIBU, the same or higher yield than that of the main crop was achieved. The mechanisms inducing the high yield have not been well studied, but a possible reason is that lower nodes can extend new roots and improve nutrient uptake from the soil (Yamaoka *et al.*, 2017). The implementation of SALIBU has been successful in different areas and at different elevations and groundwater levels in Indonesia (Fitri *et al.*, 2019), and has recently spread to Myanmar (Yamaoka *et al.*, 2017).

Evaluation of management practices

However, even if the similar conditions, in some cases, the yield is less than 50% of the main crop yield (Pasaribu *et al.*, 2018). This means the robustness of SALIBU cropping method is not enough. To adapt the SALIBU cropping method to areas with different growing conditions, we should evaluate the performance of each management practice, and modify the practices to suit the conditions. We aimed to adapt the SALIBU method to direct seeding triple-cropping of rice in the Mekong Delta, so that we evaluated the effect size of each practice and that robustness. Here, we found that the most effective (positive) management practice under poor conditions had an adverse effect (negative) under standard conditions. Furthermore, we found that the practice has a robust negative effect on the yields under both poor and standard conditions.

Methods

Evaluating each practice of a cropping method under different conditions is difficult because of the huge number of possible combinations. We have summarized the management practices of SALIBU method (Yamaoka *et al.*, 2017) into four practices. We allocated those practices to two levels of an L_{16} orthogonal array (Taguchi, 1986) and conducted a pot experiment. To test robustness, the experiment was replicated under standard conditions and poor conditions, namely low plant density, no fertilization, continuous flood water management, and late harvesting: these conditions are known to reduce the yield of ratoon cropping of rice (Negalur *et al.*, 2017). We analyzed the effect of each of the four practices on ratoon tillers and yield. Then, we evaluated the robustness of the effect of practices between the two conditions.

Materials

The pot experiment was conducted in a fine net house at Can Tho University (Can Tho city, Vietnam) from December 2018 to June 2019. We used 38 cm × 58 cm wide and 30 cm high containers. All containers were filled up to 20 cm with paddy soil. The soil was collected from topsoil (about 25 cm) of a paddy field at TL2 Hamlet, Thuan Hung village, Thot Not district, Can Tho city, Vietnam, just after natural flooding of the Mekong River and used on the day it was collected. The soil was well mixed in advance. Germinated seeds (Jasmin 85 variety from Can Tho University, popular in the Mekong Delta) were used. Jasmin is an Indica and has characteristics unsuitable for ratoon cropping of rice (Negalur *et al.*, 2017). These disadvantages will amplify the effects of the practices. We used urea (46% N), single superphosphate (16% P_2O_5), and potassium chloride (61% K_2O) as fertlizers; the applied amount of those contents (kg ha^{-1}) used for each treatment are given in the following section.

Treatments

SALIBU management consists of cutting near the ground and nine special management practices in addition to the conventional cropping management practice of rice transplanting (Yamaoka *et al.*, 2017). The practice of early harvesting

(physiological maturity; 25% green color husk) is conventional in Mekong Delta triple-cropping cultivation. The rest of the practices are as follows. (1) Pre-fertilization: 25 kg ha^{-1} N and 46.75 kg ha^{-1} P_2O_5 at seven days before harvesting. (2) Cutting twice: all rice was harvested 25 cm above the ground, then cut again beneath the first node above ground on day seven (or day zero for control plants) after harvesting (rice straws were returned to the ground). The recommendation is to cut 3–5 cm above ground; we kept only the node below ground. (3) Late irrigation: irrigation was started on day 14 (or day seven for control plants) after harvesting (the water table was about 5 cm until irrigation started). (4) Adjusting: the practice consisted of (a) hand weeding, (b) dividing hills into two or three tillers and replanting to fill the space, (c) pushing the rice plants into the soil if the root came up on soil surface, (d) removing excess plants to keep original plant density, and (e) draining from day 29 to 43 after harvesting (though (e) is not "adjusting", it is technically inseparable because "adjusting" requires draining). We did the pot experiment using an L_{16} orthogonal array design (Oda *et al.*, 2019). We set the pots randomly in the fine net house.

