BRIEF REPORT

REVISED Use of the K factor from the Universal Soil Loss Equation can show arable land in Palau [version 2; peer review: 2 approved with reservations]

Masato Oda ¹, Yin Yin Nwe², Hide Omae¹

¹Japan International Research Center for Agricultural Sciences, Tsukuba, Ibaraki, 305-8686, Japan

²Palau Community College, Koror, Palau

V2 First published: 07 Feb 2020, 9:89
<https://doi.org/10.12688/f1000research.22229.1>
 Second version: 24 Jun 2020, 9:89
<https://doi.org/10.12688/f1000research.22229.2>
 Third version: 22 Jun 2021, 9:89
<https://doi.org/10.12688/f1000research.22229.3>
 Latest published: 21 Jan 2022, 9:89
<https://doi.org/10.12688/f1000research.22229.4>

Abstract

From the viewpoint of sustainability, the annual soil erosion must be controlled below an erosion level. Palau is an island in the Micronesia region of the western Pacific Ocean. The island receives heavy rainfall and has steep slopes, so 80% of the land is categorized within the most fragile rank, with at most 1 ton per acre per year (T factor = 1). We tested several methods of preventing soil erosion on the land, with a slope of 15.4° (13.4°–17.3°), cultivated the land, planted sweet potatoes, and compared the amount of soil erosion. Surprisingly, there was no erosion at all in all plots (including control plots), although there were 24 rainfall events and the USLE equation predicted 32 ton per ha of the soil erosion in the cropping period. For the parameters of the USLE equation used in the present study, only the K factor was not actually measured. This means the K factor was larger than the actual value. Land at low risk of soil erosion and suitable for agriculture can be found by measuring K factor locally, even if the area is categorized as unsuitable.

Keywords

Babeldaob, hillside farming, island, tillage, mulching, USLE equation

This article is included in the **Agriculture, Food and Nutrition** gateway.

Open Peer Review

Approval Status

	1	2	3
version 4			
(revision)			
21 Jan 2022			
version 3			
(revision)			
22 Jun 2021			
version 2			
(revision)			
24 Jun 2020			
version 1			
07 Feb 2020			

1. **Kathleen B. Boomer** , Foundation for Food and Agriculture Research, Washington, USA
CBP Scientific Technical Advisory Committee, Washington, USA
2. **Kebede Wolka**, Wondo Genet College of Forestry and Natural Resource, Hawassa University, Shashemene, Ethiopia
3. **Nor Rohaizah Jamil** , Universiti Putra Malaysia, Serdang, Malaysia

Universiti Putra Malaysia, Serdang, Malaysia

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; **Nwe YY:** Investigation, Resources, Writing – Original Draft Preparation; **Omae H:** Investigation, Project Administration, Writing – Original Draft Preparation

Competing interests: No competing interests were disclosed.

Grant information: The author(s) declared that no grants were involved in supporting this work.

Copyright: © 2020 Oda M *et al.* This is an open access article distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

How to cite this article: Oda M, Nwe YY and Omae H. **Use of the K factor from the Universal Soil Loss Equation can show arable land in Palau [version 2; peer review: 2 approved with reservations]** F1000Research 2020, 9:89 <https://doi.org/10.12688/f1000research.22229.2>

First published: 07 Feb 2020, 9:89 <https://doi.org/10.12688/f1000research.22229.1>

REVISED Amendments from Version 1

We have corrected the technical term “estimate” to “predict”.

We have corrected the use of the T factor according to the definition.

A citation was corrected and references for a recent USDA survey and for the use of K factor were added.

The K-factor was corrected to 0.15 to 0.05 (calculation had been used 0.05 so the results have been not affected)

The recommendation of the vertical ridge was mentioned.

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

Introduction

From the viewpoint of sustainability, the annual soil erosion must be controlled below an erosion level of the T factor (USDA Natural Resources Conservation Service). Although No-tillage farming is effective for preventing soil erosion (Zuazo & Pleguezuelo, 2009), but the use of herbicides is unfavorable from an ecological perspective. The problem of tillage is the early stage of the crop of small vegetation coverage (Wischmeier & Smith, 1978). It is essential to increase the water infiltration rate at this stage. The water infiltration rate is positively proportional to the root mass of the crop soil (Oda *et al.*, 2019). Therefore, we tried to clarify the risk of erosion and the effect of root mass for preventing soil erosion in a field with an incline typical for Palau in an area of categorized highly erodible. Surprisingly, there was no erosion at all in all plots. The results show land at low risk of soil erosion can be found by determining site-specific K factor measurements. We couldn't evaluate the effects of the treatments; nevertheless, this information is important for Palau's agricultural development.

