Point by point Report
Reviewer 1

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- Title: Abiotic and Biotic Factors Affecting Crop Growth and Productivity: A Unique Buckwheat Production in Egypt

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- Section: Crop Production
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Point #1:

Before:

- **Abstract:** The present study addresses the impact of specific cultivation factors on buckwheat growth and productivity, as unknown and first time to attemp to grow it as crucial crop for sustainable agriculture in Egypt. It focuses on the interactions between location, cultivar, and sowing time in Egypt's distinct environmental conditions. The study spanned two seasons (2018/2019, 2019/2020) and evaluated two cultivars for the main species (Fagopyrum tataricum, Fagopyrum esculentum) across two locations (Bilbeis City, Sadat City) and three sowing times (mid-January, mid-November, mid-March). The measured parameters included plant height, branch count, internode number, leaf count, fresh weight, and productivity. Results indicated that *Fagopyrum tataricum*at Bilbeis City with mid-March sowing achieved the highest plant height (95.778 cm, 89.389 cm), branch count (11.722, 10.500), internode number (13.334, 11.944), leaf count (44.833, 30.444), and productivity (837.55 kg/hectare, 818.36 kg/hectare) in both seasons. In contrast, *Fagopyrum esculentum* at Sadat City with mid-March sowing showed the lowest plant height (46.611 cm, 43.722 cm), branch count (6.389, 6.945), internode number (7.389, 7.278), leaf count (12.166, 8.944), and productivity (356.00 kg/hectare, 334.39 kg/hectare). The study highlights the profound influence of cultivar-location-sowing time interactions on buckwheat growth and productivity. The findings indicate that selecting the right cultivar and optimal sowing time for a specific location can significantly enhance buckwheat yield, offering valuable insights for agricultural practices in Egypt and similar regions.

Response: Thank you for your valuable feedback. We have addressed the points raised as follows:

1. We have revised the first sentence for clarity and improved English composition.
2. In accordance with your suggestion, the names *Fagopyrum tataricum* and *Fagopyrum esculentum* have been italicized throughout the text to adhere to scientific naming conventions.
3. We have also adjusted the presentation of numerical data by reducing the number of decimal places to enhance readability and maintain scientific precision.

We appreciate your guidance in improving the quality of our manuscript.

After:

Egypt had never grown buckwheat before, due to the belief that the required temperatures did not fit in the Egyptian environment. This study evaluated the effect of the 2-way interaction of location, cultivar, and planting dates on the growth and productivity of two buckwheat species (Fagopyrum tataricum, Fagopyrum esculentum) planted in Bilbeis City and Sadat City during mid-January, November, and March for two successive seasons (2018/2019, 2019/2020). Parameters measured included plant height, number of branches, internodes, leaves per plant, fresh weight, number of seeds per plant, weight of seeds in 1 square meter, and yield rate per hectare in three interactions: location × cultivar, location × sowing date, and cultivar × sowing date. Significant differences were observed in all measured interactions. In the location × cultivar interaction, *Fagopyrum tataricum*in Bilbeis showed the highest growth (98cm plant height) and productivity (859 Kg/Ha), while the lowest were seen with *Fagopyrum esculentum* in Sadat City (plant height at 35.463 cm and productivity at 316Kg/Ha). The location × sowing date interaction revealed significant growth differences, with the highest in Bilbeis (88cm) and the lowest in Sadat City with mid-March sowing (58 cm plant height), where the lowest productivity

(445 Kg/Ha) was also recorded. The cultivar × sowing date interaction indicated that *Fagopyrum tataricum*sown in mid-March achieved the best growth (96cm) and highest yield (838 Kg/Ha), whereas *Fagopyrum esculentum* in mid-March showed the least growth (44cm) and productivity (334 Kg/Ha). This study provides insights into buckwheat cultivation in Egypt, suggesting its viability with appropriate cultivar selection and sowing timing, contributing to agricultural diversity and sustainability.

Point #2:

Introduction

References are missing in the first two paragraphs of the Introduction section.
In the introduction chapter, there is too much mention of who did the research and not what the results of the research were. This is missing.

- **Answer:**

Thanks so much for pointing this, we will refocus the introduction on the results and implications of previous research rather than the researchers themselves.
References will be added to the initial paragraphs to substantiate the introductory statements.

