

Metabolomics in Functional Food Research and Innovation

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يُؤْتِيهِ سَيِّدِي إِسْلَامًا أَنْبَاءًا يُغْنِيَانِي مِلَّةً سَيِّئًا

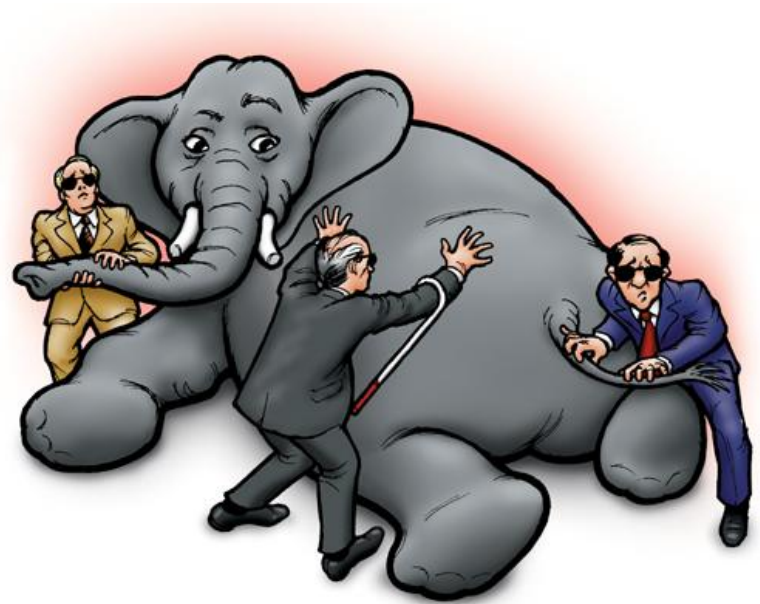
Introduction

- Malnutrition and food insecurity affect a very large percentage of world population, and worsen during covid-19 pandemic era.
- When studying the problems of ensuring food security, both country's general features and particularities of various natural and production conditions of its individual regions have to be taken into account. Diversification of local food production can streamline supply chains, and ultimately increase food security.
- Application of innovations and novel scientific findings in functional food is one of the important paths towards high value added economy, and therefore towards increase of competitiveness of novel food products, industries, and, ultimately, through food security towards economic security of the whole country.

- Indonesia is bursting with a significant diversity of food resources, but they are naturally not exploited or neglected.
- Herbal pharmaceutical worldwide reaches USD 60 billion in 2020, with annual growth 5-15%.
- Indonesia is rich with herbal and spices, including *jamu*, and have been known traditionally having health benefit. However, the lack of scientific proof hampers its potential. Less than 5% of herbs and spices have been studied.
- Others problem are standardization and quality control during plantation, harvesting, processing, preserving and others possibilities for marketing.
- One of bottle neck is difficulty in detection, identification, and quantitation of bioactive compounds since the raw materials consist of complex components (working synergist and/or antagonist).
- One of promising approach is metabolomics