Methods

Site description

Palau forms part of the Micronesia region in the western Pacific Ocean. Palau's economy is mainly owing to tourism and the increase of tourists increases the consumption of agricultural products, but they had been afforded by imports. The agriculture in Palau is mainly taro cultivation at swamp by a traditional and environmentally friendly method. However recently, modern agriculture is rapidly grown and that has a large risk of causing erosion. There are open agricultural fields that were once utilized by the Japanese, prior to World War Two. The redevelopment of these fields is starting. Generally, fields with inclines of more than 8° are unsuitable for growing crops, but most of the agricultural fields in Palau have slopes of more than 8°. As well as having steep slopes, the island is also subject to heavy rainfall. Most of the country (92%) was categorized within the most tolerable rank, having a T factor of 5 (more than 5 tons per acre per year) (Smith, 1983); however, the data was updated by USDA Natural Resources Conservation Service in 2009, and most of the land (80%) was categorized within the most fragile rank, having a T factor of 1. A study estimated the risk of soil erosion from agricultural land was reported to be from 720 to 813 tons per ha per year (Gavenda *et al.*, 2005).

The experiment was conducted at the Palau Community College Research and Development Station (N7.529694, E134.560522). The field is one of the agricultural fields that were once utilized by the Japanese. The soil here is Oxisol—“Ngardmau-Bablethuap Complex”, which is characterized as a very gravelly loam with low organic matter content of between 1% and 4%, and (Smith, 1983). The permeability is moderately rapid (15–50 cm/hr) and very well drained. The available water capacity is between 0.05 and 0.10 cm/cm (Smith, 1983). The previous crop grown on the land was taro (*Colocasia esculenta*). The slope is 15.4° (13.4°–17.3°).

Treatments

We conducted the experiment from January to July 2019. The treatments were plants (with or without) × ridge (with or without) × 2 replications. We set these eight plots (2 × 10 m) randomly on the field (Table 1, Figure 1 and Figure 2). We tilled the field using a hand tractor on 22 January, leveled the field, and covered half the plots with weed control fabric (polypropylene, 0.4-mm thick, 120 g m⁻²; I-Agri Corp., Tsuchiura) on 28 January. We cut weeds on 16 April, blew off the residue, removed the weed control fabric on 17 April (Figure 3), then tilled each plot using the hand tractor up and down so that the soil did not mix with the soil of the neighboring plots. The average thickness of the soil tilled was 16 cm. We made a 70 cm width of the monitoring areas in the center of the plots by ridges or wooden boards (for the no-ridge treatment). We transplanted sweet potatoes (*Ipomoea batatas*) at 70 cm intervals on 17 April (Figure 4). We dug trenches at the upper end of the fields to prevent rainwater inflow. We embanked the lower ends and added 1-m lengths of weed control fabric to trap any eroded soil. Fertilizer was not applied. Hand weeding was conducted on 21 May and 6 June.

Determination

Following every heavy rainfall event, we collected any soil that had been eroded and accumulated on the weed control fabric (Figure 4). We collected precipitation data every 5 minutes via a weather station in the Palau Community College Research and Development Station (about 100 m from the experimental fields). The condition of the fields was recorded using an automatic camera.

Table 1. Treatments.

Block	Plot ID	Plants	Ridge	Slope/°
Left	4			15.1
	7	+		17.3
Mid	1		+	14.2
	5	+	+	14.6
	6	+	+	15.7
Right	8	+		13.4
	2		+	16.1
	3			16.6

Figure 1. Location of plots. Green: No mulch treatment, Stripe: Ridge treatment.

Figure 2. Initial condition of the field.

Figure 3. Conditions before cultivation.

Figure 4. Initial conditions. The order of the plots is 4, 7, 1, 5, 6, 8, 2, 3.

Analysis

We identified rainfall events that caused severe erosion (more than 3 mm/10 min) (Onaga, 1969) and compared the amount of eroded soil of each event.

