

1 Introduction

- Leveraging the potent capabilities of the **Earbox** imaging system [1] and its accompanying segmentation algorithm, based on the renowned **Mask RCNN** [2], we unearthed valuable insights into cob dimensions and grain organization.
- This study represents our response to these challenges, a simple yet effective approach that aims to surpass the boundaries set in our prior work [1]. We embark on a journey to elevate the standards of maize ear analysis, guided by the recently unleashed Segment Anything Model (SAM) [3].



Diversity of ear and grain shape, colour and dimensions in a panel of inbred lines

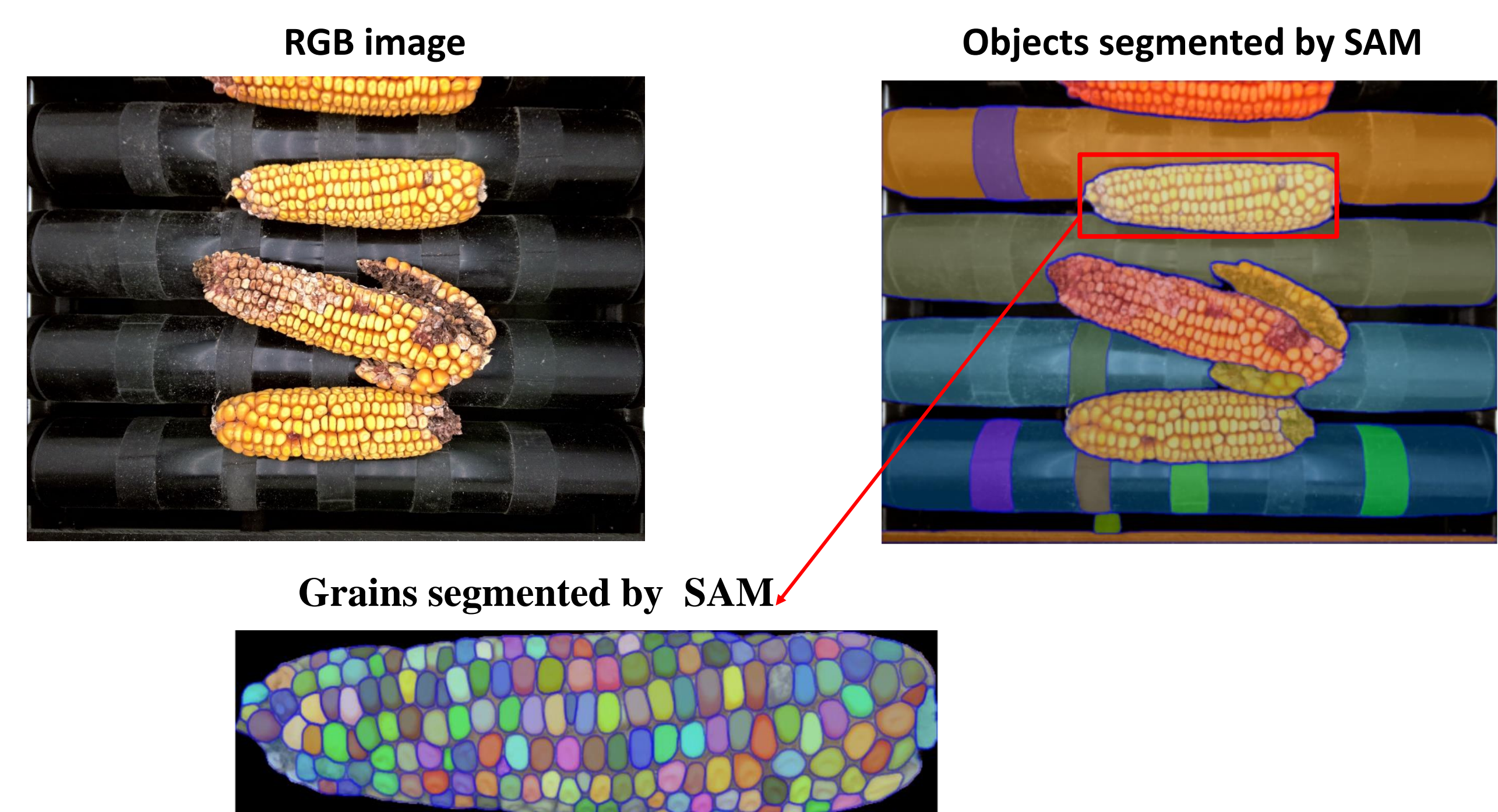


Diversity of ear and grain traits in response to soil water deficit in a panel of hybrids

- SAM** holds the key to unlocking enhanced maize ear segmentation and revolutionize our understanding of maize stress responses. Yet, as we delved deeper into this realm, we encountered hurdles that couldn't be ignored. These challenges encompassed high computational demands, restricted scalability, struggles with small objects, intricate occlusion management, and the burdensome task of labor-intensive annotation.