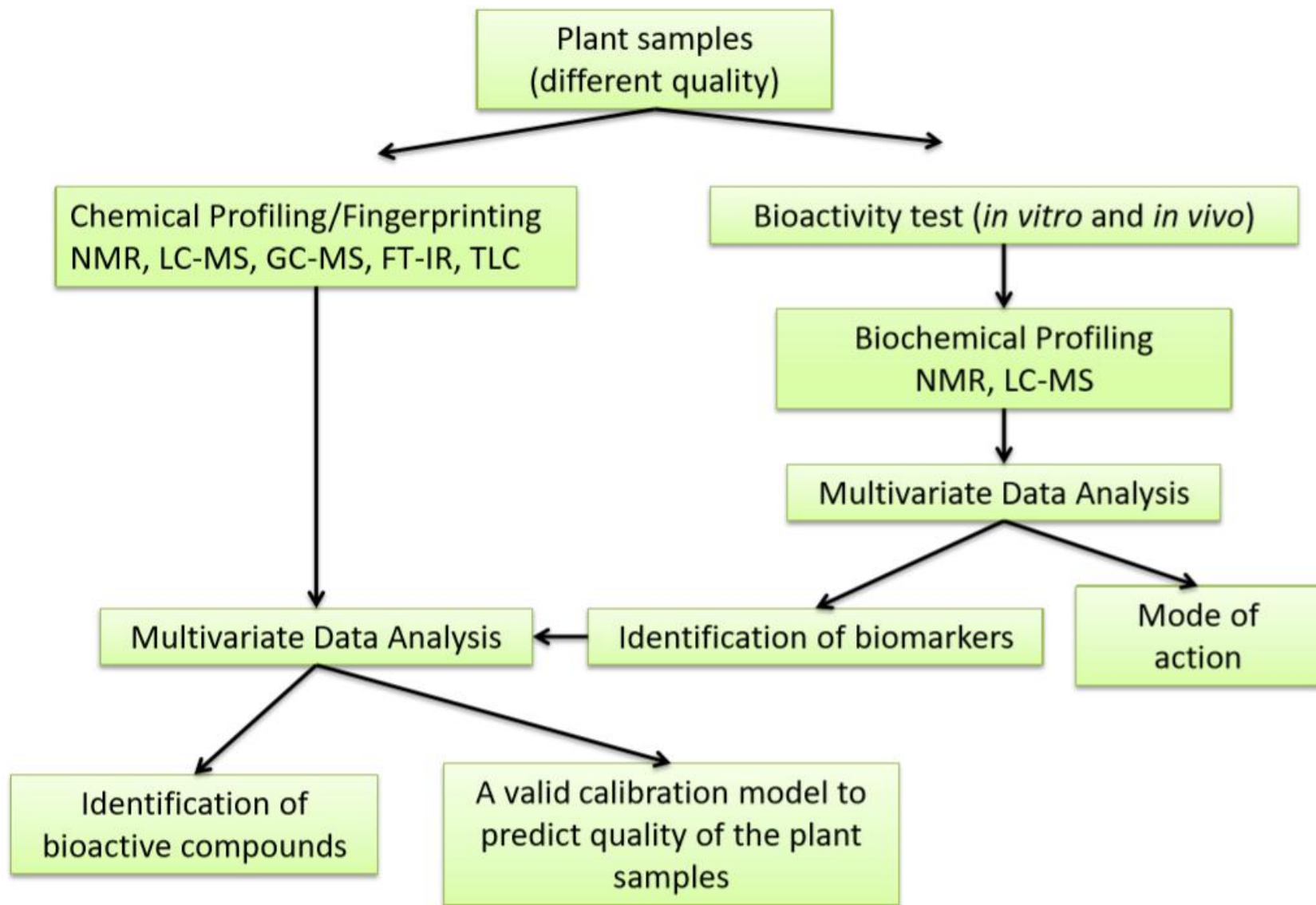
What is metabolomics?

- Metabolomics: comprehensive analysis of the **whole metabolome** under a given set of conditions (Fiehn *et al.*, 2000)
- Focuses on small molecules or low molecular weight chemicals (<1500 Da) involved in metabolisms network.

