

Original Research Paper

EFFECT OF PHOSPHORUS LEVELS ON YIELD COMPONENTS AND GRAIN

YIELD OF TWO NERICA VARIETIES IN MWEA

- **Follow the journal formats:** Journal format followed
- **Delete pink highlights:** Pink highlights deleted in the document, it was meant to show where I had corrected in version 1
- **The big question is: why do you need to add P as long as the P is 107.0% P as you mentioned in methodology section :** Since P was high in the soils to that level, and was not available for plants, then it was necessary to add the inorganic source that may have converted immediately into solution form and could be absorbed by plants also immediately, otherwise it was going to be bound into the soils by Aluminium and iron ions in such acidic soils in Mwea.
- **Read the effect of soil acidity on P solubility and availability to support your monograph :** Read it, and so the explanation is as above please, though I have adopted tables in this version.
- **In general the paper on this phase is not at the journal rank, even though good data had achieved :** I have reworked on it and feel there is a lot good also in it that can be learnt by other scientists.

ABSTRACT

These days, most readers look at the abstract and decide if the monograph merit to read or not. Abstract between 200 -300 words

Re write the abstract A complete Abstract should include the parts as follows:

- the purposes / aims of the paper should be presented as the enter words and expression such as “propose”, “aim”, and “in order to” should be used should be used more precisely;
- the research method / theory used / proposed should be concisely described (how?)
- summary of research / work is necessary to be presented
- Results briefly / significance of the research in the abstract is an essential

These points have been considered exhaustively in the version 2 now.

First look, the abstract is so long about 580 words

One macronutrient that always appears high in the soil, yet unavailable to plants for being readily immobile is phosphorus. Such scenario is ontological in Mwea, yet this element is one main critical nutrient that plants cannot do without. Rice being the main crop grown there, needs it for root initiation, root development, photosynthesis, grain- formation, grain-filling and yielding. In that view therefore, an experiment was undertaken in Mwea irrigation scheme to investigate on the influence of phosphorus levels on grain-yield and yield components of NERICA 4 and 11.

- 1- *This paragraph (above) is part of introduction - needs References*
- 2- *This abstract Just full information of experiment and Results permanently*
- 3- *Do not discuss your results in abstract!!!!!!!*

This part has been reviewed in version two where results and discussions have been placed where proposed by the editor.

The experiment was laid out in a Randomized Complete Block Design in split-plot arrangement replicated thrice. Phosphorus levels (0 kg P/ha, 25 kg P/ha, 50 kg P/ha and 75 kg P/ha) formed main plots and two rice varieties (Nerica 4 and Nerica 11) formed the split plots. The treatments significantly influenced plant height, leaf number, leaf fresh weight, chlorophyll content, and panicle length. Highest (72.7cm) plant height in Nerica 4 on 75kg P/ha was recorded in week 19, season 2, while least (10.09cm) in Nerica 11 on control was recorded in week 4, season 1. Highest (40.78 per hill) leaf number in Nerica 4 on 50kg P/ha was recorded in week 19, season 2, while least (2.475 per hill) in Nerica 11 on control was recorded in week 4, season 1. Highest (10.33 g/hill) leaf fresh weight in Nerica 11 on 75kg P/ha was recorded in week 13, season 1, while least (0.0575g/hill) in Nerica 4 on 25kg P/ha in week 4, season 2 was recorded. Highest (41.99 SPADs/hill) chlorophyll content in Nerica 4 on 75kg P/ha in week 13, season 2 was recorded, while least (10.63 SPADs/hill) in Nerica 11 on control was recorded in week 4, season 2. Panicle's highest (20.78 cm/hill) length in Nerica 11 on 50kg P/ha was recorded in week 16, season 1, while least (2.0 cm/hill) in Nerica 11 also on control was recorded in week 10, season 2. Positive influence albeit insignificant on dry leaf weight and number of tillers was realized, where highest (7.19g/hill) dry leaf weight in Nerica 11 on 75kg P/ha was recorded in week 13, season 1, while least (0.0298g/hill) in Nerica 4 on 25kg P/ha was recorded in week 4, season 2; and highest (20.78 per hill) number of tillers in Nerica 11 on 50kg P/ha was recorded in week 16, season 1, while least (2.0 per hill) in Nerica 11 as well on control was recorded in week 4, season 2. The influence on panicle number was positive and insignificant through weeks 10, 13 and 16, but only significant in week 19, season 1 where highest (17.28 panicles/hill) in Nerica 11 on 25kg P/ha was recorded, while least (2.89 panicles/hill) in Nerica 4 on 25kg P/ha as well, was recorded in week 10. There was significant influence on 1000-grain weight and panicle number, and insignificant influence on the other yield components and grain yield in season 1, as well in all the yield components and grain yield in season 2. Grain yield (ton per hectare) did not present any significant effect as a result of the treatments in both seasons. Nonetheless, variation in means of grain yield was observed, where highest grain yield of 0.988 tons per hectare was produced in Nerica 4 on 50kg P/ha in season 2, while least grain yield of 0.831 tons per hectare was still produced in the same variety on control in season 1. Therefore, 50kg P/ha on Nerica 4 is recommended for rice farming in Mwea as per the study.

Key words: Mwea, Phosphorus, Levels, Nerica, Yield

1.0 INTRODUCTION

Rice (*Oryza sativa*, L) is the most popular food crop in Kenya, and third highly cultivated and utilized cereal crop in Kenya currently [1]. Being a lifestyle food, Kenyan people utilize it various forms, though much of the consumed in the nation is imported since

national production cannot meet the existing demand[2]. Such wanting production-trend is attributable to fixed and unavailable phosphorus [3] to plants, among others. Apparently, Mwea appears to be one most-hit rice-producing area where concern has been raised.

To fix the problem, farmers are encouraged to apply phosphate fertilizers to crops in the field, and by so doing increased yields [4] will be realized. Such yield-increment would translate to sufficient food, rise of income, and good health in populations in Mwea. The application of phosphates to rice crops energizes uptake of nitrogen, and improves micronutrient absorption by rice plants. Nerica rice presents itself to be the most adaptable to Mwea semi-arid agroecology, hence selection of the two; Nerica 4 and 11 for yield comparison purposes considering phosphorus levels required to influence their yields.

To fix the problem, farmers are encouraged to apply phosphate fertilizers. Who did this (Ref)

In that view therefore? an experiment was carried out in Mwea between December 2016 to May 2017 (season 1) and between July to November 2017 (season 2) to investigate on the effect of phosphorus levels on yield of Nerica 4 and 11.

This methodology : Though it is vital to mention bit of it in the introduction , I have considered it be placed in Methods as proposed.

The experiment was set in a Randomized Complete Block Design in split-plot arrangement, replicated thrice. Four phosphorus levels (0kg P/ha, 25kg P/ha, 50kg P/ha and 75kg P/ha) formed main plots, and two rice varieties (Nerica 4 and Nerica 11) formed the splitplots.

Which experiment? This section look like method not introduction: This point has been placed under methodology but rather briefly or paraphrased please.

Data was collected in both seasons from week 4, 7,10,13,16 on plant height, tiller number, leaf number, leaf fresh weight, leaf dry weight, SPAD readings, panicle length, panicle number, and in week 19; mature plant height, mature tiller number, root biomass, shoot biomass, mature panicle number, mature panicle length, filled grain number, unfilled grain number, 1000-grain weight, 1.5 m² plot grain weight, grain moisture content and grain yield was collected. The data was cleaned and analyzed using GenStat version 15.1 and means separated using Fischer's Protected LSD test [5]. Results on Phosphorus level treatments positively influenced, albeit insignificantly on filled grain number, shoot biomass, root biomass, unfilled grain number, productive tillers, panicle number, 1.5 m² plot grain weight, moisture content, 1000-grain weight, and on grain yield except for the unproductive tillers in season 2, while significantly influenced the 1000-grain weight and panicle number, and insignificantly yet positively influenced other yield components and grain yield in season 1, and all the yield components and grain yield in season 2. Grain yield (tons per hectare) did not present any significant effect as a result of the treatments in both seasons, though highest grain yield of 0.988 tons per

hectare was produced in Nerica 4 on 50kg P/ha, while least grain yield of 0.831 tons per hectare was produced in Nerica 4 on control in season 1.