Conditions

The standard conditions were based on the standard of direct seeding triple-cropping rice in the Mekong Delta: the plant density was 230 kg ha^{-1} dry weight (about 173 seeds per pot), fertilizer was applied three times on day seven (27.6 kg ha^{-1} N, 45.2 kg ha^{-1} P_2O_5, 3.68 kg ha^{-1} K_2O), 20 (36.7 kg ha^{-1} N), and 42 (27.6 kg ha^{-1} N, 3.68 kg ha^{-1} K_2O) after seeding, with alternate wet and dry water management (15 to 5 cm; from seven days after seeding to 10 days before harvesting).

The poor conditions were as follows: low plant density (nine plants per pot), no fertilization (except the pre-fertilization treatment), continuous flooding water management (0 to 5 cm, from seven days after seeding to 10 days before harvesting), and late harvesting (seeded 10 days before the standard condition plants and harvesting on the same day of harvesting as the standard conditions). These conditions are known to negatively affect ratoon cropping of rice (Negalur *et al.*, 2017).

Analysis

We recorded the number of plants and ratoon tillers at the harvesting time. We immediately oven-dried the sample then weighed the grain and straw. We analyzed the effect of the practices using the mean value and Cohens' *d* effect size using the following formula (Cohen, 1992):

$$d = \frac{M_1 - M_2}{\sqrt{\frac{SD_1^2 + SD_2^2}{2}}}$$

where, d is the effect size, M_1 is the mean of treatment, M_2 is the mean of un-treatment, and SD is standard deviation.

The p value of the significance test is affected by the sample size and cannot be used to assess the effect. Measuring effect sizes allows for evaluation involving variance and is not affected by the sample size. Data were processed using Microsoft Excel 2016.

Results

We examined the SALIBU management practices using an L_{16} orthogonal array design pot experiment and duplicated the experiment under standard and poor conditions. The ratoon rice yield was proportional to straw biomass, and the straw biomass was proportional to the number of ratoon tillers. Cutting twice had the highest effect, and the effect was reversed between the standard and poor conditions. Furthermore, late irrigation had a robust negative effect (Oda *et al.*, 2019).

Yield component

The ratoon rice yield was proportional to straw biomass. The harvest index under poor conditions was higher than that under standard conditions (Figure 1). Importantly, straw biomass was proportional to the number of ratoon tillers under both conditions (Figure 2). The ratoon rice yield is determined by the number of ratoon tillers, and the relationship between the number of ratoon tillers and the yield is consistent with those reported in a previous study (Pasaribu *et al.*, 2018). The number of ratoon tillers was also in proportion to the number

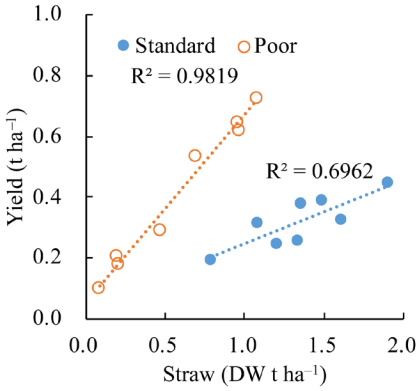


Figure 1. Straw biomass vs yield. DW, dry weight.

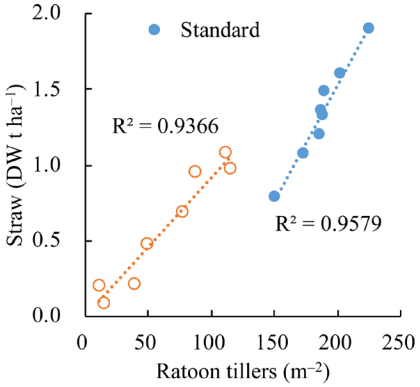


Figure 2. Ratoon tillers vs straw biomass.

of plants under poor conditions (Figure 3), although it is important to note that under poor conditions, half of the pots had no ratoons.

Effect of practices

We examined the effect of management practices such as pre-fertilization, cutting twice, late irrigation, and adjusting on the number of ratoon tillers.