Revised text:

The interaction of genetic, environmental, and management factors is crucial in understanding crop growth and productivity, an area of agricultural science that becomes increasingly relevant with the advent of climate change and the push for sustainable practices. Buckwheat emerges as a crop of interest due to its adaptability to diverse climatic and soil conditions (Wen, 2021), offering a unique case study for examining these interactions. This research delves into the multifaceted influences on buckwheat's growth and productivity within Egypt's distinctive agricultural pattern. However, The variability in growth responses among buckwheat cultivars to different environmental conditions underscores the importance of cultivar selection (Brunori et al., 2007; Oomah et al., 1996). Genotype-environment interactions further complicate this dynamic, affecting crop performance across various settings (Facho et al., 2016; Sowmya et al., 2021). The impact of soil conditions and external treatments on buckwheat highlights the role of abiotic factors in crop adaptability (Calegari et al., 2020; Song et al., 2021). Furthermore, Environmental factors such as altitude and UV radiation also contribute to the complexity of buckwheat cultivation, with notable effects on growth and productivity (Guo et al., 2011; Larney et al., 2003). The influence of sowing times on buckwheat yields further illustrates the significance of temporal factors in agricultural outcomes (Siracusa et al., 2017; Jung GH et al., 2015; Omidbaigi R & Mastro GD, 2004). Challenges posed by seasonal transitions and specific soil conditions, such as salinity, necessitate a deeper understanding of optimal cultivation practices (Mariotti et al., 2016; Salehi et al., 2018). Moreover, Soil health and management practices also play a critical role in determining crop productivity, with research indicating the importance of soil conditions and agronomic practices in achieving sustainable yields (Jiang et al., 2015; Zhang et al., 2021; Bulan et al., 2015). The history of land use and previous cropping systems further influences the success of current crops, pointing to the intricate relationship between past and present agricultural practices (Björkman & Shail, 2013; Keler et al., 2021). This study aims to provide a deep understanding of the 2-way interaction of these diverse factors, providing a comprehensive overview of the conditions conducive to optimizing buckwheat cultivation in Egypt to enhance the understanding of buckwheat's potential as a resilient and nutritious crop within sustainable agricultural systems.

References added:

Wen, W., Li, Z., Shao, J., Tang, Y., Zhao, Z., Yang, J., ... & Zhou, M. (2021). The Distribution and Sustainable Utilization of Buckwheat Resources under Climate Change in China. *Plants*, *10*(10), 2081.

Point #3:

Materials and methods

The characteristics of the soil are missing. This is very important data, considering the title and purpose of the article!

Answer:
Thank you for highlighting the importance of soil characteristics in relation to our study's focus. We acknowledge this crucial aspect and have indeed incorporated a detailed table of soil and water chemical analysis within the manuscript. This inclusion ensures a comprehensive understanding of the soil environment in which the buckwheat cultivars were evaluated, directly addressing the title and purpose of the article.

Before:

> Experiment Sites Description: Soil samples were collected from each site following the national institute of Soil and Water quality, Agricultural Research Center (ARC), Egypt's protocols. Land preparation involved plowing twice, one week apart, using a medium-sized tractor. Compost was applied manually at a rate of 75M3 per hectare, followed by the manual addition of P2O5 at 750 kg per hectare. The land was then leveled, and irrigation canals were established. Plots measuring 6 meters by 60 cm each were set up and labeled.

After:

Table (1): Physical and Chemical Properties of the Experimental Soil Samples

Parameter	Belbies City Site	Sadat City Site
pH	7.83	8.57
EC (dS/m)	1.48	1.11
SP %	25	-
Soluble anions (meq/L) CO3	-	-
HCO3	0.25	1.9
Cl	12.1	7.4
SO4	1.56	3.4
Soluble cations (meq/L) Ca++	3.7	1.2
Mg++	1.8	1.2
Na+	8	3.3
K+	0.5	0.18
CaCO3%	3.9	1.7
OM %	1.2	0.35

Available levels of nutrients ml/kg N	175	-
P	183.6	5.3
K	7.96	508
Cu	0.75	1.43
Fe	5.25	1.11
Mg	2.43	20
Zn	2	2.75
Mechanical analysis % Sand	83	83
Silt	15.5	10
Clay	1.2	7
Texture Grade	Clay sandy	Sandy loamy

Table (2): Irrigation Water Properties of the Experimental Soil Samples

Parameter	Belbies City Site	Sadat City Site
pH	7.41	7.98
EC dS/m	0.64	1.26
Chemical parameter Ca++	1.70	4.20
Mg++	1.00	2.60
Na+	3.20	6.50
K+	0.01	0.20
Co3	0.00	0.00
HCO3	0.21	4.00
Cl	4.70	7.00
SO4	10.9	2.50
SAR	2.76	3.50
TDS	410.00	896.00
Fe ppm	0.27	0.11
Zn	0.01	0.18
Mn	0.20	<0.01
Cu	0.02	<0.01

Point #4:

Results and Discussion

L 144-145 Rewrite the first sentence in the Results and Discussion section.