Where are paper aims? *No clear goals have been seen*

You need to re write this introduction as:

- Domestic studies as first paragraph
- International studies as second paragraph
- the significance as few words links it paper aim as the final paragraph

While it is advisable to have in the introduction as proposed by the editor, I think it is rather valuable to systematically move from international, regional, and finally national or domestic narrations that could link with significance as I have demonstrated in the version two now.

2.0 MATERIALS AND METHODS

2.1 Study Area

Why there is no map ? : Included in version two

The study was conducted for two growing seasons in Mwea irrigation scheme's-Kirogo farm site which lies at Latitude 0°37' S 37°20'E and at altitude of 1159 meters above sea level [6]. Its climate is tropical monsoon. It has two rainy seasons and two dry seasons, with rain being of uneven distribution. Temperature ranges from 15.6° c to 28.6° c with a mean of 22° c.

2.2 Soil type

Soil types are classified as red soils with a slightly acidic pH of 6.18 [7], 0.119 % N, 107.0% P?? [then why do you need to add P] (ppm) and 0.085 %K me/140g, while the exact farm site where the trial was set had its soil properties analyzed in the beginning and at the end of the two seasons. Put this as section: I have captured the question of highness of soil P in the abstract corrections as proposed.

-Week/weeks these words mentioned maney times in results and discussion but none in materials and methods !!!!!!!!!!!!!!! : Mentioned in both parts as Weeks after Sowing when growth data and finally yield data was collected.

- are these weeks as (4, 7, 10, 13, 19) or (4, 7, 10, 13, 16)!!!. Look your discussion : Weeks After Sowing relative to the time of sowing for growth monitoring.

2.2 Experimental design, materials, treatments, data collection and analysis. this long sup title with little detail , may better if divided into more than titles

I think it is worth maintaining it within one subheading but have improved on information needed concisely.

The experiments were carried out in RCBD with Phosphorus four levels (0, 25, 50 and 75 kg P/ha) and two Nerica varieties (Nerica 4 and Nerica 11). Soil sampling and analysis was done before and after harvesting. All the appropriate routine agronomic practices such as water application, weeding, thinning, pricking, disease control, pest control, other fertilizer applications, et cetera were applied as required. Growth, yield components' and grain yield data were collected at appropriate stages, measured and findings recorded. Collected and recorded data on yield components and grain yield was cleaned and analyzed using GenStat version 15.1 and means separated using Fischer's Protected LSD test [5].

3.0 RESULTS AND DISCUSSION

3.1. Effect of phosphorus levels on plant height of two Nerica varieties [this paragraph more than 480 words] why? : The concern addressed by explaining it briefly in version two

Results showed that there was significant effect ($P \leq 0.05$) on plant height of the tested Nerica varieties due to phosphorus levels applied on, at planting throughout the crop's life in both seasons.

That is why [put this as a table 1] and delete below : Replaced with a table and brief explanations given in version two.

In week 4, highest plant height of 18.21 cm in Nerica 4 plants on 50kg P/ha in season 1 was recorded, while least of 10.09 cm in Nerica 11 plants on control in season 1 was elicited.

In week 7, highest plant height of 28.85 cm in Nerica 11 plants on 75kg P/ha in season 1 was recorded, while least of 19.67 cm in Nerica 4 plants on 50kg P/ha in season 2 was elicited.

In week 10, highest plant height of 44.02 cm in Nerica 11 plants on 50 kg P/ha in season 1 was recorded, while least of 21.41 cm in Nerica 4 plants on control in season 1 was elicited.

In week 13, highest plant height of 58.67 cm in Nerica 11 plants on 50 kg P/ha in season 1 was recorded, while least of 31.76 cm in Nerica 11 plants on control in season 1 was elicited.

In week 16, highest plant height of 69.0 cm in Nerica 4 plants on 50 kg P/ha / 75 kg P/ha in season 2 was recorded, while least of 46.33 cm in Nerica 4 plants on control in season 1 was elicited

and finally in week 19, highest plant height of 72.7 cm in Nerica 4 plants on 75 kg P/ha in season 2 was recorded, while least of 53.33 cm in Nerica 4 plants on control in season 1 was elicited.

give deep-scientific opinion to your discussion : I feel the explanation given is heavy-loaded Editor, though I have given more justification though so briefly again.

That necessitated the induction that, with addition of phosphorus into the cultivated soils, plant height increase in the growth stages was made among plants that had been treated with phosphorus than with those that did not receive any phosphorus [8]. Such is consistent with Turner et al. [9] who reported that, with increased phosphorus applications, increased plant height was evident due to better root increase and nutrient uptake. At stem elongation stage, plants for both varieties recorded highest plant height on highest phosphorus treatment than those that had received lower phosphorus applications, and least plant height on control.

Therefore, Nerica 11 and 4 recorded 28.85cm and 25.38cm respectively as highest plant heights. Maximum plant height of 72.7 cm was realized in week 19 (at harvest) in Nerica 4 on 75kg P/ha in season 2, whereas the least plant height of 10.09 cm was elicited in week 4 in Nerica 11 on control. **[This mentioned above as results]** : This time round in version two, results contained in table form, but words used to explain a bit for comprehension of the readers.

give deep-scientific opinion to your discussion : Point taken and considered in version two.

Tillering, panicle-initiation, heading, flowering, and grain-formation demonstrated significant plant height increase resulting from the 50kg P/ha application as compared to other applications, with least plant height recorded at plants that did not receive any phosphorus application (Figure 1). Plants that did not receive any phosphorus fertilizer for both varieties remained slowly growing from germination until maturity and harvest; indicating that phosphorus was a limiting growth parameter [10]. **Why Plants that did not receive any phosphorus fertilizer for both varieties remained slowly growing from germination until maturity and harvest?** **There 107 % P in the soil** : Soil P for it was high, it was fixed too and not available to those plants, and that is why we were making comparison between control and three other P levels added into soils of some some sub plots at sowing to observe changes in plants tested.