Importantly, the effect of cutting twice was positive under poor conditions but was negative under standard conditions. In other words, there is an interaction between the practice and the condition. The average cutting heights (length of the first node) of the standard condition plants were 5.5 cm (cutting twice) and 4.0 cm (harvesting time), and those of the poor conditions were 6.8 cm and 3.0 cm, respectively. The extensions of nodes were smaller under standard conditions than those under poor conditions. There is no consensus about the ideal cutting height (Negalur *et al.*, 2017), although previous studies were not carried out using the SALIBU method.

Furthermore, late irrigation had a negative effect on the number of ratoon tillers under both conditions (Table 1). This might be a drawback of the pot experiment method due to decreased percolation; however, this is unlikely because the SALIBU method is successful in the lowlands (Fitri *et al.*, 2019).

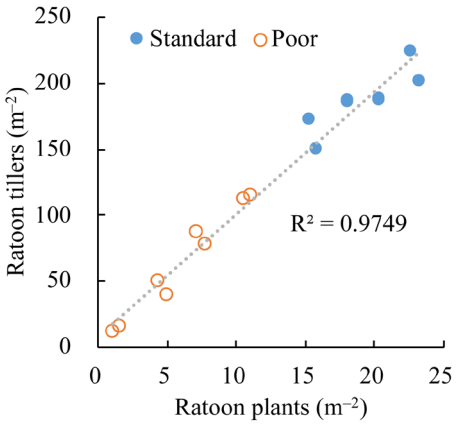


Figure 3. Ratoon plants vs Effective tillers.

Table 1. Number of ratoon tillers by practice (m⁻²).

Practice		Mean		s.d.	
		Standard	Poor	Standard	Poor
Pre-fertilization	+	187	112	151	110
	–	188	15	149	37
Cutting twice	+	150	116	147	109
	–	225	12	143	29
Late irrigation	+	186	40	102	68
	–	189	87	186	114
Adjusting	+	172	50	152	93
	–	202	78	147	99

The mean value of the practices, $n = 8$.

Robustness of effects

Effect sizes provide an evaluation involving variance and are not affected by the sample size. The effect sizes of Cohen's $d < 0.2$, 0.5, 0.8, and 1.2, and $d > 2.0$ correspond to small, medium, large, very large, and huge, respectively (Cohen, 1992; Sawilowsky, 2009). Figure 4 shows the relationship of the effect sizes between the conditions. The effect on ratoon tillers (Figure 4, left) and on yield (Figure 4, right) was similar but the effect on tillers was high under poor conditions. Pre-fertilization, cutting twice, and late irrigation had medium to large effect sizes. When the effect is near the 1:1 line, the effect is independent of the condition and is robust. A non-robust effect signifies an interaction between the practice and the conditions. Positive large effects were shown under poor conditions only.

Discussion

The results of the effect size analysis show that the SALIBU cropping method includes practices that are unstable, negative, or small. Improving these practices could improve the method. Perennial ratoon rice cropping will be possible for the Mekong Delta triple-cropping rice with the sole practice of harvesting rice near the ground because positive large effects were shown in the poor condition only. This also means standard condition is robust.

Reversed effect

For the effects of SALIBU management on ratoon tillers, we found an interaction between cutting twice and the cultivation conditions (standard and poor). However, the poor conditions consisted of four factors, which are as follows: low plant density, no fertilization, continuous flooding water management, and late harvesting. Therefore, which of the factors interacts with cutting twice should be clarified. The extensions of nodes by cutting twice shows the reason; although, we cannot say the meaning.