The amount of eroded soil was predicted with the Universal Soil Loss Equation (USLE) equation (Wischmeier & Smith, 1978) by the following formula using Microsoft Excel.

$$A = R \times K \times LS \times P \times C \text{ metric ton ha}^{-1} \text{ year}^{-1}$$

The above equation was parameterized as follows.

$$E = 210 + 89 \log_{10} I_{30} \text{ 100 metric ton ha}^{-1}$$

I_{30} cm h⁻¹: maximum rainfall in 30 min multiplied to 60 min; rainfall less than 1.27 cm is omitted, and the maximum value is 7.62 cm.

$$A = EI \times K \times LS \times P \times C \text{ metric ton ha}^{-1}$$

$$K = 0.05$$

$$LS = (10/20.0)^{0.5} \times (68.19 \sin^2 15.4^\circ + 4.75 \sin 15.4^\circ + 0.068) = 4.34$$

$$P = 1.00; \text{ vertical ridge}$$

$$C = 1.0; \text{ Tillage}$$

$$EI = (E \times I_{30})/100$$

$$\text{Plot area} = 7 \text{ m}^2$$

Results

Precipitation

The field site received regular rainfall, with total precipitation of 992 mm during the experimental period, from 17 April to 15 July (Figure 5). There were 46 days of erosive rainfall more than 3 mm per 10 min (Figure 6). The rainfall threshold where surface run-off occurs is 2–3 mm per 10 min on a 15° slope, although these values vary according to different soil characteristics (Onaga, 1969). There was a highly erosive rainfall event on day 7 after planting (2 May). Following weeding, an erosive period, a heavy rainfall event of 17 mm per 10 min occurred on the next day after weeding took place. The second weeding was conducted after seven days of intensive rainfall, with a further erosive rainfall event of 7 mm per 10 min that occurred just after weeding took place. Thus, the rainfall conditions during the experimental period were expected to result in severe soil erosion.

Soil loss prediction by USLE

There were 24 rainfall events that could have caused erosion during the observation period (Table 2). The soil loss prediction

Figure 5. Daily precipitation.

Figure 6. Erosive rainfall events. The blocks show a rainfall event of more than 3 mm/10 min and the amount of precipitation. The colors distinguish the events.

Table 2. Soil loss prediction by USLE for each rainfall event.

Date	Day	I_{30} cm h ⁻¹	E	EI	A t/ha	Erosion kg/plot	Remark
8-Apr	-9	1.76	232	4.08	0.89	0.62	(Before planting)
24-Apr	7	1.64	229	3.76	0.82	0.57	1st rain
26-Apr	9	1.36	222	3.02	0.65	0.46	
1-May	14	2.76	249	6.88	1.49	1.05	
2-May	15	2.84	250	7.11	1.54	1.08	
6-May	19	1.52	226	3.44	0.75	0.52	
9-May	22	1.68	230	3.86	0.84	0.59	
10-May	23	2.92	251	7.34	1.59	1.12	
12-May	25	3.52	259	9.10	1.98	1.38	
18-May	31	2.92	251	7.34	1.59	1.12	
24-May	37	6.56	283	18.55	4.02	2.82	After weeding
2-Jun	46	1.56	227	3.54	0.77	0.54	
3-Jun	47	2.68	248	6.65	1.44	1.01	
5-Jun	49	2.68	248	6.65	1.44	1.01	
8-Jun	52	0.76	199	1.52	0.33	0.23	After weeding
8-Jun	52	2	237	4.74	1.03	0.72	
17-Jun	61	1.72	231	3.97	0.86	0.60	
21-Jun	65	1.12	214	2.40	0.52	0.36	
27-Jun	71	1.96	236	4.63	1.00	0.70	
29-Jun	73	1.6	228	3.65	0.79	0.55	
2-Jul	76	1.04	212	2.20	0.48	0.33	
10-Jul	84	5.36	275	14.73	3.20	2.24	
13-Jul	87	2.44	244	5.97	1.29	0.91	
14-Jul	88	4.32	267	11.52	2.50	1.75	
15-Jul	89	2.44	244	5.97	1.29	0.91	(End of observation)
19-Jul	93	1.96	236	4.63	1.00	0.70	
19-Jul	93	2.36	243	5.74	1.25	0.87	
25-Jul	99	3.04	253	7.69	1.67	1.17	
26-Jul	100	2	237	4.74	1.03	0.72	
27-Jul	101	5.4	275	14.86	3.22	2.26	
28-Jul	102	4.28	266	11.39	2.47	1.73	
30-Jul	104	1.4	223	3.12	0.68	0.47	
Sum of observation period (Day 7 to 89)					32.23	22.56	

for bare land conditions by USLE was 0.57 kg per plot on day 7 (the first rainfall event after transplanting) and 2.82 kg (after the first weeding).