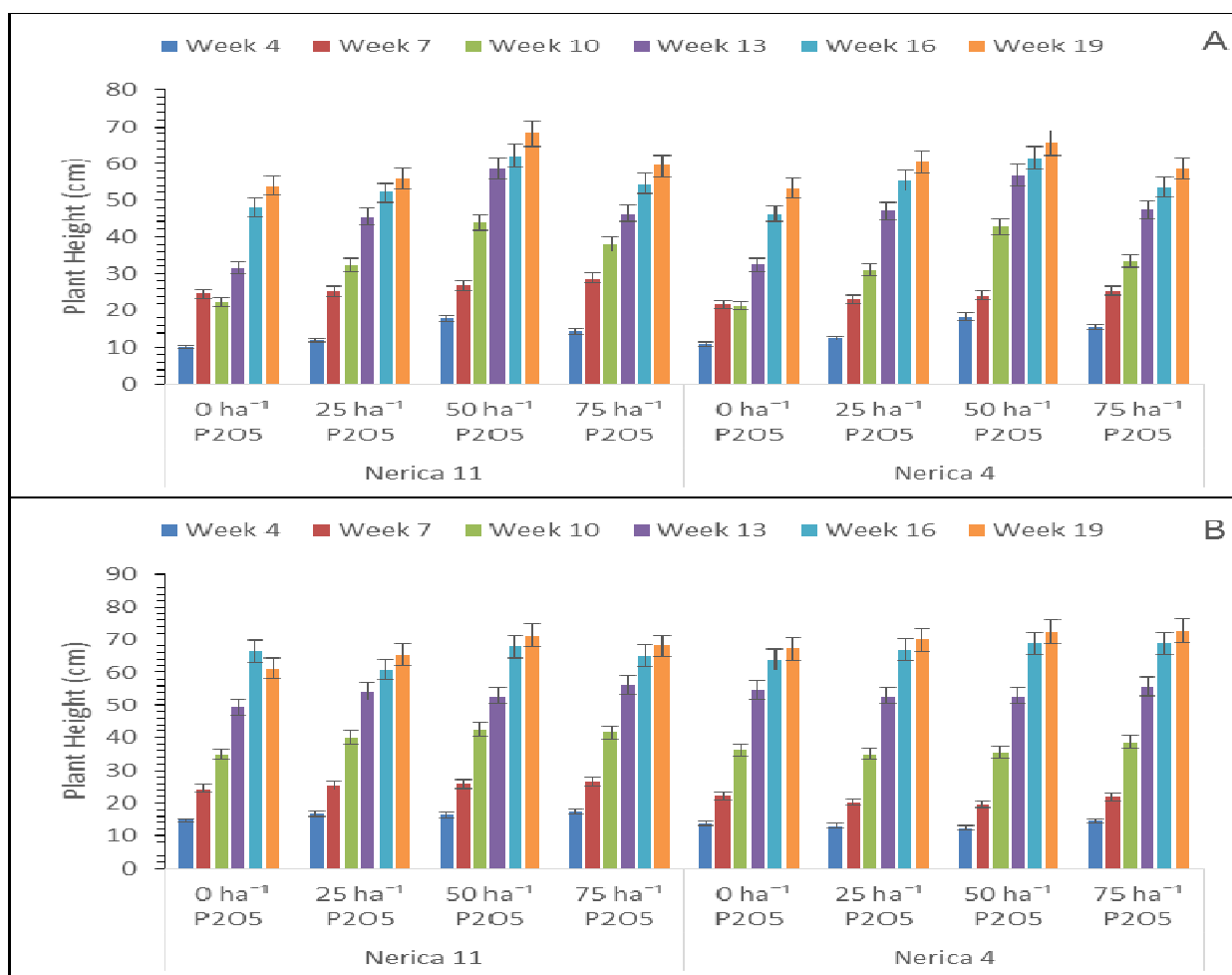


Figure 1: Effect of phosphorus levels on plant height of two Nerica varieties in season 1(A) and in season 2 (B). **Figure is not necessary if you put a table and would be better if put photo (optional).** Replaced with table in version two.

3.2 Effect of phosphorus levels on leaf number [Same as above section]

Results showed that there was significant difference ($P \leq 0.05$) exhibited in leaf number resulting from treatments on Nerica varieties in both seasons throughout crop's life. In that case, it could be explained that

Put data in Table 1 and delete below : Replaced with table in version two.

in week 4, highest leaf number of 11.42 per hill in Nerica 4 on control in season 2 was recorded, while **least** leaf number of 2.475 in Nerica 11 **on** control again in season 1 was recorded.

In week 7, highest leaf number of 20.58 per hill in Nerica 4 **on** control in season 2 was recorded, while **least** leaf number of 5.68 per hill in Nerica 11 **on** control in season 1 was recorded.

In week 10, highest leaf number of 32.75 per hill in Nerica 4 on control in season 2 was recorded, while least leaf number of 17.9 per hill in Nerica 11 on control in season 1 was recorded.

In week 13, highest leaf number of 34.56 per hill in Nerica 4 on control in season 2 was recorded, while least leaf number of 20.94 per hill in Nerica 11 on control in season 1 was recorded.

In week 16, highest leaf number of 40.1 per hill in Nerica 4 on control in season 2 was recorded, while least leaf number of 21.32 per hill in Nerica 11 on control in season 1 was recorded. Finally in week 19, highest leaf number of 40.78 per hill in Nerica 4 on 50kg P/ha in season 2 was recorded, while least leaf number of 23.45 per hill in Nerica 11 on control in season 1 was recorded.

give deep-scientific opinion to your discussion : I feel the explanation was sufficient enough though improvement have been done.

Phosphorus is responsible for stimulation of root growth, root development, stem elongation, water absorption and storage [11], nitrogen uptake [12] and cell division, and so with increased phosphorus applications, increased vegetative growth occurs [13]. Such was the case in the experiment where phosphorus effects varied considerably revealing increment in the number of leaves at every stage of rice crop development with increased levels of applications as was reported by Amanullah *et al.* [14], that with increased phosphorus levels, there occurred increment in growth variables [15] due to increase in leaf photosynthetic rates and formation of photosynthates. At 50 kg P/ha, maximum leaf number across the seasons was observed in week 19 of season 2 in Nerica 4 plants, yet least leaf number was recorded on no-phosphorus applied level in Nerica 11 plants in week 4 of season 1. Least leaf number was observed on no-phosphorus applied plants [16] probably due to plant-phosphorus deficiency consequenced by lack of plant-available phosphorus in the soils [17] as evidenced in Figure 2.

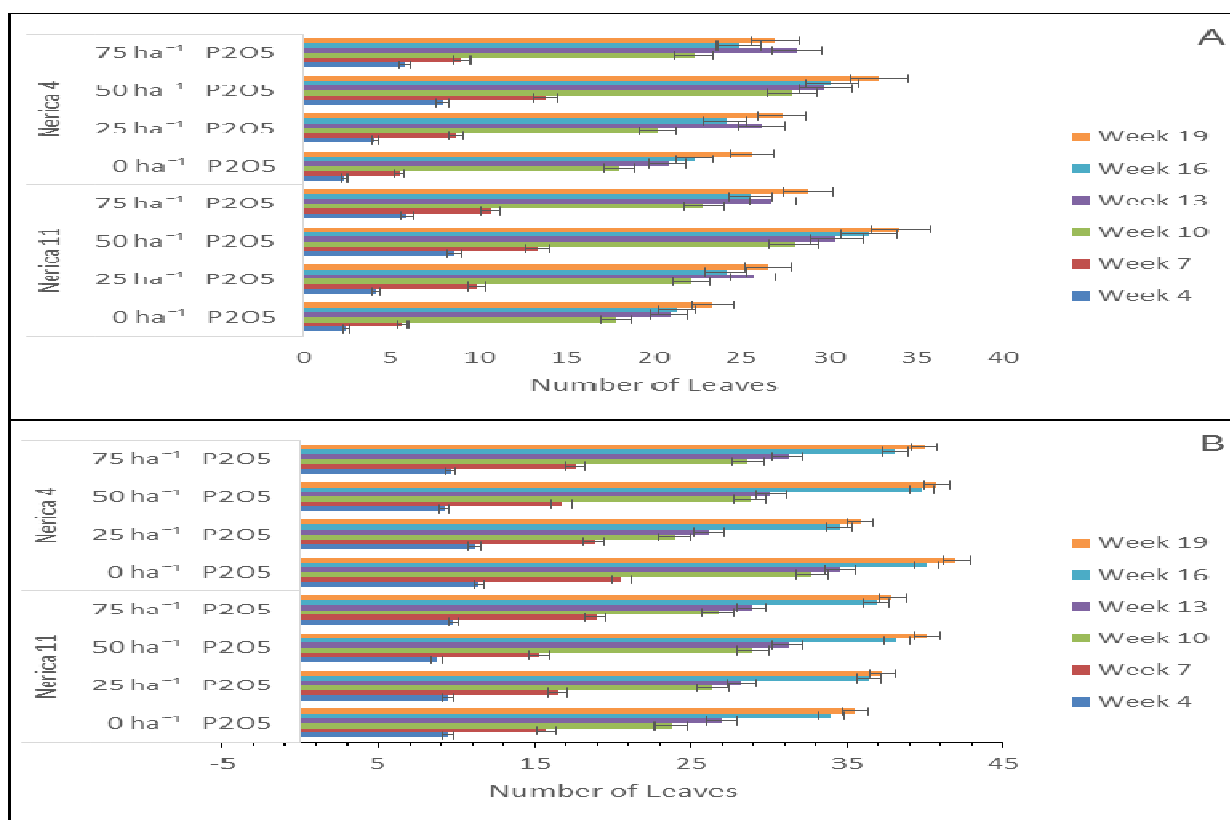


Figure 2: Effect of phosphorus levels on leaf number of two Nerica varieties in season 1 (A) and season 2 (B).

3.3: Effect of phosphorus levels on fresh leaf weight [Same as above section] Replaced with table

The experimental findings revealed that there was significant effect ($P \leq 0.05$) in leaf fresh weight of the two Nerica varieties tested in both seasons due to phosphorus level treatments applied at planting, throughout the phenology of the crop.

Put data in Table 1 and delete below Replaced with table.

In fact in week 4, highest leaf fresh weight of 0.477 gram per hill in Nerica 11 plants on control /25kg P/ha in season 1 was recorded, while least leaf fresh weight of 0.0575 gram per hill in Nerica 4 on 25kg P/ha in season 1 was recorded.

