

## Homework

1. You will be assigned a number (either 1a, 2a, or 3a). Go onto Moodle and download the article that shows the same number as what's on your paper.
2. Read the article actively and write down the preliminary and final answers to the four important questions in the earlier slide.
3. Strengths and weaknesses of the paper in terms of the quality of the research question, the experimental design, the writing, and whether the data support the paper's conclusions.

### Four important questions to keep in mind while reading:

- What is the question that the authors are trying to address, and why is it important?
- If this were my thesis project, what kind of experimental approach can I take in tackling the problem?
- What kind of data would I need to generate in order to support the conclusions of this paper?
- How would this conclusion fit into my previous understanding of this subject?

Sun TT. Active versus passive reading: how to read scientific papers? Natl Sci Rev. 2020 Jun 19;7(9):1422-1427. doi: 10.1093/nsr/nwaa130. PMID: 34691538; PMCID: PMC8288757.

It's RunjunJin. I am assigned the number '1a'.

My answers for the four questions:

1. The authors are trying to underly the transcriptome-wide details about the effects of exogenous sucrose application timing and concentration on fruit coloring, fruit quality, bioactive compound content, and the expression of genes involved in ripening processes. Because the ripening process of non-climacteric fruits is unclear, and different from that of climacteric fruits whose ripening process depends on ethylene. The better understanding for the mechanism underlying sucrose-induced fruit ripening is important to human, we will get the properly ripened fruit in any time if we can regulate the fruit ripening.

2. If this were my thesis project, the variable control (i.e., only change one variable at a time) and phased sampling together with instrumental analysis are two most important methods, and the setting of the control group is necessary. Sampling together with instrumental analysis can reflect the changes of samples in different time or stages. Moreover, I will take some stages as initial states at the ripening process as much as possible, such as the different colors of fruit at the ripening process. Phased sampling can reflect the overall process while reducing the workload appropriately.

3. I need the ripening time of fruits containing and not containing (i.e., with water) sucrose, and anthocyanin concentration, to support the 'Exogenous Sucrose Accelerating Fruit Ripening and Anthocyanin Biosynthesis'. The weight and size parameters of fruits evaluate the quality of fruits. The characteristic genetic data of fruits in different stages are required to explore the expression of genes. The changes in the species and concentration of plant hormone should be collected to confirm the 'sucrose could affect the plant hormone signal transduction', however, this is lacked in this paper.

4. In my previous views, the ripe is due to the pheromone such as the ethylene, which is also mentioned in this article. However, this paper reported that sucrose also promotes strawberry fruit ripening and affects ripening-related processes. After reading this paper, I understood that sucrose could also be considered as the pheromone which prompts the ripening process and affects the expression of genes.

The strengths and weaknesses:

Quality of research question: The effects of exogenous sucrose application timing and concentration on ripening process, and the expression of genes, are valuable. This can help us to understand and further regulate the ripening process of fruits accurately. However, the expression of genes is abstract although the representation of images, and it only

can be proved by circumstantial evidence instead of situ observation or detection.

The experiment design: The control variate method is suitable for understanding the influences of sucrose application timing and concentration. The comparison between them reveal the suitable concentration of sucrose. Lots of experimental samples have good statistical law. However, the measurement of compound metabolism is too close to the treatment time (after 8 days). Although the concentration is same, the different contents are also produced because of the different surface area or volume of a strawberry. So I think that we should control the sucrose contents on each strawberry more appropriately instead of the concentration.

Writing: The logic is very clear, and evidences are sufficient. Besides, the hierarchy is clear, and the results are separate from the discussion. Almost every word has evidence. However, the Abstract seems to be a little bit more while the Introduction may not be enough. The Introduction elaborated these questions: What did I do? Why did I do? What is lacking now? and What has been done before? Therefore, at least the meaning of big field (i.e., fruits ripening) is needed.

Finally, the sucrose application and concentration, as well as the changes in fruit color and quality, well support the conclusion 'sucrose could affect (or prompt) the ripening process'. Moreover, the data of bioactive compound content and the expression of genes could support the conclusion 'sucrose could affect the plant hormone signal transduction and ripening-related gene expression, which supplied the details of the effects of sucrose on ripening'. However, the supporting data of 'Sucrose Suppressed the TCA Cycle' is more of a description, or an indirect inference. It lacks direct hard evidence although it can justify oneself. Besides, as the authors said, the interaction between sucrose and plant hormone needs further exploration.