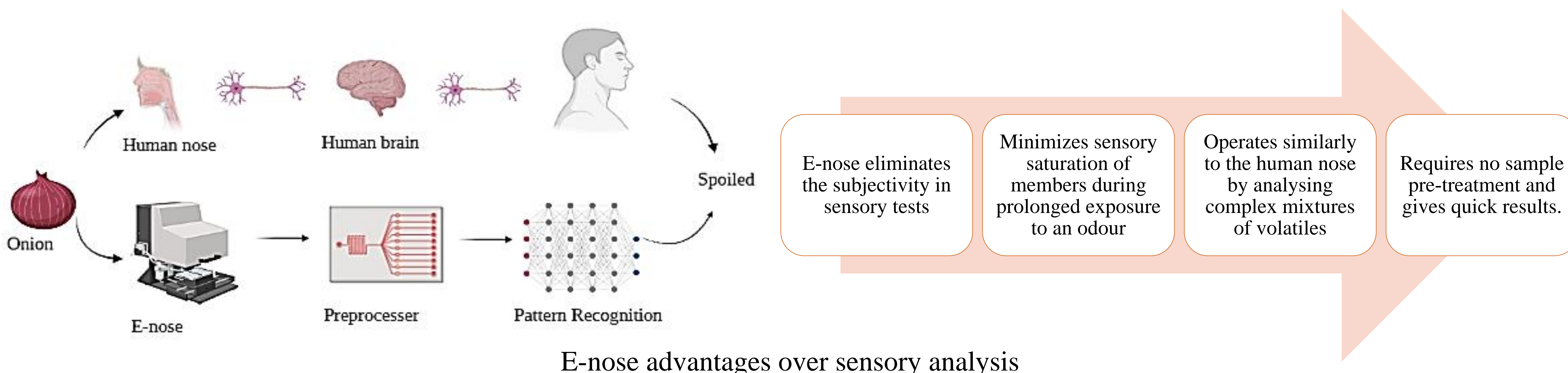
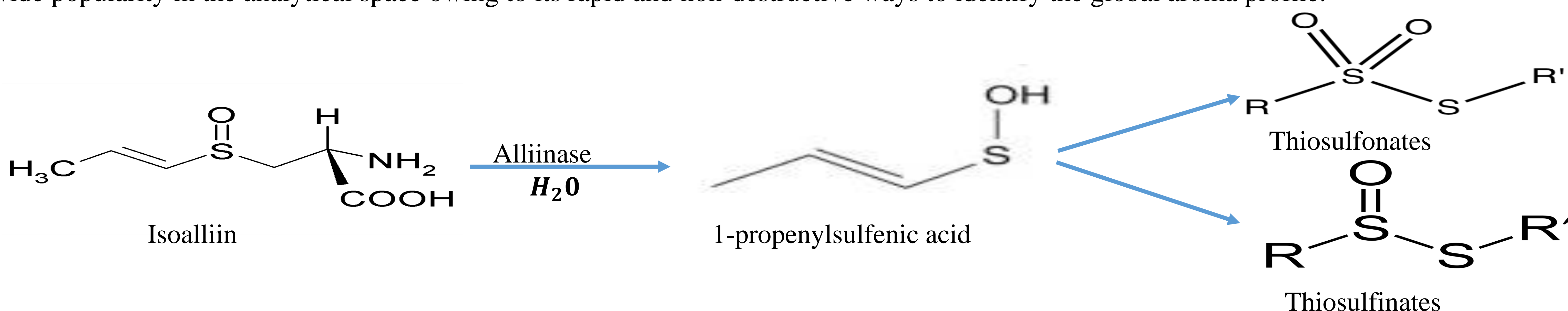


## Background

Onion (*Allium cepa*), a very commonly used vegetable. Apart from imparting a delicious taste and flavor due to its pungency in many culinary preparations, it serves several medicinal purposes also. However, when the onions are stored for a longer time there may be chances of spoilage and wrong storage conditions or the use of incorrect transport leads to damage to the onion. It is of the utmost importance to discover precise, accurate, and cutting-edge sophisticated analytical techniques to reduce spoilage. The electronic nose (e-nose) has gained wide popularity in the analytical space owing to its rapid and non-destructive ways to identify the global aroma profile.



## Objectives

1

- Determination of the ability of hybrid e-nose–fuzzy logic approach to filter (ranking and screening) the best responsive sensors which could be used to monitor the volatile headspace of a small onion

2

- Prediction of the storage time and rapid detection of volatiles of onion by data extracted from fuzzy screened sensors using multiple linear regressions (MLR).

3

- Comparison of Odor Index (OI) with data processing software integrated with e-nose data and correlating with volatiles indices to estimate the discard time of spoiled small onion.

4

- Development of hybrid e-nose–fuzzy logic approach envisaged to be a non-destructive way to monitor the storage quality of small onion.

## Materials and methods



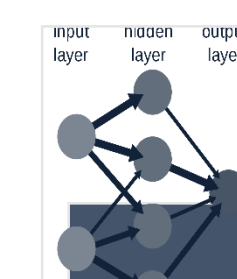
### Onion grouping and storage

- The small onions were distributed into two sets namely training onion (T) and storage onion (P). The e-nose trained using a duplicate set of deliberate volatiles of onions



### E-nose assessment

- The fresh and aged odor (headspace volatiles) of the T and P set of small onions was evaluated by a Fox 4000 e-nose system (Alpha MOS, Toulouse, France)



### Odor Index (OI)

- An e-nose-based OI was estimated for onions (T and P sets) using data extracted from fuzzy-ranked e-nose sensors by an integrated software AlphaSoft v14.0

## Deliverables

- The storage stability assessment of onions will be attempted using an e-nose coupled with the fuzzy logic approach to estimate discard time.
- An analogy will be drawn from sensory panel evaluation, and e-nose sensors were regarded as equivalent to hedonic scores and filtered using fuzzy logic interpretation.

## References

- Srivastava, S., Mishra, G. and Mishra, H.N., 2019. Fuzzy controller based E-nose classification of *Sitophilus oryzae* infestation in stored rice grain. *Food chemistry*, 283, pp.604-610.
- Sireyil, G. and Alim, A., 2022. Effects of onion paste on flavor of a different kind of bread (naan) analyzed with E-Nose and GC-IMS. *Journal of Food Processing and Preservation*, 46(4), p.e16457.