In week 7, highest leaf fresh weight of 0.788 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf fresh weight of 0.083 gram per hill in Nerica 4 on 25kg P/ha in season 2.

In week 10, highest leaf fresh weight of 4.25 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf fresh weight of 0.1386 gram per hill in Nerica 4 on 25kg P/ha in season 2.

In week 13, highest leaf fresh weight of 10.14 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf fresh weight of 0.273 gram per hill in Nerica 4 on 25kg P/ha in season 2.

In week 16, highest leaf fresh weight of 0.502 gram per hill in Nerica 11 on 50 kg P/ha in season 1 was recorded, while least leaf fresh weight of 0.374 gram per hill in Nerica 4 on control in season 2.

In week 19, highest leaf fresh weight of 0.477 gram per hill in Nerica 11 on control in season 1 was recorded, while least leaf fresh weight of 0.310 gram per hill in Nerica 4 on control in season 2. The maximum leaf fresh weight (10.14 gram per hill) was produced in Nerica 11 on 75kg P/ha level in season 1, yet the least leaf fresh weight (0.0575 gram per hill) was produced in Nerica 4 on 25kg P/ha in season 2 (Figure 3).



Figure 3: Effect of phosphorus levels on leaf fresh weight of Nerica varieties in season 1 (A) and season 2 (B)

3.4: Effect of phosphorus levels on dryleaf weight [Same as above section] Replaced with table

In regard to leaf dry weight, results revealed that phosphorus level applications on planting did not have any significant influence ($P > 0.05$) on leaf dry weight of the tested Nerica varieties in both two seasons. Nevertheless, variation in means of leaf dry weight was observable in all the weeks upto harvest. Therefore,

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in week 4, highest leaf dry weight of 0.1915 gram per hill in Nerica 4 on 25kg P/ha in season 1 was recorded, while least leaf dry weight of 0.0298 gram per hill in Nerica 4 on 25 kg P/ha in season 2 was recorded. In week 7, highest leaf dry weight of 0.298 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf dry weight of 0.0473 gram per hill in Nerica 4 on 25 kg P/ha in season 2 was recorded. In week 10, highest leaf dry weight of 1.703 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf dry weight of 0.0485 gram per hill by Nerica 4 on control in season 2 was recorded. In week 13, highest leaf dry weight of 7.19 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf dry weight of 0.0795 gram per hill in Nerica 4 on 75 kg P/ha in season 2 was recorded. In week 16, highest leaf dry weight of 0.243 gram per hill in Nerica 11 on 75kg P/ha in season 1 was recorded, while least leaf dry weight of 0.131 gram per hill in Nerica 4 on 75 kg P/ha in season 2 was recorded. Finally, in week 19, highest leaf dry weight of 0.2984 gram per hill in Nerica 11 on 50 kg P/ha in season 2 was recorded, while least leaf dry weight of 0.155 gram per hill in Nerica 11 on 75 kg P/ha in season 1 was recorded. It became apparent that, maximum leaf dry weight (7.19 gram per hill) was produced on 75kg P/ha in Nerica 11 plants in season 1, and the least leaf dry weight (0.0298 gram per hill) was produced on 25 kg P/ha in Nerica 4 plants in season 2.

give deep-scientific opinion to your discussion : precisely given in version two

All in all, leaf dry weight of the two Nerica variety plants was lower in relation to the respective means of leaf fresh weights as evidenced in Figure 3.

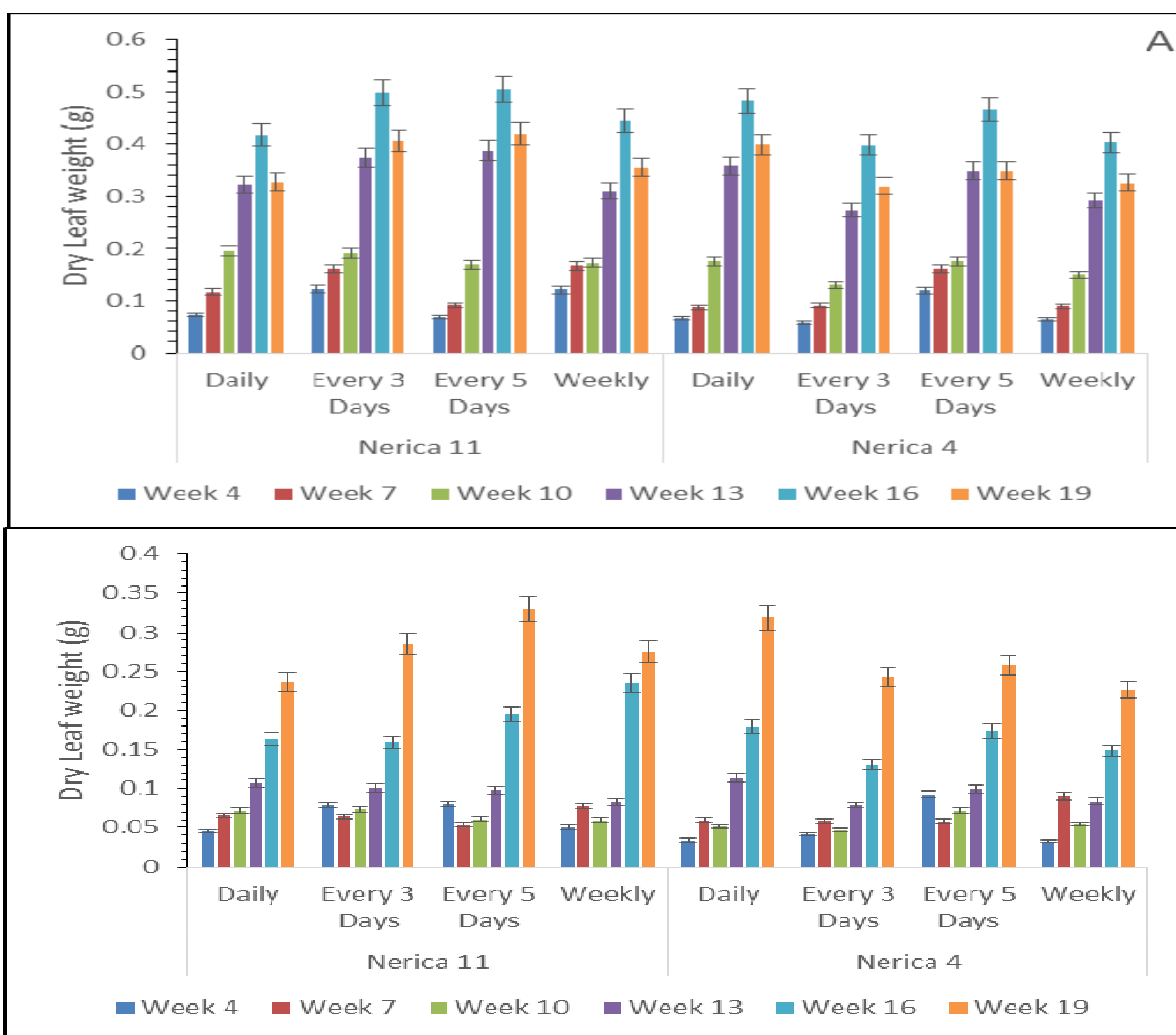


Figure 4: Effect of phosphorus levels on leaf dry weight of Nerica varieties in season 1 (A) and season 2 (B) why these figures as long as you showed data as tables Replaced with table.

3.5: Effect of phosphorus levels on number of tillers

Results revealed that there was no significant difference ($P>0.05$) exhibited in tiller number of the two Nerica varieties' plants due to phosphorus level applications in both seasons after planting; the period within which tillering proves important in rice growth and development. However, the minor difference in mean of tiller number was demonstrated throughout the life of the plants in the field. Therefore

Put data in Table 1 and delete below Replaced with table.

in week 4, highest tiller number of 6.41 per hill in Nerica 4 plants on 50kg P/ha level in season 1, while the least tiller number of 2.0 per hill in Nerica 11 on control in season 2 was recorded.

In week 7, highest tiller number of 8.325 per hill in Nerica 4 on 50kg P/ha in season 1 was recorded, while least tiller number of 3.325 per hill in Nerica 11 on control in season 1 was recorded.

