

For research article

Response to Reviewer 4 Comments

1. Summary

We are grateful to the reviewers and the Academic Editor for their thoughtful evaluation and constructive feedback. We have carefully addressed each comment in detail below, with the corresponding revisions highlighted in the revised manuscript.

2. Questions for General Evaluation	Reviewer's Evaluation	Response and Revisions
Does the introduction provide sufficient background and include all relevant references?	Yes	We appreciate your feedback and have compiled a list of content that needs to be revised and improved based on your suggestions. Please read through it point by point. The same as below.
Is the research design appropriate?	Yes	"
Are the methods adequately described?	Yes	"
Are the results clearly presented?	Yes	"
Are the conclusions supported by the results?	Yes	"
Are all figures and tables clear and well-presented?	Yes	"

3. Point-by-point response to Comments and Suggestions for Authors

Comments 1: The Discussion should provide a deeper biological interpretation of the principal components (PC1–PC3), beyond their statistical contribution, to explain what each represents and why it is meaningful for breeders.

Response 1: Thank you for your insightful suggestion. In response, we have enhanced the Discussion section by providing a deeper biological interpretation of the principal components (PC1–PC3), elucidating their biological significance beyond statistical variance and highlighting their relevance to breeders. This includes citations to relevant studies on forage crops, with the added content appearing in Lines 184–200 to strengthen the linkage between PCA results and practical breeding applications.

Comments 2: Since the study was conducted at a single site and in one growing season, the

environmental limitation should be emphasized more strongly. It would also be valuable to suggest future work with multi-environment or multi-year trials to confirm the stability of the PCA-based selection index.

Response 2: We fully agree with the reviewer's comment and recognize the importance of validating our findings across multiple environments and growing seasons in future studies. In the present study, we have made every effort to address this limitation by adding detailed descriptions of soil and climate conditions in Section 2.1. (Materials and Methods) of the revised manuscript. We kindly invite the reviewer to refer to these additions.

Comments 3: The choice of the six traits is reasonable but should be better justified. For instance, quality-related traits might also be relevant for breeders. Clarifying why these and other traits were excluded would add valuable context.

Response 3: We thank the reviewer for this insightful comment. In response, we have conducted a comprehensive review of the traits included in our study and have revised the Discussion section to clarify why quality-related and other traits were not included, providing readers with a more complete explanation. Briefly, we prioritized the evaluation of yield-related traits (e.g., plant height, branch number) rather than quality traits because the overall value of forage is primarily determined by total dry matter yield rather than the characteristics of individual plants. Moreover, yield-related traits generally have a relatively simple genetic basis (such as plant height, branch number, and leaf area index), making selection more efficient. Improving yield traits can lead to a more substantial increase in total forage production, whereas focusing solely on quality traits may have limited impact on overall farm productivity if yield remains low.

4. Response to Comments on the Quality of English Language

Point 1: The English is fine and does not require any improvement.

Response 1: We sincerely thank the reviewer for the positive assessment of the language quality in our manuscript. We are glad that the English was found to be clear and appropriate.

5. Additional clarifications

Not applicable.