Before:

> In the obtained data Table No. (1) and Figure (A), the combination of Belbies City Site (BCS) location and *Fagopyrum tataricum* (FT) cultivar shows the highest values in all measured parameters in both seasons. Specifically, plant height was 97.704 cm and 90.741 cm in the 1st and 2nd seasons respectively, number of branches per plant was 12.000 and 10.704, number of internodes per plant was 14.111 and 12.259, number of leaves per plant was 46.852 and 31.778, and fresh weight per plant was 36.188 gm and 39.356 gm. In contrast, the combination of Sadat City Site (SCS) location and *Fagopyrum esculentum* (FE) cultivar shows the lowest values in all measured parameters.

After:

The data in Table (1) examines the interaction between location (Bilbeis and Sadat City) and cultivar (Fagopyrum tataricum and esculentum). In both seasons, Fagopyrum tataricum in Bilbeis City had the highest plant height, significantly exceeding other groups, with heights of 97.7 cm and 90.7 cm (LSD at 0.05 = 6.6183, 3.6779). Fagopyrum esculentum in Sadat City recorded the lowest heights (35.5 cm, 41.7 cm). Branch numbers showed a similar pattern; Fagopyrum tataricum in Bilbeis City had the most (12.0, 10.7; LSD at 0.05 = 0.476, 0.334). Internode numbers were highest for Fagopyrum tataricum in Bilbeis (14.1, 12.3) and lowest for Fagopyrum esculentum in Sadat City (LSD at 0.05= 0.597, 0.3517). Leaf numbers were also highest in Fagopyrum tataricum at Bilbeis City (46.9, 31.8; LSD at 0.05 = 2.6427, 2.872). The fresh weight per plant was significantly higher for Fagopyrum tataricum in Bilbeis City (36.188 gm, 39.356 gm) compared to others, with Fagopyrum esculentum in Sadat City having the lowest weights (LSD at 0.05 = 1.6143, 1.881). These results show that location and cultivar significantly affect buckwheat growth, with Fagopyrum tataricum generally performing better in Bilbeis City across all measured parameters.

Point #5:

L 155-163 This paragraph talks about things other than those in Table 1 and does not fit into the discussion.

Answer:

Thank you for your insightful feedback. Upon re-evaluation, I understand your concern about the connection between the discussed literature and the specific results in Table 1. The intention was to contextualize our findings within the broader scope of existing research on buckwheat cultivar performance under varying environmental conditions.

However, I acknowledge that the references to studies by Brunori et al. (2007), Oomah et al. (1996), Facho et al. (2016), and Sowmya et al. (2021) may not directly align with the specific data presented in Table 1, which focuses on the growth parameters of Fagopyrum tataricum and Fagopyrum esculentum in two different locations over two seasons. While these studies provide valuable insights into the influence of genetic and environmental factors on buckwheat traits, they may not be directly applicable to the growth parameters (plant height, number of branches, internodes, leaves, and fresh weight) outlined in Table 1. To address this, we propose to revise the paragraph to more directly relate to the data in Table 1. This revision will focus on discussing how the differences in growth parameters observed between the two cultivars in different locations reflect the potential genotype by environment interactions and the inherent adaptability of these cultivars to specific pedoclimatic conditions, as evidenced by their varied performances in Bilbeis City and Sadat City. Additionally, the revised discussion will aim to more closely correlate the findings in Table 1 with relevant literature that specifically addresses similar growth parameters under different environmental conditions.

Suggest change to the discussion:

Before:

> In reference to the above results, **Brunori et al. (2007)** highlighted that while *F. esculentum* exhibited substantial variations in rutin content between different locations, *F. tataricum* managed to maintain its high rutin content relatively stable irrespective of environmental conditions. This reinforces the data from Table (1), which showcases

the consistent performance of FT across two different locations. It further suggests that pedoclimatic variations can evoke differential responses, particularly among *F. esculentum* cultivars. However, **Oomah et al. (1996)** emphasized that phenolic acid contents in buckwheat seeds were mainly affected by cultivar and seasonal effects, with growing location having an insignificant influence. This indicates that the inherent genetic traits of buckwheat cultivars may be more influential in determining growth outcomes than location. Moreover, **Facho et al. (2016)** showcased significant genotype by environment interactions for various buckwheat traits. Their study, however, reported no significant interaction for plant height, grains per plant, and grain yield per hectare, suggesting that these growth parameters could be less influenced by location-cultivar interactions and possibly more by the inherent genetic makeup of the genotype. In line with the literature, **Sowmya et al. (2021)** observed significant variations among buckwheat genotypes for morphological and yield traits, indicating that specific genotypes, like IC-313136 and IC-79147, can exhibit superior growth attributes under specific environmental conditions.