In week 10, highest tiller number of 10.55 per hill in Nerica 11 on 50kg P/ha in season 1 was recorded, while least tiller number of 5.67 per hill in Nerica 11 on control in season 2 was recorded. In week 13, highest tiller number of 14.14 per hill in Nerica 11 on 50kg P/ha in season 1 was recorded, while least tiller number of 9.62 per hill in Nerica 11 on control in season 1 was recorded. In week 16,???????????? (Replaced with stages of growth)highest tiller number of 20.78 per hill in Nerica 11 on 50kg P/ha in season 1 was recorded, while least tiller number of 10.67 per hill in Nerica 11 on control in season 2 was recorded. There was an observed trend in which the 50kg P/ha level happened to have influenced production of highest number of tillers in season 1 particularly throughout the phenological development of the crop on test regardless of the genotypic dissimilitude of the varieties planted. Also, notable across the seasons was the trend in which on control treatment, lower number of tillers specifically in Nerica 11 plants was realized from week 4 until week 16. Such trend manifested throughout the experiment indicated that phosphorus was limiting in the soil since none was applied and on the other hand the extant in the soils prior to sowing was fixed and unavailable to plants. Perhaps, maximum number of tillers was produced in week 16 on 50kg P/ha level of application in Nerica 11 in season 1, yet leasttiller number was realized on control treatment in Nerica 11 in season 2. The treatments of 25kg P/ha and 75 kg P/ha influenced moderately on tiller production, although tillers produced as a result of 75kg P/ha were higher than produced on the 25kg P/ha treatment, thus affirming the statement of Alam *et al.*[18] that, phosphorus application on rice plants increased production of tillers (Table 1& 2).

Table 1: Number of tillers for phosphorus levels in season 1

Variety	Phosphorus Level					
		Week 4	Week 7	Week 10	Week 13	Week 16? Modified Weeks After Sowing
Nerica 11	0kg P/ha	2a	3a	6a	10a	16a
	25kg P/ha	3a	5a	8a	11a	16a
	50kg P/ha	6a	8a	11a	14a	21a
	75 kg P/ha	6a	7a	9a	12a	17a
Nerica 4	0kg P/ha	3a	4a	6a	10a	16a
	25kg P/ha	4a	5a	8a	11a	17a
	50kg P/ha	6a	8a	10a	14a	20a
	75 kg P/ha	6a	8a	8a	11a	17a
LSD		NS	NS	NS	NS	NS

Means followed by the same letter in a column are not significantly different at 95% confidence level

Table 2: Number of tillers for phosphorus levels in season 2

Variety	Phosphorus Level	Week 4	Week 7	Week 10	Week 13	Week 16?
Nerica 11	0kg P/ha	2a	4a	6a	11a	11a
	25kg P/ha	3a	5a	7a	12a	15a
	50kg P/ha	3a	5a	7a	10a	15a
	75 kg P/ha	3a	5a	7a	12a	12a
Nerica 4	0kg P/ha	3a	5a	6a	13a	14a
	25kg P/ha	2a	5a	7a	11a	12a
	50kg P/ha	3a	5a	7a	12a	14a
	75 kg P/ha	4a	7a	9a	13a	13a
LSD		NS	NS	NS	NS	NS

Means followed by the same letter in a column are not significantly different at 95% confidence level

3.6: Effect of phosphorus levels on chlorophyll content of Nerica varieties

Results indicated that there was significant effect ($P \leq 0.05$) on chlorophyll content in the leaves of the two Nerica rice plants tested by effect of phosphorus levels applied on soil at planting in both seasons. The significant influence was as follows:

in week 4, highest chlorophyll content of 22.07 SPADs per hill was elicited in Nerica 11 plants on 25kg P/ha in season 1, whereas least chlorophyll content of 10.63 SPADs per hill in Nerica 11 on control treatment in season 2 was produced;

in week 7, highest chlorophyll content of 32.35 SPADs per hill was elicited in Nerica 11 on 50kg P/ha in season 1, whereas least chlorophyll content of 18.97 SPADs per hill in Nerica 4 on control treatment in season 2 was produced;

in week 10, highest chlorophyll content of 41.07 SPADs per hill was elicited in Nerica 11 on 50kg P/ha in season 1, while least chlorophyll content of 28.38 SPADs per hill in Nerica 11 on control treatment in season 2 was produced;

in week 13, highest chlorophyll content of 41.99 SPADs per hill was elicited in Nerica 4 on 75kg P/ha in season 2, whereas least chlorophyll content of 36.51 SPADs per hill in Nerica 4 on control in season 2 was produced

and in week 16, highest chlorophyll content of 37.43 SPADs per hill was elicited in Nerica on 75kg P/ha in season 1, whereas least chlorophyll content of 15.77 SPADs per hill in Nerica 11 on 25kg P/ha in season 2 was produced.

The effect of 75kg P/ha on Nerica 4 proved most important for it contributed towards the synthesis of chlorophyll on chloroplasts of the referred plants particularly in week 13 of season 2, yet the least effect on chlorophyll was observed in week 16 of season 2 in Nerica 11 plants on 25kg P/ha (Figure 5).

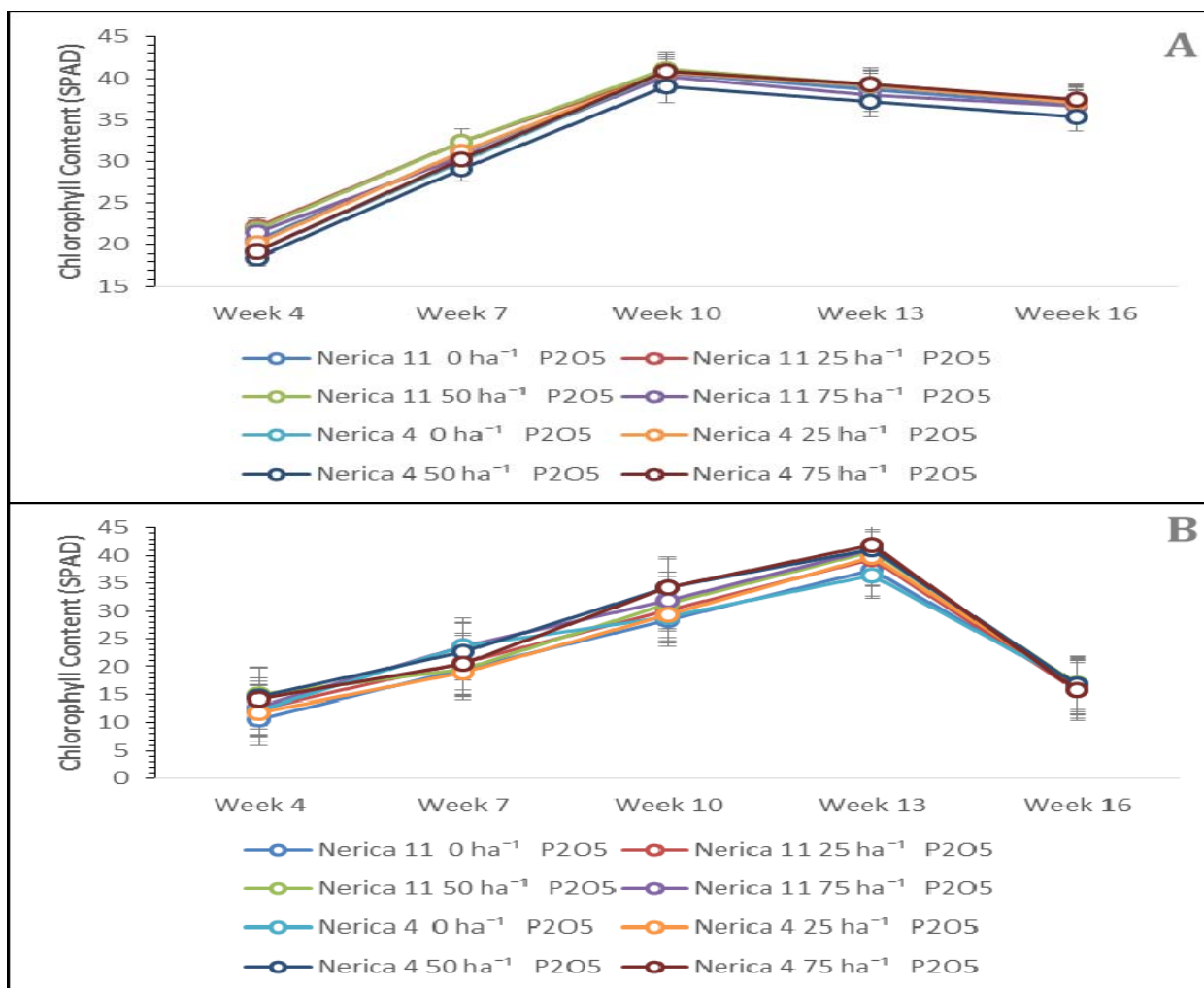


Figure 5: Effect of phosphorus levels on chlorophyll content of Nerica varieties in season 1 (A) and season 2 (B) why these figures as long as you showed data as tables
Replaced with table