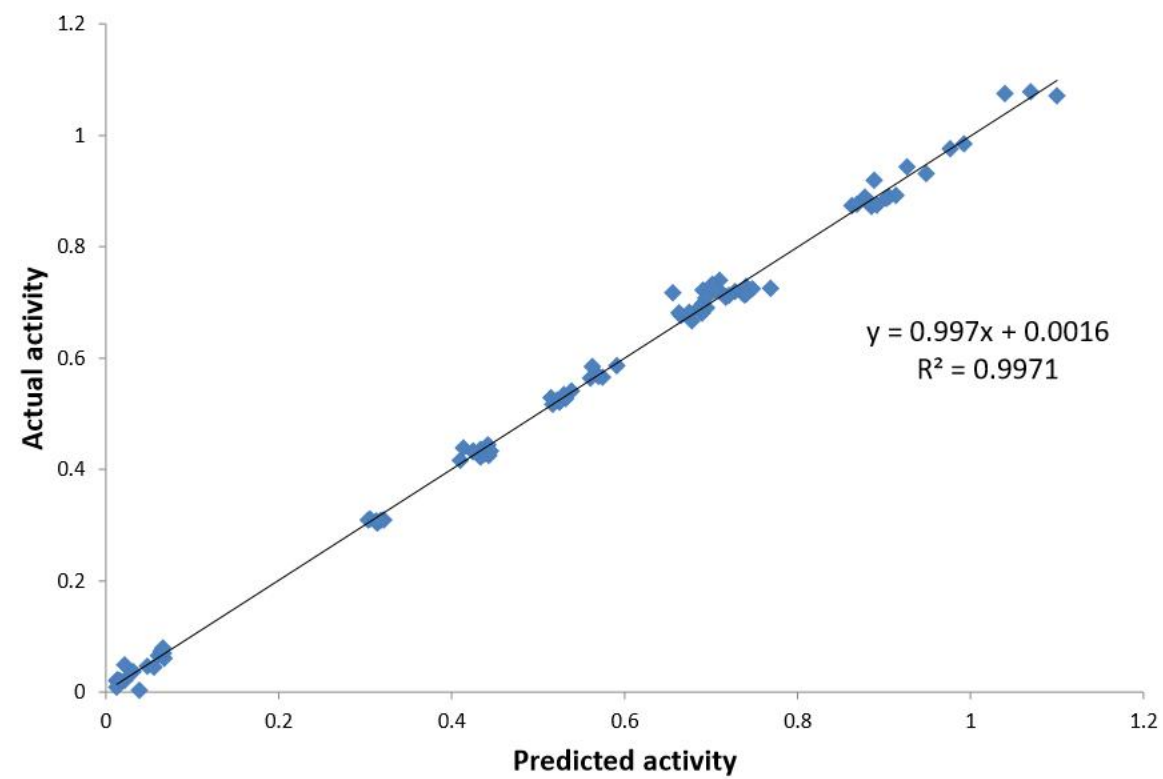


Examples of metabolomics application in medicinal herbal science

1. Analysis of known bioactive compounds and screening of metabolites in the extracts prior to isolation of unknown bioactive compounds.
2. Analytical tool in quality control and process optimization of herbal products based on the fingerprint of their metabolites.
3. Comprehensive bioactivity and toxicity evaluation of the herbal products