Soil erosion

Despite the severe rainfall conditions, none of the plots had any erosion at all through the experimental period (Figure 7).

Vegetation coverage

Most of the soil surface was bare by day 14 (1 May). The surface of the soil was covered by small weeds on day 21 (8 May), the day of the first weeding. The vegetation coverage by visual inspection ranged from 15–85% on day 54 (10 Jun), after the second weeding. The vegetation coverage was 100% by day 89 (15 July) (Figure 8).

Figure 7. Zero erosion of the first rainfall event after transplanting. The predicted erosion was 0.57 kg per plot; however, the actual erosion was 0 kg in all plots.

Discussion and conclusion

The experiment was conducted under severe conditions, with a slope of approximately 15° and vertical ridge, and the treatment with weed control fabric was expected to erase the effect of root mass for preventing soil erosion. There were many intensive rainfall events during the experimental period. Nevertheless, no soil erosion occurred. This means that the risk of soil erosion was low for the fields and tillage is acceptable. Although the use of mulching material may erase the effect of root mass for preventing soil erosion, still the use of mulching material is available. The above results were unexpected; even if considering the length of the ridge is short (10 m), and the vertical ridge may

reduce erosion than horizontal ridge widely recommended because a vertical ridge without a catch canal is less erosive (Shima *et al.*, 1991).

For the parameters of the USLE equation in the present study, only the K factor was not actually measured. This means that the K factor was larger than the actual value. Low erosion land for agriculture can be found by measuring erosion locally, even if the area is categorized as being unsuitable for field crops. The risk of erosion should be clarified for other soil types, and the effect of the previous crop type too. For taro, the previous crop in these fields, the roots might be left in the soil; although, we took a

Figure 8. Vegetation coverage. Top panel: day 14, Upper middle panel: day 21 (before the first weeding), Lower middle panel: day 54 (after second weeding), Bottom panel day 89.

fallow period. Land suitable for agriculture and at low risk of soil erosion can be found in Palau by determining site-specific K factor measurements.

Following the USDA report, lands suitable for agriculture are rare in Palau. However, the use of USLE to predict sediment yields is not advisable despite their present widespread application (Boomer *et al.*, 2008). Our results obtained from a limited field, still, this information is important for Palau's agricultural

development. Further study is needed for distinguishing the area of the low K.

Data availability

Underlying data

Figshare: Precipitation of Palau, <https://doi.org/10.6084/m9.figshare.11769909.v1> (Oda *et al.*, 2020). Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

References

Boomer KB, Weller DE, Jordan TE: **Empirical Models Based on the Universal Soil Loss Equation Fail to Predict Sediment Discharges from Chesapeake Bay Catchments**. *J Environ Qual*. 2008; **37**(1): 79–89.
[PubMed Abstract](#) | [Publisher Full Text](#)

Gavenda RT, Ingersoll AH, White SL, *et al.*: **Ngerikil Watershed Resource Assessment**. USDA Natural Resources Conservation Service, 2005.

Oda M, Rasyid B, Omae H: **Root mass may affect soil water infiltration more strongly than the incorporated residue [version 2; peer review: 1 approved with reservations]**. *F1000Res*. 2019; **7**: 1523.
[Publisher Full Text](#)

Oda M, Omae H, Nwe YY: **Precipitation of Palau**. *figshare*. Dataset. 2020.
<http://www.doi.org/10.6084/m9.figshare.11769909.v1>

Onaga K: **On the properties of rainfall influenced on soil erosion (Fundamental studies on farmland conservation in okinawa I.)**. *The Science Bulletin of the Faculty of Agriculture. University of the Ryukyus*. 1969; **16**: 180–187.

Shima E, Yamaji E, Koide S, *et al.*: **Effects of Ridge and Catch Canal on Soil**

Erosion in a Sloping Reclaimed Field of Decomposed Granite Soil. *JSIDRE*. 1991; **1988**(138): 75–82.

[Reference Source](#)

Smith CW: **Soil survey of Islands of Palau Republic of Palau**. 1983; Washington, DC: USDA.

[Reference Source](#)

USDA Natural Resources Conservation Service: **Soil survey of the Islands of Palau. Republic of Palau**. 2009.

[Reference Source](#)

Wischmeier WH, Smith DD: **Predicting rainfall erosion losses - a guide to conservation planning**. 1978; [Accessed: 19 June 2018].