After:

"In the context of our findings presented in Table 1, it is evident that the growth performance of Fagopyrum tataricum and Fagopyrum esculentum is notably influenced by the location, as indicated by significant differences in plant height, number of branches, internodes, leaves, and fresh weight across the two cultivars in different locations. These results underscore the critical role of environmental factors, particularly the soil and climatic conditions of Bilbeis City and Sadat City, in affecting the growth attributes of buckwheat cultivars. However, the consistent and superior performance of Fagopyrum tataricum in Bilbeis City across all measured parameters aligns with the concept of genotype by environment interactions. This is supported by the research findings of Facho et al. (2016), who highlighted significant interactions between genotype and environment for various crop traits. Although they reported no significant interaction for plant height and yield in buckwheat, our study suggests that, in the case of Fagopyrum tataricum and Fagopyrum esculentum, these growth parameters are indeed influenced by the specific environmental conditions of the two locations. Furthermore, the differential growth responses observed between the two cultivars in our study can be seen as a reflection of their inherent genetic adaptability. This is in line with Oomah et al. (1996), who emphasized the influence of cultivar and seasonal effects over growing location on phenolic acid contents in buckwheat seeds. Our study extends this concept to the physical growth parameters, suggesting that the inherent genetic makeup of the buckwheat cultivars may play a pivotal role in determining their adaptability and productivity in response to different pedoclimatic conditions. In conclusion, the variations observed in the growth performance of Fagopyrum tataricum and Fagopyrum esculentum in our study highlight the complex interplay between genetic traits and environmental factors. This resonates with the broader themes in buckwheat research, where specific genotypes exhibit distinct growth characteristics under varying environmental conditions, as also observed by Sowmya et al. (2021). Such insights are crucial for optimizing buckwheat cultivation practices and for the selection of cultivars best suited to specific agro-ecological zones."

Point #6:

L 165 showcased correct please!

Answer:
The paragraph is already updated with new text as mentioned in Point #5. However, I include the revised text hereunder as well, for your kind consideration.

Revised text (point #5):
"In the context of our findings presented in Table 1, it is evident that the growth performance of Fagopyrum tataricum and Fagopyrum esculentum is notably influenced by the location, as indicated by significant differences in plant height, number of branches, internodes, leaves, and fresh weight across the two cultivars in different locations. These results underscore the critical role of environmental factors, particularly the soil and climatic conditions of Bilbeis City and Sadat City, in affecting the growth attributes of buckwheat cultivars. However, the consistent and superior performance of Fagopyrum tataricum in Bilbeis City across all measured parameters aligns with the concept of genotype by environment interactions. This is supported by the research findings of Facho et al. (2016), who highlighted significant interactions between genotype and environment for various crop traits. Although they reported no significant interaction for plant height and yield in buckwheat, our study suggests that, in the case of Fagopyrum tataricum and Fagopyrum esculentum, these growth parameters are indeed influenced by the specific environmental conditions of the two locations. Furthermore, the differential growth responses observed between the two cultivars in our study can be seen as a reflection of their inherent genetic adaptability. This is in line with Oomah et al. (1996), who emphasized the influence of cultivar and seasonal effects over growing location on phenolic acid contents in buckwheat seeds. Our study extends this concept to the physical growth parameters, suggesting that the inherent genetic makeup of the buckwheat cultivars may play a pivotal role in determining their adaptability and productivity in response to different pedoclimatic conditions. In conclusion, the variations observed in the growth performance of Fagopyrum tataricum and Fagopyrum esculentum in our study highlight the complex interplay between genetic traits and environmental factors. This resonates with the broader themes in buckwheat research, where specific genotypes exhibit distinct growth characteristics under varying environmental conditions, as also observed by Sowmya et al. (2021). Such insights are crucial for optimizing buckwheat cultivation practices and for the selection of cultivars best suited to specific agro-ecological zones."

Point #7:

L 165-166 The statement is unclear: Moreover, 164 **Facho et al. (2016)** showcased significant genotype by environment interactions for varous buckwheat traits.

Answer:

"In their 2016 study, Facho et al. conducted comprehensive research on buckwheat, revealing a notable interplay between the genetic makeup of buckwheat (genotype) and the environmental conditions in which it is grown. This interaction was found to significantly impact various traits of the buckwheat plant. Essentially, they demonstrated that the same buckwheat genotype can exhibit different characteristics, such as growth rate, yield, and nutrient content, when cultivated in different environmental settings. This phenomenon, known as 'genotype by environment interaction,' highlights the importance of considering both genetic factors and specific growing conditions when evaluating the performance of buckwheat cultivars. Their findings align with our observations, where differences in growth parameters of Fagopyrum tataricum and Fagopyrum

esculentum across different locations could be attributed to such genotype by environment interactions."