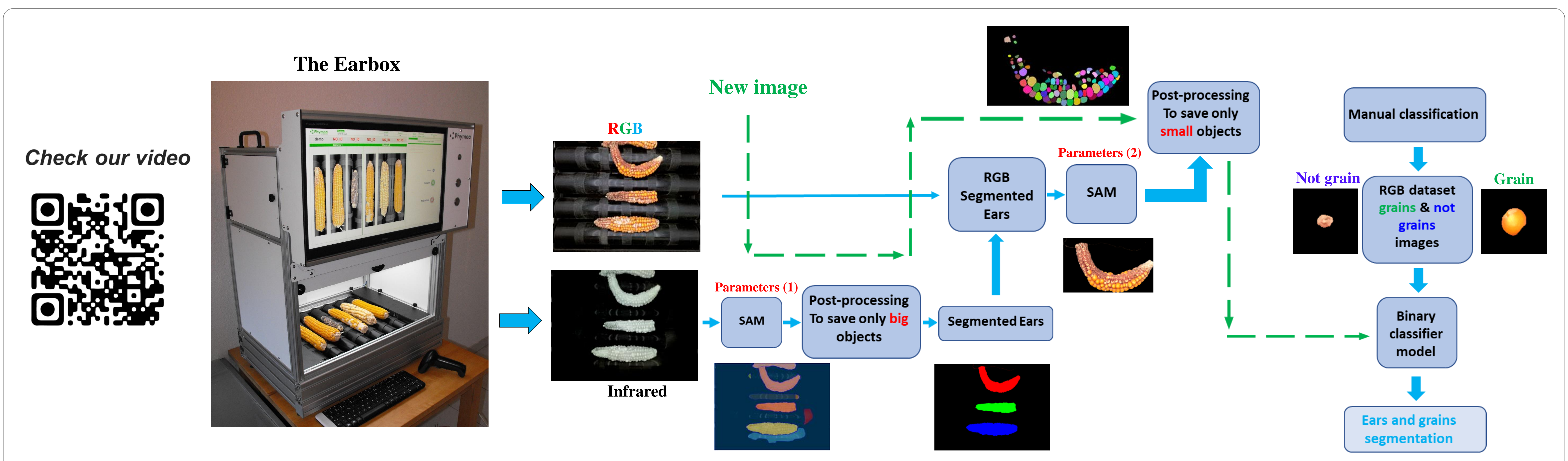
2 Segment Anything Model (SAM)

- Trained with billion scale mask labels, **SAM** is a segmentation foundation model that demonstrates strong zero-shot ability in partitioning images into semantically meaningful segments.
- Unlike traditional segmentation models that focus on specific object categories or predefined classes, **SAM's** unique capability lies in its ability to segment anything, regardless of the object type or class. It achieves this by leveraging advanced deep learning techniques and sophisticated algorithms.