3.7: Effect of Phosphorus levels on panicle length

Panicle length was significantly affected ($P \leq 0.05$) by different levels of phosphorus treatments applied at planting in both seasons. The differential response on panicle length of Nerica 4 and 11 plants due to phosphorus levels was manifested throughout weeks 10, 13, 16 and 19 in both seasons as follows: in week 10, highest panicle length of 6.41 cm per hill in Nerica 4 on 50kg P/ha level in season 1 was elicited, while the least panicle length of 2.0cm per hill in Nerica 11 on control in season 2 was recorded; in week 13, highest panicle length of 10.55 per hill in Nerica 11 on 50kg P/ha in season 1 was recorded, while least panicle length of 5.67 per hill in Nerica 11 on control in season 2 was recorded; in week 16, highest panicle length of 14.14 per hill in Nerica 11 on 50kg P/ha in season 1 was recorded, while least panicle length of 9.62 per hill in Nerica 11 on control in season 1 was recorded; and lastly in week 19, highest panicle length of 20.78 per hill in Nerica 11 on 50kg P/ha in season 1 was recorded, while least panicle length of 10.67 per hill in Nerica 11 on control in season 2 was recorded. There was an observed trend in which the 50kg P/ha level happened to have influenced production of highest

panicle length in season 1 particularly throughout the phenological development of the crop under test regardless of the genotypic dissimilitude of the varieties planted. Also, notable across the seasons was the trend in which, on control treatment, least panicle length specifically in Nerica 11 plants was realized from week 4 until week 16. Such trend manifested in the experiment consistently indicated that phosphorus was limiting in the soil since none was applied and on the other hand the extant phosphorus in the soils prior to sowing was fixed and unavailable to plants. Perhaps, maximum panicle length was produced in week 16 on 50kg P/ha level of application in Nerica 11 in season 1, yet least panicle length was realized on control in Nerica 11 in season 2 (Figure 5).

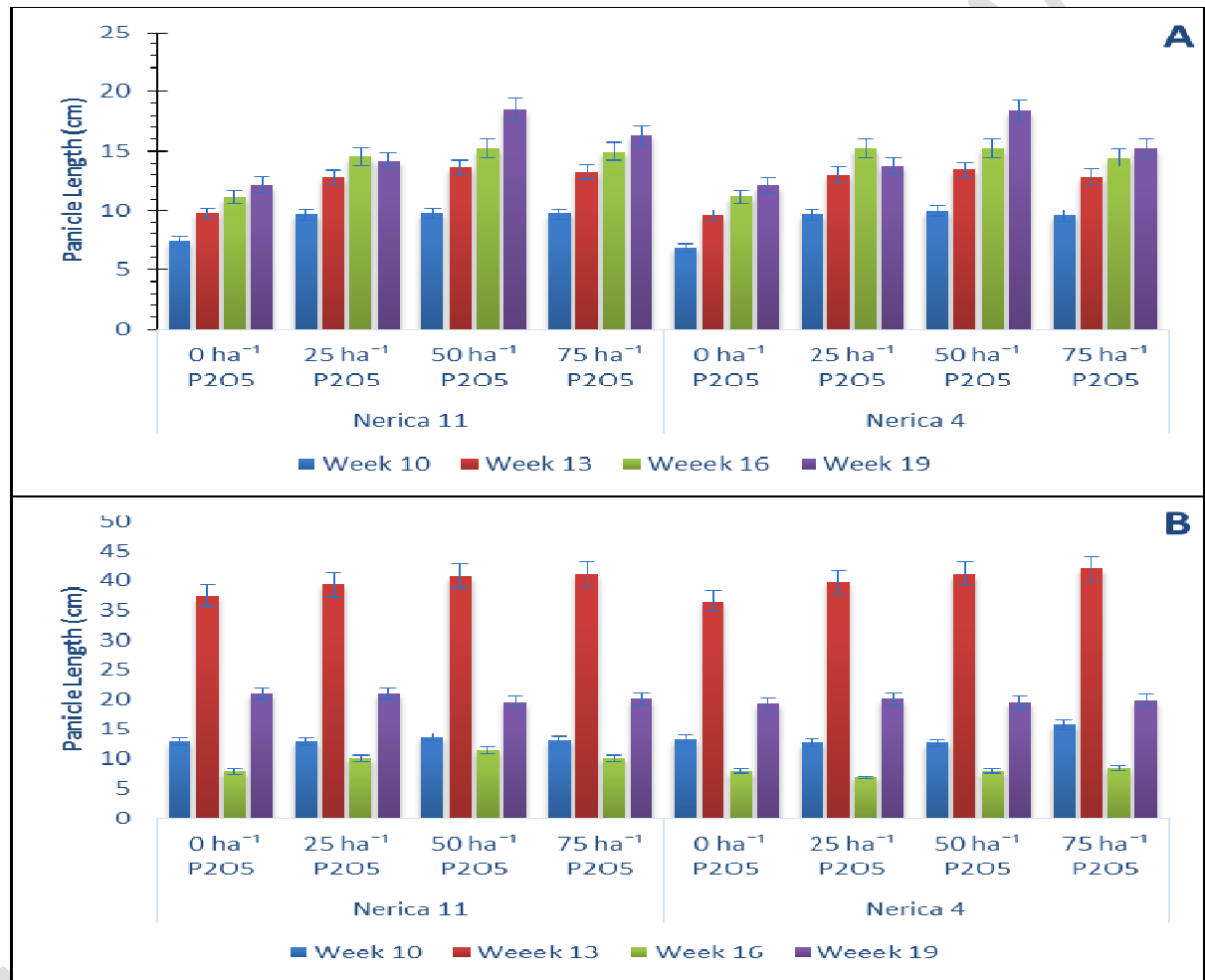


Figure 6: Effect of phosphorus levels on panicle length of two Nerica varieties in season 1 (A) and season 2 (B) why these figures as long as you showed data as tables
Replaced with table

3.8: Effect of phosphorus levels on panicle number

Results in season 1 revealed significant effect ($P \leq 0.05$) on panicle number of plants for Nerica varieties tested due to phosphorus level applications in week 19, while none ($P > 0.05$) was manifested in weeks 10, 13 and 16. In season 2, there was significant influence ($P \leq 0.05$) of phosphorus level treatments on panicle number of plants for the two Nerica varieties throughout the crop's life. In as much as insignificance of

phosphorus level treatments on panicle number of the given plants for the two varieties was dominant in deed, variation in means of panicle number was notable across the two seasons. Therefore in week 10, highest mean of 4.41 panicles per hill in Nerica 11 plants on 25kg P/ha in season 2 was recorded, while least mean of 2.89 panicles per hill in Nerica 4 plants on 25kg P/ha in season 1 was recorded. In week 13, highest mean of 7.42 panicles per hill in Nerica 11 plants on 50kg P/ha in season 2 was recorded, while least mean of 4.82 panicles per hill in Nerica 4 plants on control in season 1 was recorded. In week 16, a mean of 15.58 panicles per hill in Nerica 11 plants on 50kg P/ha in season 1 was recorded, while least mean of 7.35 panicles per hill in Nerica 11 plants on control in season 2 was recorded. Finally, in week 19, highest mean of 17.28 panicles per hill by Nerica 11 plants on 50kg P/ha in season 1 was recorded, while least mean of 8.65 panicles per hill in Nerica 11 plants on control in season 2 was also recorded. Maximum panicle number was realized on 50kg P/ha in Nerica 11 plants in season 1, and least panicle number was realized on 25kg P/ha in Nerica 11 plants in season 1 (Figure 7).