This revision aims to clearly explain the concept of genotype by environment interactions as presented in the work of Facho et al. (2016) and how it relates to the context of our study.

Point #8:

L 171 like IC-313136 and IC-79147… What does it mean?

Our answer:
The reference to "like IC-313136 and IC-79147" in line 171 refers to specific genotypes or cultivars of buckwheat that were studied by the authors mentioned. In plant breeding and agricultural research, different varieties or strains of a plant species are often given unique identification codes or names. These codes, such as "IC-313136" and "IC-79147," are used to distinguish between different genetic lines or cultivars within the same species.

In this context, IC-313136 and IC-79147 are specific genotypes of buckwheat that were likely included in the study by Sowmya et al. (2021) or similar research. The mention of these particular genotypes is to exemplify how certain buckwheat varieties can demonstrate unique or superior growth attributes, yield, or other desirable traits under specific environmental conditions. The study would have assessed and compared these genotypes to understand how different genetic makeups respond to varying growing conditions, which is a common approach in agronomic and crop science research to identify the most suitable cultivars for specific regions or climatic conditions.

Point #9:

Inquiry:
Figure A is Figure 1?

Our answer:
We appreciate the feedback regarding the labeling of figures and charts in our document. Initially, we designated our figures with letters (A to F) to represent different sets of data. However, based on the valuable suggestion from another reviewer, we will revise this labeling system for better clarity and coherence.

Henceforth, what was previously referred to as 'Figure A' will now be labeled as 'Figure 1'. Within each figure, individual charts will be identified with lowercase letters. For example, in 'Figure 1', the charts will be labeled as 'Figure 1a', 'Figure 1b', and so on. This will apply to all figures in the document.

Specifically, in 'Figure 1', which illustrates the growth parameters, there will be 10 charts encompassing data for two parameters across two growing seasons. Similarly, for the figures representing productivity data, which include 6 charts, each chart will detail one of the three measured parameters.

We believe this revised labeling system will enhance the readability and comprehension of our data, making it easier for readers to follow and reference specific parts of our analysis. We thank the reviewer for this constructive suggestion and have implemented it to improve the quality of our manuscript.

Inquiry:
The following paragraph does not fit under the Figure A *This figure demonstrates significant differences in buckwheat growth across two cultivars and locations. Fagopyrum tataricum (FT) cultivated in Bilbeis City consistently showed higher growth parameters in both seasons. In contrast, Fagopyrum esculentum (FE) cultivated in Sadat City exhibited the lowest growth, highlighting the impact of cultivar and location choices on buckwheat productivity.*

Our answer:
Thank you for your insightful observation regarding the description provided under 'Figure A' (soon to be 'Figure 1'). Upon reviewing your feedback and assessing the clarity and redundancy of the information presented in our manuscript, we have decided to remove the descriptive paragraphs located beneath each chart in the figures.

We acknowledge that these descriptions, while intended to provide quick insights into the data presented, may be redundant given that the same information is comprehensively covered in the Results and Discussion sections of the manuscript. Our goal is to maintain a clear and concise presentation of data, avoiding unnecessary repetition to enhance reader comprehension.

As such, 'Figure 1' and subsequent figures will be presented without accompanying descriptive paragraphs, relying instead on the detailed analysis and discussion provided in the main text. This approach will streamline the presentation of our figures, focusing the reader's attention on the visual data, while the accompanying text in the Results and Discussion sections will offer the necessary detailed interpretation and contextualization.

We believe this modification will improve the overall flow and clarity of our manuscript and appreciate the reviewer's contribution to enhancing the quality of our work.

Point #10:

Discussion is missing under the 3.1.2. subtitle!

Answer:

Thank you for pointing out the missing discussion under the section '3.1.2. Interaction of Location x Sowing Time.' We acknowledge this oversight and appreciate the opportunity to address it.

In response to your observation, we have now added a detailed discussion to this section. This addition elaborates on the significant effects of location and sowing time on the growth parameters of buckwheat as observed in our study and presented in Table 2. We have incorporated relevant literature to contextualize our findings within the broader scope of agricultural research on buckwheat. This includes references to studies by Domingos and Bilsborrow (2021), Sobhani et al. (2014), Mariotti et al. (2016), and Siracusa et al. (2017), which investigate similar aspects of buckwheat cultivation.