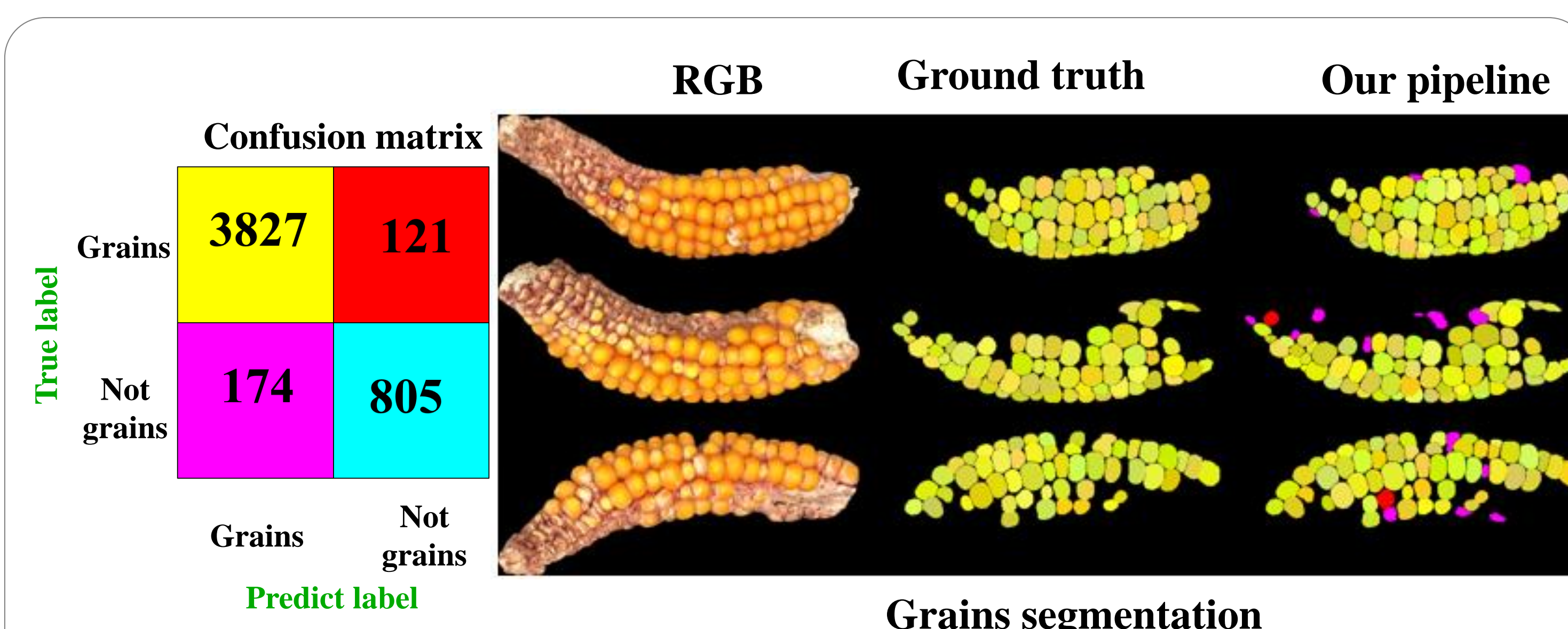


Example of image segmentation by SAM.

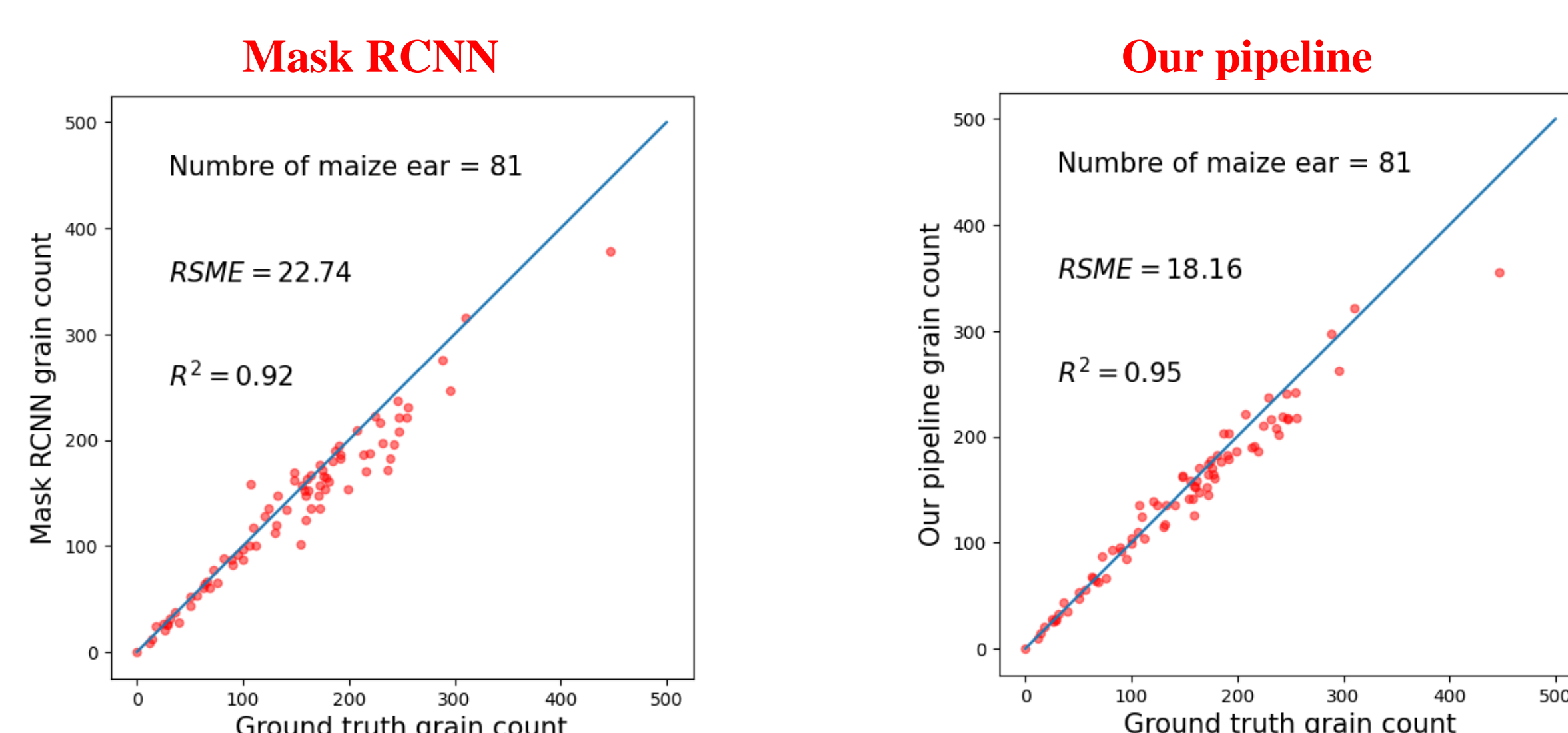
3 Pipeline



4 Results



Performance comparison



5 For the future

- While our proposed framework has shown promising outcomes, there is still ample opportunity for further exploration and enhancement. We are committed to continuing our research endeavors to tackle the limitations identified in this study.
- To expand the horizons of our current framework and enhance its performance, we will delve into more advanced merging algorithms, fine-tune hyperparameters, and integrate deep learning technique for improved segmentation results. Through these endeavors, we aim to push the boundaries and achieve significant advancements in our framework.

References

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