Negative effect

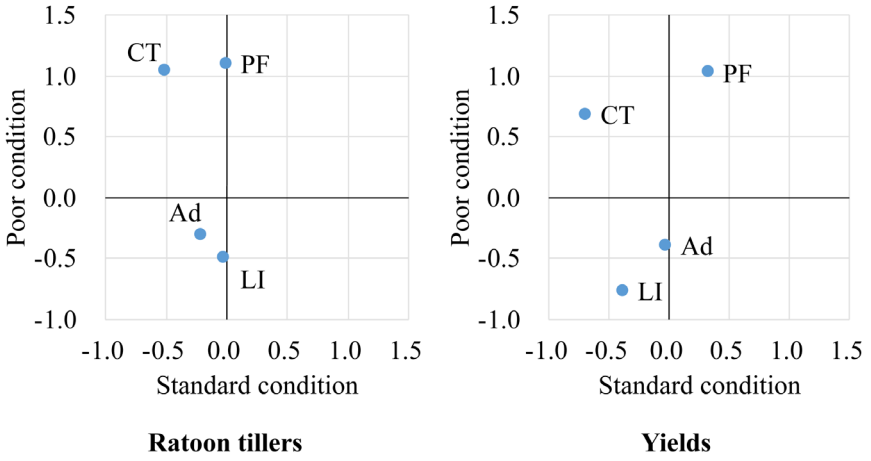
Late irrigation has a robust negative effect. We can erase the negative effect by simply removing the practice. On the other hand, early irrigation may have a positive effect. In this way, an agricultural cropping method may include negative management practices if the effects are not evaluated. Our method is useful for screening positive practices in cropping methods.

Small effect size practices

Adjusting has a robust small effect and therefore, implementation should depend on a cost-benefit analysis. In contrast, pre-fertilization has a small effect under standard conditions, but has a large effect under poor conditions. The difference shows an interaction between the practice and the condition; however, this is reasonable because the plants under poor conditions were unfertilized.

Evaluation of cropping method

SALIBU achieved more yield than the main crop and enables the perennial cropping; however, its adaptability is unclear.



Effect size	< 0.2	0.5	0.8	1.2	>2.0
	Small	Medium	Large	Very large	Huge

Figure 4. Relation of effect size between the poor and standard conditions. PF, pre-fertilization; TC, cutting twice; LI, late irrigation; Ad, Adjusting and mid-term draining. Robust practices show similar effect sizes. Unstable practices, shown by differing effect sizes, have interactions with conditions.

Although evaluating each practice in a cropping method under different conditions is difficult because of the huge number of potential combinations, we overcame this difficulty by using an orthogonal array design pot experiment and duplicating the experiment under standard and poor conditions. Our results show that the SALIBU cropping method includes practices with unstable, negative, or small effect sizes. Improving the use of these practices could improve the method. Practices with unstable effects should be used when known to have a positive effect under a specific condition. Negative effects can be excluded by excluding the practice. Small effect practices should be used depending on the outcome of a cost-benefit analysis. Perennial ratoon rice cropping will be possible for Mekong Delta triple-cropping rice without the nine special management practices of the original SALIBU cropping method, because most of the effects of practices under standard conditions are small or negative. The triple-cropping is different with the Indonesian rice cropping; therefore, SALIBU practices should be evaluated for the Indonesian rice cropping.

Conclusions

We examined the effect size of management practices of the SALIBU ratoon rice cropping method in triple-cropping rice in Vietnam. Cutting twice has a large effect on ratoon tillers and the effect reverses depending on the cultivation condition. Late irrigation has a robust negative effect on the yield. No additional practice is effective for perennial ratoon rice cropping in the Mekong Delta triple-cropping rice except harvesting rice near the ground because positive large effects were shown in the poor condition only. We will clarify the factors that interact with cutting twice and demonstrate ratoon cropping on fields. The use of the orthogonal array design under different conditions is useful for future studies.

Data availability

Underlying data

Figshare: Salibu Effect. https://doi.org/10.6084/m9.figshare.9937928.v1 (Oda *et al.*, 2019)

Acknowledgments

We thank the students who supported this work.

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Reference Source

Open Peer Review

Current Peer Review Status: ? ? ? ?

Version 2

Reviewer Report 18 August 2020

https://doi.org/10.5256/f1000research.24012.r67377

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Surajit Mondal
ICAR-Research Complex for Eastern Region, Patna, Bihar, India

The authors tried to address a noble issue with research findings. The paper is well written but has some shortcomings which are listed below:

1. The variety "Jasmine" which was used in the study was unsuitable for 'ratoon'. It will impact the result greatly. If a farmer wants to adopt ratoon system, he will select a suitable variety which is the first step of a successful production system.