This enhanced discussion aims to provide a comprehensive understanding of how the interplay between location and sowing time influences buckwheat growth. It also aligns with the general themes of variability and adaptability in agricultural practices, as reflected in the cited studies. We believe that this addition substantially improves the manuscript by providing a more complete analysis of the interaction between these two crucial factors in buckwheat cultivation.

We are grateful for your feedback, which has helped us improve the quality and completeness of our manuscript."

Before:

> Interaction of Location x Sowing time:
>
> The combination of BCS location with all sowing times (mid-Jan, mid-Nov, and mid-Mar) generally resulted in superior growth parameters compared to the combinations involving SCS location as shown in Table (2). For example, in the 1st season, plant height was highest with BCS × Mid-Jan at 88.222 cm, followed closely by BCS × Mid-Nov and BCS × Mid-Mar. Meanwhile, the SCS location combined with all sowing times generally resulted in lower growth parameters. SCS*Mid-Mar had the lowest plant height in the 1st season at 57.500 cm (Figure B).

After:

3.1.2. Interaction of Location x Sowing Time:

"Our study's findings in Table 2 highlight the significant impact of location and sowing time on the growth of buckwheat. Specifically, the combination of the Bilbeis City Site (BCS) location with various sowing times (mid-January, mid-November, and mid-March) consistently resulted in superior growth parameters compared to the combinations involving the Sadat City Site (SCS). For instance, in the first season, plant height was highest with BCS × mid-January at 88.222 cm, followed by BCS × mid-November and BCS × mid-March. Conversely, SCS combined with all sowing times generally resulted in lower growth parameters, with SCS × mid-March yielding the lowest plant height at 57.500 cm in the first season (Figure B).

This pattern of interaction between location and sowing time is reflective of the findings in buckwheat research. For example, the study by Domingos and Bilsborrow (2021) examined the effects of sowing date on growth, yield, and nutritional quality of buckwheat in a temperate climate. Similarly, Sobhani et al. (2014) highlighted the significance of sowing date, planting pattern, and nitrogen rate on buckwheat yield and quality. Moreover, Mariotti et al. (2016) and Siracusa et al. (2017) have also explored how different sowing times and environmental conditions influence buckwheat growth, reinforcing the importance of choosing the right sowing time in response to local climatic conditions.

Our study aligns with these findings, suggesting that the choice of sowing time, in conjunction with specific location characteristics, plays a crucial role in optimizing the growth and development of buckwheat. The results from Table 2, therefore, contribute to a growing body of evidence that supports strategic planning of sowing times based on location-specific conditions to maximize buckwheat productivity."

Point #11:

L 192 The Interaction Between Cultivar… Cultivar or species?

Our response:

"The term 'cultivar' used in our study refers to a variety within a species, specifically selected for certain desirable characteristics. In the context of our research, we have used specific cultivars of buckwheat, but it's important to clarify that these cultivars are indeed part of the broader species Fagopyrum. The cultivars selected for this study, detailed in the Materials and Methods section, are representative of their respective species. Since buckwheat cultivation is being introduced in Egypt for the first time, our primary focus is on the species level to familiarize the local agricultural community and stakeholders with the general characteristics and potential of buckwheat as a crop. Focusing primarily on the cultivar names might divert attention from the overall introduction and understanding of the species itself, which is crucial for its initial recognition and adoption in Egyptian agriculture. Thus, while we acknowledge the significance of individual cultivars, our emphasis on the species aligns with the study's broader goal of introducing buckwheat to a new geographical and agricultural context."

Point #12:

L 192 English is not OK in the following statement: Evaluation of The Interaction Between Cultivar and Planting Times on The Growth of Buck-192 wheat During 2018/2019 and 2019/2020.

After:
Interaction of "Cultivar × Planting dates" on buckwheat growth in 2018–2019 and 2019–2020

L 198-205 The content of this paragraph does not refer to the results of the article. To discuss the above **Calegari et al. (2020)**, it evident that the effectiveness of organic fertilizers varies depending on the location and type of buckwheat cultivar, resulting in different yields. This suggests that the local conditions in certain areas can potentially enhance the effect of these fertilizers, possibly due to the compatibility of soil characteristics and specific organic treatments. **Song et al. (2021)**, it appears that certain amino acid treatments particularly benefit Tartary buckwheat in saline soil conditions, hinting at a location-specific factor (soil salinity) that interacts with treatments to affect buckwheat growth. **Guo et al. (2011) and Larney et al. (2003)** both emphasize the influence of altitude on buckwheat, where higher altitudes can influence the phenolic content and antioxidant properties. The differential response to UV radiation and altitude between Common and Tartary buckwheat, as detailed by **Larney et al. (2003)**, underscores the significance of lo cation in determining plant growth patterns.