[Reference Source](#)

Zuazo VHD, Pleguezuelo CRR: **Soil-Erosion and Runoff Prevention by Plant Covers: A Review**. In: Lichtfouse, E., Navarrete, M., Debaeke, P., Véronique, S., and Alberola, C. eds. *Sustainable Agriculture*. Dordrecht: Springer Netherlands. 2009; 785–811.

[Publisher Full Text](#)

Open Peer Review

Current Peer Review Status: ? ?

Version 2

Reviewer Report 06 May 2021

<https://doi.org/10.5256/f1000research.27523.r83162>

© 2021 Wolka K. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Kebede Wolka

Wondo Genet College of Forestry and Natural Resource, Hawassa University, Shashemene, Ethiopia

The research attempted to show the K-factor of the universal soil equation in Palau. In the study design, a small plot of about 20m² used to collect the eroded material, which the study reported no erosion despite a reasonable amount of rainfall. The study is conducted in areas where crop growth is less common. The research approach is good to show erosion under specific conditions. Like many other researches, it has shortcomings, specified below:

1. Method of calculation for USLE has not been mentioned clearly.
2. The study reported that the K-factor overestimated the soil loss in USLE. However, there are options to consider K-factor for different soil. The options followed to use K-factor has not been mentioned, which might be inappropriate that led to far overestimating result.
3. The plot considered in the experiment seems smaller.
4. Results of the study has not been discussed sufficiently and fully.
5. In most cases, the USLE is meant to estimate soil loss at annual base. The author estimated the soil loss for every rainfall event. How reliable is this method?
6. The paper has a few editing problems.

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?

Partly

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

No

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

Not applicable

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

Partly

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Erosion and soil and water conservation

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 17 Jun 2021

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

Thank you for reviewing our manuscript. We have dealt with the matters you pointed out as follows. Please check the revised manuscript.

1. *Method of calculation for USLE has not been mentioned clearly.*

A) We made the method citation more faithful and detailed. We also clarified that the rainfall intensity was calculated according to the definition. Relatedly, we corrected the symbols in the formula.

2. *The study reported that the K-factor overestimated the soil loss in USLE. However, there are options to consider the K-factor for different soil. The options followed to use K-factor have not been mentioned, which might be inappropriate that led to far overestimating the result.*

A) In the abstract, methods, and discussion sections, we referred to that the K-factor was estimated based on soil texture and permeability.

3. *The plot considered in the experiment seems smaller.*

A) When the survey area is less than 10 m², the erosion rate is almost constant, but when the survey area exceeds 10 m², the erosion rate decreases linearly as the area increased. Accordingly, this experiment may overestimate soil erosion. We quoted the literature in the method section.

4. *Results of the study has not been discussed sufficiently and fully.*

A) The flow of discussion has been improved as follows. 1) Summarizing the results of the experiment, 2) Considering that the experiment meets the conditions for applying the USLE prediction formula, 3) Pointing out the gap between the predicted value and the measured value, and that the gap is derived from K-factor, 4) Showing that various improvement proposals have been shown for K factor, but there are cases where the original is more accurate depending on the soil, and the definitive calculation method has not been determined. 5) As a result of the above, there is a good possibility of finding suitable land in an unsuitable land for agriculture in Palau, and the results of this test can be regarded as an example.

5. In most cases, the USLE is meant to estimate soil loss at annual base. The author estimated the soil loss for every rainfall event. How reliable is this method?

A) Clarified in the method section that the calculation is based on the USLE forecast formula. We also mentioned in the discussion that the number of events is considered to be large enough.

Competing Interests: None

Version 1

Reviewer Report 30 April 2020

<https://doi.org/10.5256/f1000research.24517.r61753>

© 2020 Boomer K. This is an open access peer review report distributed under the terms of the [Creative Commons Attribution License](#), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Kathleen B. Boomer

¹ Foundation for Food and Agriculture Research, Washington, DC, USA

² CBP Scientific Technical Advisory Committee, Washington, DC, USA

Technical Review: Use of the K factor from the Universal Soil Loss Equation can show arable land in Palau by Oda *et al.*

General Comments:

The investigators report the results of measured and estimated soil erosion in the Micronesia region of the western Pacific Ocean. To compare how plantings and micro-tilling affects soil detachment and transport to field edges, they established eight plots within a single field, following as closely as possible (presumably) the original protocol of the USLE. Although the title

indicates a focus on soil erodibility (K), the study design is more relevant to understanding practice effects on erosion. Given the importance of subsistence agriculture and the lack of studies specific to promoting sustainable practices in this region, this work calls attention to a critical information gap.