2. In M&M sections, authors have not described the nine special management practices in addition to conventional management.

3. The seed rate under normal condition was 173 seeds per pot which I think give an overpopulated plant density. What is the purpose of this high seed rate?

4. For late harvesting treatment, sowing date was advanced by one week, which may actually promote the growth as well as yield.

5. There is some repetition in the results. The first and second paragraphs of results are almost the same.

6. There is a lack of data in 'Result' section and results are mostly qualitative than quantitative. Results must include the main outcomes of the research in a quantitative term. The yield is the main purpose of ratoon crop and the data related to yield is missing (except the regression graphs). A table comparing the yield under different conditions can well serve the purpose.

7. The citation pattern has a problem. The results section has the most citations while discussion section has no citations. The results section describes the main outcomes of the research while discussion section discusses the possible reasons for outcomes with supporting literature. Authors should look into the citations.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Soil science, conservation agriculture, soil organic carbon.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 26 Aug 2020

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

Thank you for admitting the worth of our work.

1) The variety "Jasmine" which was used in the study was unsuitable for 'ratoon'. It will impact the result greatly. If a farmer wants to adopt ratoon system, he will select a suitable variety which is the first step of a successful production system.

We think that "These disadvantages will amplify the effects of the practices; Methods-Materials L. 7". Just as using a sensitive sensor. Indeed it was. That made 0 to 0.7 tons per ha of a large range of rice yield.

Furthermore, that is a problem if the tendency of the sensor (variety) is different from other sensors, but that point was also no matter. "The ratoon rice yield is determined by the number of ratoon tillers, and the relationship between the number of ratoon tillers and the yield is consistent with those reported in a previous study (Pasaribu et al., 2018); Result-Yield component L. 3".

2) In M&M sections, authors have not described the nine special management practices in

addition to conventional management.

That is in the Methods-Treatments.

3) The seed rate under normal condition was 173 seeds per pot which I think give an overpopulated plant density. What is the purpose of this high seed rate?

That is the standard in in the Mekong Delta. The aim of this work is adaptation of SALIBU to triple-cropping in Vietnam.

4) For late harvesting treatment, sowing date was advanced by one week, which may actually promote the growth as well as yield.

That is matter of the main crop. The ratoon cropping started at the same day and harvested the same day.

5) There is some repetition in the results. The first and second paragraphs of results are almost the same.

That is a style for readability for average readers. You have a good memory than ordinary people if you feel it redundant.

6) There is a lack of data in 'Result' section and results are mostly qualitative than quantitative. Results must include the main outcomes of the research in a quantitative term. The yield is the main purpose of ratoon crop and the data related to yield is missing (except the regression graphs). A table comparing the yield under different conditions can well serve the purpose.

You can see the table by clicking the URL in Underlying data section.

7) The citation pattern has a problem. The results section has the most citations while discussion section has no citations. The results section describes the main outcomes of the research while discussion section discusses the possible reasons for outcomes with supporting literature. Authors should look into the citations.

We agree with you; however, there are few papers in English for SALIBU. In addition, our work is the first work of adaptation of SALIBU to triple-cropping in Vietnam, probably. The statistical analysis of the cropping methods component is also very rare. The discussion section was combined with the results section.

Competing Interests: No competing interests were disclosed.

Reviewer Report 25 March 2020

https://doi.org/10.5256/f1000research.24012.r61311

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Chenfei Dong
Institute of Animal Science, Jiangsu Academy of Agricultural Sciences, Nanjing, China

The research point is very interesting and worthy of affirmation. However, I think there are several problems in the design of this experiment. First, the rice variety adopted in this experiment is not suitable for ratoon use, so the results could not explain the impact of SALIBU measures on ratoon rice well. Second, the soil fertility of standard conditions and the climatic factors such as sun light and temperature of the experiment site are not explained, so it is difficult to compare the results with previous reports. What's more, there is no introduction for the fertilizer status of the tested soil, so it is difficult to discuss the changes of soil under four adverse environments, which is the important reason that leads to the conclusion of the study not being convincing.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Partly

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Yes

Are all the source data underlying the results available to ensure full reproducibility?
Partly

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: My research areas are mainly on rice straw forage processing, ratoon rice cultivation and forage utilization

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 23 Apr 2020

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

Thank you for admitting the worth of our work.