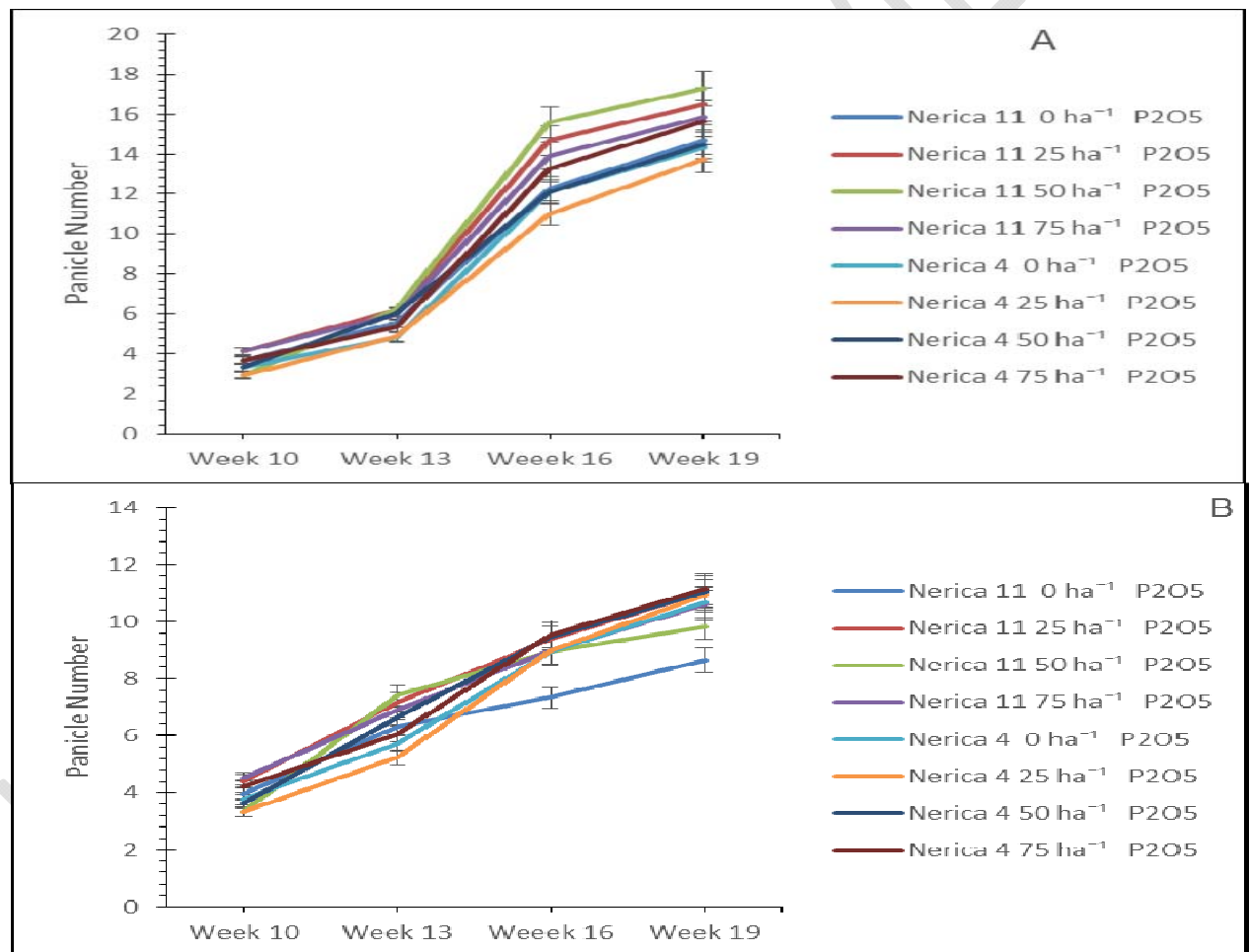


Figure 7: Effect of phosphorus levels on panicle number of two Nerica varieties in season 1 (A) and season 2 (B) why these figures as long as you showed data as tables
Replaced with table.

3.9: Effect of phosphorus levels on yield components and grain yield

Results indicated that there was significant effect ($P \leq 0.05$) on 1000-grain weight and in panicle number due to phosphorus levels, but there was no significant effect ($P > 0.05$) on filled grain lot per hill, shoot biomass (gram/hill), root biomass (gram/hill), unfilled grain per hill, productive tillers per hill, unproductive tillers per hill, 1.5 m² plot grain weight (gram), moisture content (%) and grain yield (ton/hectare) in season 1, while there was no significant influence ($P > 0.05$) of phosphorus level applications on any of the yield components and grain yield of the Nerica varieties tested in season 2. In such case, mean variation of the variables indicated performance of the experimented plants. The significant influence of phosphorus level treatments on 1000-grain weight in season 1 was evident in table 1 in which on 50kg P/ha treatment, in Nerica 4 plants, highest 1000-grain weight of 76.25 grams was recorded, while the least weight of 22.97 grams on control treatment in Nerica 11 plants was recorded. The significant influence of phosphorus level applications on panicle number of Nerica plants was such that on 50kg P/ha in season 1, highest number of 17.28 panicles per hill in Nerica 11 plants were produced, whereas least panicle number of 13.76 per hill was produced on 25kg P/ha in Nerica 4 plants in season 1. At post-harvest, where the following variables were determined though non-significant in both seasons, highest mean of 191.4 grams of filled grain lot per hill on control treatment in season 1 was recorded, while least filled grain lot of 85.8 grams per hill in Nerica 11 plants on 25 kg P/ha in season 2 was recorded. Shoot biomass' highest mean of 26.1 grams per hill on 25kg P/ha in Nerica 11 plants in season 1 was recorded, while least shoot biomass of 0.1587 on 25 kg P/ha in Nerica 4 plants in season 2 was recorded. Then, highest root biomass of 18.46 grams per hill in Nerica 4 plants on 75 kg P/ha in season 1 was recorded, while least root biomass of 0.1555 grams per hill in Nerica 4 plants on 25kg P/ha in season 2 was recorded. In addition, highest number of 261 unfilled grain lot per hill on 50kg P/ha in Nerica 4 plants in season 1 was recorded, while least number of 8.43 unfilled grain lot on 75 kg P/ha in Nerica 4 plants in season 2 was recorded. Further, highest mean of 15.36 productive tillers on 50 kg P/ha in Nerica 11 plants in season 1 was recorded, while least mean of 9.82 productive tillers on 25 kg P/ha in Nerica 4 plants in season 2 was recorded. A little further, highest mean of 1.717 unproductive tillers on 75 kg P/ha in Nerica 11 plants in season 2 was recorded, while least mean of 0.8 unproductive tillers on control treatment in Nerica 4 plants in season 1 was recorded. Moreover, highest number of 11.15 panicles per hill on 75 kg P/ha in Nerica 4 plants was recorded, while least number of 8.65 panicles per hill on control treatment in Nerica 11 plants was recorded. As far as the 1.5 m² plot grain weight (gram) was concern, highest mean of 148.2 grams on 50kg P/ha in Nerica 4 plants in season 2 was recorded, while least mean of 124.6 on control treatment in Nerica 4 plants in season 1 was recorded. Moreover, the highest mean of 13.06 % moisture content per split plot on control treatment in Nerica plants in season 2 was recorded, while least of 11.26 % on 25 kg P/ha in season 1 was recorded. Finally, highest mean of 20.27 grams of 1000-grain weight on 75kg P/ha in Nerica 4 plants in season 2 was recorded, while least mean of 19.63 grams on 75kg P/ha in Nerica 11 plants was recorded in season 2. Grain yield (tons per hectare) did not present any significant effect as a result of phosphorus level treatments in the two seasons. Nonetheless, variation in means of grain yield could be observed, where highest grain yield of 0.988 tons per hectare was produced in Nerica

4 on 50kg P/ha in season 2, while **least** grain yield of 0.831 tons per hectare was produced in Nerica 4 **on** control in season 1.