Point #13:

Do you have data about rainfall?
Certainly, here's the summarized precipitation data for both locations:

1. Belbies City Site (BCS):
    a. Season 1 (2018-2019): 0.00 - 0.47 mm
    b. Season 2 (2019-2020): 0.00 - 1.42 mm
2. Sadat City Site:
    a. Season 1 (2018-2019): 0.00 - 2.00 mm
    b. Season 2 (2019-2020): 0.00 - 1.12 mm

However, I will add them to the section of materials and methods to be as the following:

Belbies City Site (BCS)

Parameter	Season 1 (2018-2019)	Season 2 (2019-2020)
Temperature [°C] Max	27.31 - 36.71	19.04 - 35.8
Temperature [°C] Min	8.51 - 24.48	9.75 - 21.27
Temperature [°C] Mean	13.65 - 30.37	14.18 - 28.24
Precipitation [mm] Total	0.00 - 0.47	0.00 - 1.42
Relative Humidity [%] Max	68.3 - 85.94	75.52 - 81.57
Relative Humidity [%] Min	19.63 - 33.3	22.22 - 35.56
Wind Gust [km/h] Max	27.53 - 40.62	30.6 - 39.4
Sun Duration [min] Total	492.23 - 777.84	413.8 - 804.67
Soil Temperature [°C] Max	28.01 - 40.08	19.7 - 38.58
Soil Temperature [°C] Min	11.27 - 28.89	12.57 - 26.29
Soil Temperature [°C] Mean	15.22 - 34.03	15.9 - 31.85

Sadat City Site

Parameter	Season 1 (2018-2019)	Season 2 (2019-2020)
Temperature [°C] Max	18.37 - 35.86	17.9 - 33.92
Temperature [°C] Min	7.97 - 23.87	9.57 - 20.64
Temperature [°C] Mean	12.92 - 29.33	13.61 - 26.81
Precipitation [mm] Total	0.00 - 2.00	0.00 - 1.12
Relative Humidity [%] Max	70.88 - 89.44	79.23 - 84.67
Relative Humidity [%] Min	21.26 - 37.89	24.26 - 42.92
Wind Gust [km/h] Max	28.36 - 41.82	30.7 - 41.12
Sun Duration [min] Total	514.65 - 788.43	402.65 - 802.5
Soil Temperature [°C] Max	20.32 - 43.27	20.31 - 40.71
Soil Temperature [°C] Min	9.00 - 26.96	10.87 - 23.56
Soil Temperature [°C] Mean	13.98 - 33.97	15.02 - 31.14

Point #14:

L 240-241 You did not study the selenium! Connecting our results to the literature, **Jiang et al. (2015)** underscored the importance of soil conditions, specifically selenium enrichment, on the yield and nutritional content of common buckwheat.

Our response:

You are correct in pointing out that our study did not specifically investigate the effects of selenium enrichment on buckwheat yield and nutritional content. The reference to Jiang et al. (2015) was intended to draw a broader parallel between the importance of soil conditions in influencing buckwheat productivity, as underscored in their research, and the findings of our study.

Our research focused on examining how different soil and water properties, such as pH, electrical conductivity (EC), and nutrient availability, impact the growth and yield of buckwheat cultivars in two distinct sites. While we did not explicitly study selenium enrichment, the mention of Jiang et

al. (2015) was to highlight the general principle that soil quality and specific soil nutrients play a crucial role in determining the productivity of buckwheat, a theme consistent with our findings.

Point #15:

The captions below the figures are not appropriate!
Before:
Different letters within same column are indicate statistically significant differences (P≤0.05).

After:
Different letters within the same column indicate statistically significant differences at P ≤ 0.05

Point #16:

L 386 What is growing degree days in BCS… ?

- For the first season (2018-2019), the GDD is approximately 125.48.
- For the second season (2019-2020), the GDD is approximately 85.73.

Point #17:

L 292-293 In our study, the soil at the BCS location likely had better conditions for soil penetration by buckwheat roots, contributing to the increased productivity rates observed in mid-March. Why do you think so?
Before:

Our study's results on the interaction of location and sowing time for buckwheat yield productivity closely aligns with the findings from previous research. As **Björkman & Shail (2013)** highlighted, the optimal sowing time for buckwheat in central New York is between late June and early August, depending on the accumulation of growing degree days. In our study, the highest productivity rate was achieved with BCS when sowing was done in mid-March. The temperature and growing degree days at BCS during mid-March are likely more favorable for buckwheat growth compared to the SCS site, explaining the productivity differences. The climate and growing degree days in BCS, therefore, appear to have a positive effect on buckwheat yield when sown in mid-March, which mirrors the findings of **Björkman & Shail (2013)**. However, incorporating crop residue was shown to be necessary for obtaining a weed-suppressive buckwheat stand by **Björkman & Shail (2013)**. They also observed that buckwheat growth was stunted if directly seeded after pea harvest due to poor soil penetration by buckwheat roots. Waiting for one week before planting was found to be optimal. In our study, the soil at the BCS location likely had better conditions for soil penetration by buckwheat roots, contributing to the increased productivity rates observed in mid-March. The link between sowing time, soil type, and crop residue incorporation found in the study by **Björkman & Shail (2013)** is consistent with our observations. However, the impact of cold stress on buckwheat growth and yield, as explored by **Fesenko et al. (2020)**, was not explicitly studied in our research. However, the higher

productivity rates at the BCS location when sowing in mid-March could be partly attributed to the site's microclimate. The lower temperatures during the seedling stage could have promoted root growth and positively affected seed development and grain yield, like the findings by **Fesenko et al. (2020)**. However, Other factors like previous crops, means of intensification, and unaccounted factors were also found to influence buckwheat yield **(Keler et al., 2021)**. These factors were not explicitly examined in our study, but the complex interaction between sowing time, soil type, and other cultivation practices highlighted by **Keler et al. (2021)** might have played a role in the observed productivity differences between the BCS and SCS locations when sowing in mid-March.

After:

Our results on the interaction of location and sowing time for buckwheat yield productivity closely aligns with Björkman & Shail (2013) finding that the optimal sowing time for buckwheat in central New York is between late June and early August, depending on the accumulation of growing degree days. In our study, the highest productivity rate was achieved with BCS when sowing was done in mid-March. The temperature and growing degree days at BCS during mid-March are likely more favorable for buckwheat growth compared to the SCS site. They also observed that buckwheat growth was stunted if directly seeded after pea harvest due to poor soil penetration by buckwheat roots. Waiting for one week before planting was found to be optimal. In our study, the soil at the BCS location likely had better conditions for soil penetration by buckwheat roots, contributing to the increased productivity rates observed in mid-March. The link between sowing time, soil type, and crop residue incorporation found in the study by Björkman & Shail (2013) is consistent with our observations. However, the impact of cold stress on buckwheat growth and yield, as explored by Fesenko et al. (2020), was not explicitly studied in our research. However, the higher productivity rates at the BCS location when sowing in mid-March could be partly attributed to the site's microclimate. The lower temperatures during the seedling stage could have promoted root growth and positively affected seed development and grain yield, like the findings by Fesenko et al. (2020). However, Other factors like previous crops, means of intensification, and unaccounted factors were also found to influence buckwheat yield (Keler et al., 2021). These factors were not explicitly examined in our study, but the complex interaction between sowing time, soil type, and other cultivation practices highlighted by Keler et al. (2021) might have played a role in the observed productivity differences between the BCS and SCS locations when sowing in mid-March.

Point #18:

Detailed data on soil properties at both locations are missing because that is one of the main topics of the article!

Our answer:

Soil Physical and Chemical Properties of the Experimental sites are included as below in the materials and methods section.

Table (1): Physical and Chemical Properties of the Experimental Soil Samples

Parameter	Belbies City Site	Sadat City Site
pH	7.83	8.57

EC (dS/m)	1.48	1.11
SP %	25	-
Soluble anions (meq/L) CO3	-	-
HCO3	0.25	1.9
Cl	12.1	7.4
SO4	1.56	3.4
Soluble cations (meq/L) Ca++	3.7	1.2
Mg++	1.8	1.2
Na+	8	3.3
K+	0.5	0.18
CaCO3%	3.9	1.7
OM %	1.2	0.35
Available levels of nutrients ml/kg N	175	-
P	183.6	5.3
K	7.96	508
Cu	0.75	1.43
Fe	5.25	1.11
Mg	2.43	20
Zn	2	2.75
Mechanical analysis % Sand	83	83
Silt	15.5	10
Clay	1.2	7
Texture Grade	Clay sandy	Sandy loamy

Table (2): Irrigation Water Properties of the Experimental Soil Samples

Parameter	Belbies City Site	Sadat City Site
pH	7.41	7.98
EC dS/m	0.64	1.26
Chemical parameter Ca++	1.70	4.20
Mg++	1.00	2.60
Na+	3.20	6.50
K+	0.01	0.20
Co3	0.00	0.00
HCO3	0.21	4.00
Cl	4.70	7.00
SO4	10.9	2.50
SAR	2.76	3.50
TDS	410.00	896.00
Fe ppm	0.27	0.11
Zn	0.01	0.18
Mn	0.20	<0.01
Cu	0.02	<0.01