First, the rice variety adopted in this experiment is not suitable for ratoon use, so the results could not explain the impact of SALIBU measures on ratoon rice well.

We think that "These disadvantages will amplify the effects of the practices; Methods-Materials L. 7". Just as using a sensitive sensor. Indeed it was. That made 0 to 0.7 tons per ha of a large range of rice yield.

Furthermore, that is a problem if the tendency of the sensor (variety) is different from other sensors, but that point was also no matter. "The ratoon rice yield is determined by the number of ratoon tillers, and the relationship between the number of ratoon tillers and the yield is consistent with those reported in a previous study (Pasaribu et al., 2018); Result-Yield component L. 3".

Second, the soil fertility of standard conditions and the climatic factors such as sun light and temperature of the experiment site are not explained, so it is difficult to compare the results with previous reports.

The aim of this study is to adopt SALIBU practices for the triple-rice cultivation in the Mekong Delta in Vietnam. This area is in the same climate area and most of the soil is the same.

More essentially, the orthogonal array design experiment under large noise established by Taguchi (1986) enables the utilization of the practice having a robust effect found by the experiment to the actual field. Therefore, we expect that our results are robust for other tropical countries. Actually, our colleague belonging to another project recognized (unpublished) the same result in Myanmar. We recommend you to read the Taguchi's paper because the way of thinking is very useful.

What's more, there is no introduction for the fertilizer status of the tested soil, so it is difficult to discuss the changes of soil under four adverse environments, which is the important reason that leads to the conclusion of the study not being convincing.

What do you mean the "status"? Do you mean soil nutrition properties? We think soil analysis does no effect on the conclusion of this experiment because with and without fertilizing made a large difference. Our point of view is the evaluation of the robustness and size of the effects of practices under large noises.

We are waiting for your response.

Competing Interests: No competing interests were disclosed.

Author Response 26 Aug 2020

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

We added the explanation for the Taguchi method as follows.

"The Taguchi method is a popular method to test the robustness of technologies in actual condition by artificial condition."

Competing Interests: No competing interests were disclosed.

Reviewer Report 20 January 2020

https://doi.org/10.5256/f1000research.24012.r57979

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Triadiati Antono
Department of Biology, Faculty of Mathematics and Natural Sciences, IPB University, Bogor, Indonesia

I have read the revision version of the article. If the results still cite the references, while the discussion does not cite the references, it is recommended that the results and discussion be combined.

Is the work clearly and accurately presented and does it cite the current literature?
No

Is the study design appropriate and is the work technically sound?
No

Are sufficient details of methods and analysis provided to allow replication by others?
No

If applicable, is the statistical analysis and its interpretation appropriate?
No

Are all the source data underlying the results available to ensure full reproducibility?
No

Are the conclusions drawn adequately supported by the results?
No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Plant physiology and plant ecophysiology.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 23 Jan 2020

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

For the first, let me express my heartfelt appreciation again to you for finding the mistake of the reference.
However, we cannot accept to combine the results and discussion because of the guideline of F1000Research (Results section must be independent, Conclusion and Discussion can combine).
We are using the reference to indicate that our result is consistent with the previous study (the relation between the yield and the tillers). That is "what our result is", not "what our result means". We should describe "what our results are" in the result section and "what our results mean" in the discussion section. In particular, the aim of our study is the evaluation of management practices of SABIBU in triple-rice cropping. The referenced paper is valuable but that is for SRI on SALIBU. We described triple-rice cropping in the discussion section.
I think authors should follow the guidelines of F1000Research, and I hope you accept our idea.

Competing Interests: No competing interests were disclosed.