The manuscript requires extensive revisions to clarify and substantiate its contributions. It lacks a “story arc” that enables the reader to readily understand why this work is important, how the researchers tackled this knowledge gap, and how their results compare or contribute to the existing body of research. For example, the authors might consider highlighting the importance of subsistence farming to the region and the challenge of soil erosion to sustainable agriculture, but the lack of technical guidance specific to the region. The USLE, which is based on a phenomenal US dataset, is a widely accepted tool to evaluate erosion potential based on landscape setting and management, but the empirical model ideally requires local testing and refinements for application to areas outside of its original US study area. The research objectives and methods also require clarification. Finally, the limited number of plots (8) and fields (1) raises concerns about the power of the study to detect differences among field practices. Given the difficulty and expense of field studies and the realities of scant data, however, the publication may be valuable.

Specific Comments:

- A large portion of the introduction includes study site information, which should go in the Methods section.
- Use the international the international system for classification of soils to describe site conditions.
- Define “T factor”.
- In the site description, add information about the landscape setting, outside of the study site boundaries. A study site topographic map would be helpful. Information about the distribution of croplands on the study island, as well as a brief description of how the island compares to others in the region, would be helpful to thinking about the value of information beyond the study site.
- In the methods section, add a paragraph describing how and where rainfall data were collected. Include this location on the study area map.
- It is not clear how tilling, even if by hand, does not mix soils.
- Elaborate on how soil erosion was measured. Reference methods to the extent possible.
- Elaborate on USLE application and parameterization. Use previous publications as examples.
- In the “Estimated erosion” section, define “That” in the last sentence on page 3.
- Consolidate Figure 6 into one panel.

- In the Discussion and Conclusions section, paragraph 1, reference to site conditions seem contradictory: “experiment was under severe conditions, with a slope of ... 15°” vs “risk of soil erosion was low for the experimental soil”.
- Convert Table 2 to graphical form. For example, plot A vs EI, observed vs predicted, grouped by practice.
- The pictures are difficult to interpret.
- The discussion needs to follow the same “story arc” presented in the introduction and used to organize the methods and results sections. The discussion also needs to compare the study results with the existing body of literature to assess whether findings to reinforce or challenge existing paradigms. The authors also need to acknowledge the limitations of their study design and ideally, discuss the relevance of their findings to management recommendations.

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?

Partly

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?

Partly

Are the conclusions drawn adequately supported by the results?

No

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Hydrology, soil biogeochemistry, and watershed modeling

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 25 May 2020

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

Thank you for the constructive comments.

We will accept almost of all the comments; however, before submitting a revised manuscript, may I clarify the following points?

1) Consolidate Figure 6 into one panel.

Is that mean combine Figure 6 and Figure 5?

2) Convert Table 2 to graphical form. For example, plot A vs EI, observed vs predicted, grouped by practice.

This is less effective because the practical data were all zero.

Competing Interests: No competing interests were disclosed.

Author Response 02 Jun 2020

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

Define "T factor".

Now, I understood that I misunderstood the meaning of the "T factor".

Thank you so much.

Competing Interests: No competing interests were disclosed.

Author Response 19 Jun 2020

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

Clarified the "story arc" of the paper including the lack of technical guidance specific to the region, the research objectives, and methods.

1. The description of Palau was moved to the Methods section.
2. The international classification of soils was added.
3. Define of the "T factor" was corrected.
4. A Google map link was added as an alternative of the topographic map
5. The information on the experimental field was added.
6. The distance of the weather station was added.
7. The link of a picture of the hand tractor is added.
8. The method of collecting eroded soil was clarified more.
9. The application and parameterization of USLE were clarified more.
10. "That" in the last sentence on page 3 was clarified.
11. We couldn't understand the meaning of "Consolidate Figure 6 into one panel".
12. We improved the readability. The first paragraph pointed out a contradiction and interpreted that in the second and the third paragraph.
13. No erosion was observed so the changing Table 2 to graphical form is ineffective.

14. We corrected estimated → predicted, actual was zero.

15. The discussion section was improved.

Competing Interests: No competing interests were disclosed.

The benefits of publishing with F1000Research:

- Your article is published within days, with no editorial bias
- You can publish traditional articles, null/negative results, case reports, data notes and more
- The peer review process is transparent and collaborative
- Your article is indexed in PubMed after passing peer review
- Dedicated customer support at every stage

For pre-submission enquiries, contact research@f1000.com

F1000Research