These tables below are not clear and so confused [so big and]: Honestly how else could I Present these numerous yield components whose data I collected, and which were answering the objective of this study in Mwea? Having no option, I decided to maintain these tables and give brief explanations believing that we scientists we get the meaning at a glance since tables are not so complex such that a scientist may not extract information needed Mr./Mrs.Editor.

Table 3: Effect of phosphorus levels on yield components and grain yield of Nerica varieties in season 1

Variety	P-levels	Filled grain	Shoot biomass	Root biomass	Unfilled grain	Productive tillers	Unproductive tillers	Panicles number	1.5 m ² plot grain wt(g)	Moisture Content(%)	1000 - grain wt(g)	Grain yield (t/ha)
Nerica 11	0 kg ha ⁻¹	191.	22.	17.5	213	11.2		14.7			22.9	0.973
	P2O5 4a	4a	8a	a	a	4a	0.8a	b	145.9a	12.3a	g	a
	25 kg ha ⁻¹	147.	26.	17.9	248	12.1		16.5				0.871
	P2O5 4a	4a	1a	a	a	8a	1.1a	a	130.6a	11.3a	34.5f	a
	50 kg ha ⁻¹	182.	21.	17.0	217	15.3		17.3			70.3	0.946
	P2O5 4a	4a	2a	a	a	6a	1.3a	a	141.9a	11.8a	b	a
	75 kg ha ⁻¹	162.	22.	17.4	222	12.9		15.8			60.6	0.910
	P2O5 5a	5a	2a	a	a	7a	1.3a	ab	136.5a	11.9a	c	a
Nerica 4	0 kg ha ⁻¹	167.	21.	16.8	170	11.3		14.3			23.2	0.831
	P2O5 9a	9a	7a	a	a	8a	0.8a	b	124.6a	12.3a	g	a
	25 kg ha ⁻¹	152.	21.	17.5	177	12.1		13.8			39.7	0.881
	P2O5 2a	2a	5a	a	a	4a	0.9a	b	132.1a	12.2a	e	a
	50 kg ha ⁻¹	170.	22.	17.6	261	14.5		14.5			76.3	0.962
	P2O5 5a	5a	5a	a	a	5a	1.0a	b	144.3a	11.7a	a	a
	75 kg ha ⁻¹	154.	22.	18.5	210	13.4		15.6			54.9	0.901
	P2O5 5a	5a	5a	a	a	3a	1.2a	ab	135.1a	12.1a	d	a
P value		0.961	0.153	0.32	0.292	0.651	0.886	0.041	0.45	0.488	0.004	0.45

	78.9	6.2	1.53	97.	1.46	0.53	2.35				0.158
LSD	9	62	2	2	1	17	4	23.71	1	4.83	1

Numbers with same letter in the same column are not significantly different using LSD at $\alpha=0.05$.

Table 4:Effect of phosphorus levels on yield components and yield of Nerica varieties in season 2

Variety	P- levels	Fill ed gra in	Sho ot bio mas s	Root bio mas s	Un fill ed gra in	Prod uctiv e tiller s	Unpr oduct ive tillers	Pani cle num ber	1.5 m ² plot grain wt(g)	Moist ure Conte nt (%)	1000 - grai n wt(g)	Grai n yield (t/ha)
Nerica 11	0 kg ha ⁻¹	90.	0.18	0.17							20.2	0.977
	P2O5	6a	5a	8a	17a	11a	1a	8.7a	146.6a	13.4a	a	a
	25 kg ha ⁻¹	85.	0.17	0.18				11.1			19.6	0.875
	P2O5	8a	0a	7a	14a	11a	2a	a	131.3a	12.0a	a	a
	50 kg ha ⁻¹	88.	0.18	0.26							19.8	0.953
	P2O5	8a	8a	5a	13a	13a	1a	9.9a	142.9a	12.5a	a	a
Nerica 4	75 kg ha ⁻¹	90.	0.18	0.17							19.6	0.894
	P2O5	5a	0a	6a	15a	12a	2a	10.6	134.1a	12.4a	a	a
	0 kg ha ⁻¹	99.	0.18	0.17				10.7			19.9	0.832
	P2O5	2a	0a	4a	12a	10a	1a	a	124.8a	13.1a	a	a
	25 kg ha ⁻¹	97.	0.15	0.15				10.9			20.2	0.921
	P2O5	2a	9a	6a	11a	10a	1a	a	138.1a	13.0a	a	a
	50 kg ha ⁻¹	90.	0.17	0.17				11.1			20.1	0.988
	P2O5	3a	9a	8a	10a	11a	1a	a	148.2a	12.2a	a	a
	75 kg ha ⁻¹	90.	0.17	0.19				11.2			20.3	0.916
	P2O5	2a	5a	5a	8a	11a	1a	a	137.3a	12.7a	a	a
P		0.8	0.96		0.6	0.83		0.49			0.43	
value		14	3	0.19	64	7	0.44	4	0.352	0.366	8	0.352
		19.	0.03	0.07	5.9	2.75	0.582	2.03			0.86	0.171
LSD		78	79	109	75	5	8	4	25.7	1.192	5	3

Numbers with same letter in the same column are not significantly different using LSD at $\alpha=0.05$.

4.0 CONCLUSION **this not conclusion of paper. It just re-put of results** : This I have considered in version two.

The conclusion for the reader is : summarize your main points of evidence as one paragraph or as points

1-

2-

This point is good and I have considered it in the conclusion in version two.

Phosphorus level treatments on Nerica varieties tested, significantly influenced plant height, leaf number, leaf fresh weight, chlorophyll content, and panicle length. Highest (72.7cm) plant height in Nerica 4 on 75kg P/ha was recorded in week 19 of season 2, while least (10.09cm) in Nerica 11 on control was recorded in week 4 of season 1. Highest (40.78 per hill) leaf number in Nerica 4 on 50kg P/ha was recorded in week 19 of season 2, while least (2.475 per hill) in Nerica 11 on control was recorded in week 4 of season 1. Highest (10.33 g/hill) leaf fresh weight in Nerica 11 on 75kg P/ha was recorded in week 13 of season 1, while least (0.0575g/hill) in Nerica 4 on 25kg P/ha in week 4 of season 2 was recorded. Highest (41.99 SPADs/hill) chlorophyll content in Nerica 4 on 75kg P/ha in week 13 of season 2 was recorded, while least (10.63 SPADs/hill) in Nerica 11 on control was recorded in week 4 of season 2. Panicle's highest (20.78 cm/hill) length in Nerica 11 on 50kg P/ha was recorded in week 16 of season 1, while least (2.0 cm/hill) in Nerica 11 also on control was recorded in week 10 of season 2. Positive influence albeit insignificant on leaf dry weight and number of tillers was realized where highest (7.19g/hill) leaf dry weight in Nerica 11 on 75kg P/ha was recorded in week 13 of season 1, while least (0.0298g/hill) in Nerica 4 on 25kg P/ha was recorded in week 4 of season 2; and highest (20.78 per hill) number of tillers in Nerica 11 on 50kg P/ha was recorded in week 16 of season 1, while least (2.0 per hill) in Nerica 11 as well on control was recorded in week 4 of season 2. The influence on panicle number was positive and insignificant through weeks 10,13 and 16, but only significant in week 19 of season 1 where highest (17.28 panicles/hill) in Nerica 11 on 25kg P/ha was recorded, while least (2.89 panicles/hill) in Nerica 4 on 25kg P/ha as well was recorded in week 10. There was

significant influence on 1000-grain weight and panicle number, and insignificant influence on the other yield components and grain yield in season 1, as well in all the yield components and grain yield in season 2. Grain yield (ton per hectare) did not present any significant effect as a result of phosphorus level treatments in both seasons. Nonetheless, variation in means of grain yield was observed, where highest grain yield of 0.988 tons per hectare was produced in Nerica 4 on 50kg P/ha in season 2, while least grain yield of 0.831 tons per hectare was still produced in the same variety on control in season 1. The phosphorus levels applied at the study site in two seasons demonstrated positive influence on yield components and on grain-yield in Nerica 4 on 50kgP/ha, hence recommended for adoption by farmers in Mwea irrigation scheme for better yields.

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