Author Response 26 Aug 2020

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

Finally, we could have been get a suggestion from editorial team to obey your recommendation. We combined the results and discussion.

Competing Interests: No competing interests were disclosed.

Version 1

Reviewer Report 09 December 2019

https://doi.org/10.5256/f1000research.22984.r56890

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Le Thi Hoa Sen

Hue University of Agriculture and Forestry, Hue, Vietnam

The abstract well conveys the research objectives, methods, key research results, discussion and conclusions. However, it needs to be shorter and more precise.

The study found very significant results for rice producers in three-crop rice-producing areas or in lowland areas that are vulnerable to natural disasters. However, the results will be more convincing if the collected data is analyzed more deeply, concerning the causes of fluctuating results. For instance, under poor conditions the effect of cutting twice was positive but negative under standard condition, why? What might be the causes? It needs further analyses of the results.

In addition, to be more practical and to validate research findings, experiments should be carried out one more time in the net house or in the real conditions.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Adaptation to climate change in agriculture production.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 Dec 2019

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

Thank you for your helpful comments. We shortened the abstract and made it more precise. We also changed the title too.

About the cutting twice, we are conducting an additional experiment. That is a portion of developing SALIBU for Mekong Delta triple cropping. We started the field experiment with suitable varieties.

Competing Interests: No competing interests were disclosed.

Author Response 26 Aug 2020

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

We added the explanation for the Taguchi method as follows.

"The Taguchi method is a popular method to test the robustness of technologies in actual condition by artificial condition."

Competing Interests: No competing interests were disclosed.

Reviewer Report 02 December 2019

https://doi.org/10.5256/f1000research.22984.r55968

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Triadiati Antono
Department of Biology, Faculty of Mathematics and Natural Sciences, IPB University, Bogor, Indonesia

1. The work is not yet clearly and accurately presented, nor does it cite the current literature. The literature review is limited, especially about salibu (definition, advantages, yield). The problems are not clear yet. What is the importance of this research (please use Pertanika *et al.,* 2018[1] as reference for example, because the article states the advantages.)

2. Because the methods (the treatments) are not clear and analysis does not use tools, the methods are not provided to allow replication by others.

3. Because the statistical analysis does not explain the tools used, it will be difficult to interpret easily

4. Results: did not need to state references.

5. Results: please just write down the results of the study, without mentioning the references.

6. Fig 1-3, Tab 1: please use statistical analysis to explain the results.

7. Discussion: explain the reasons for the results, use the references to discuss and compare research results. Please, use references for discussion.

References

1. Pasaribu PO, Triadiati, Anas I: Rice Ratooning Using the Salibu System and the System of RiceIntensification Method Influenced by Physiological Traits. *Pertanika J. Trop. Agric. Sci.*2018; **41** (2): 637-654

Is the work clearly and accurately presented and does it cite the current literature?
Partly

Is the study design appropriate and is the work technically sound?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Plant physiology and plant ecophysiology.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 16 Dec 2019

Masato Oda, Japan International Research Center for Agricultural Sciences, Tsukuba, Japan

1. Thank you for your helpful comments. Our work has two aspects, evaluating SALIBU method, and adopting SAIBU to Mekong Delta Triple cropping. The former is means and the latter is the aim. We changed the title and improved the abstract and introduction.

2. Thank you so much for introducing the correct citation. We referred the paper but mistakenly typed another paper wrote by the same authors in the same year. We

corrected that. Thanks again.

3. We guess that you mention about a table of the treatments. That is provided in "figshare". We added the link to the methods section. Please kindly point specifically if that is not enough.

4. For the tools, We show "Microsoft Excel 2016" and "the formula of the Cohens' d effect size". That is enough to replicate our work. We provided the raw data by "figshare" and show the link. This is the regulation of F1000Research.

5. For the location of citation, F1000Research has no regulations. Citations in the result section are commonly seen. For example, a famous book, "Science Research Writing: A Guide for Non-Native Speakers of English", recommends no references should use unless essential in the discussion section.

6. We added a statistical analysis to Figures 1-3 and Table 1.

Competing Interests: No competing interests were disclosed.