Predicting bioactivity based on the spectrum/chromatogram



Optimization Process

DESIGN-EXPERT Plot

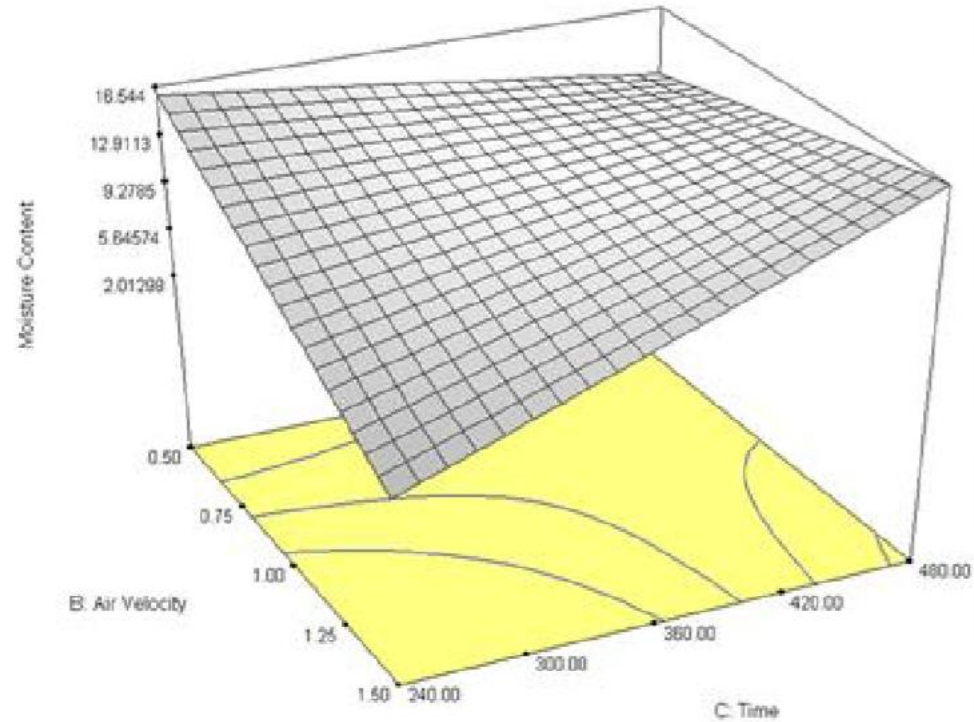
Moisture Content

X = B: Air Velocity

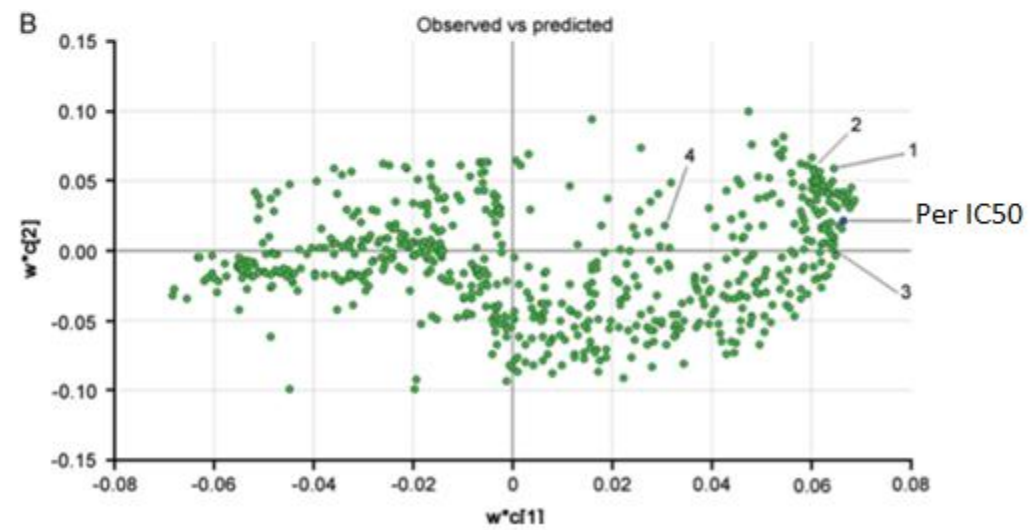
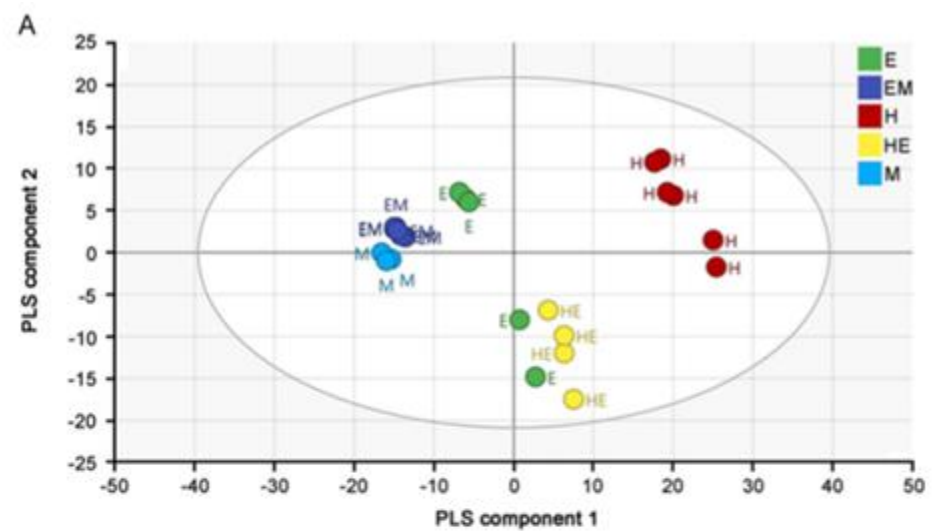
Y = C: Time

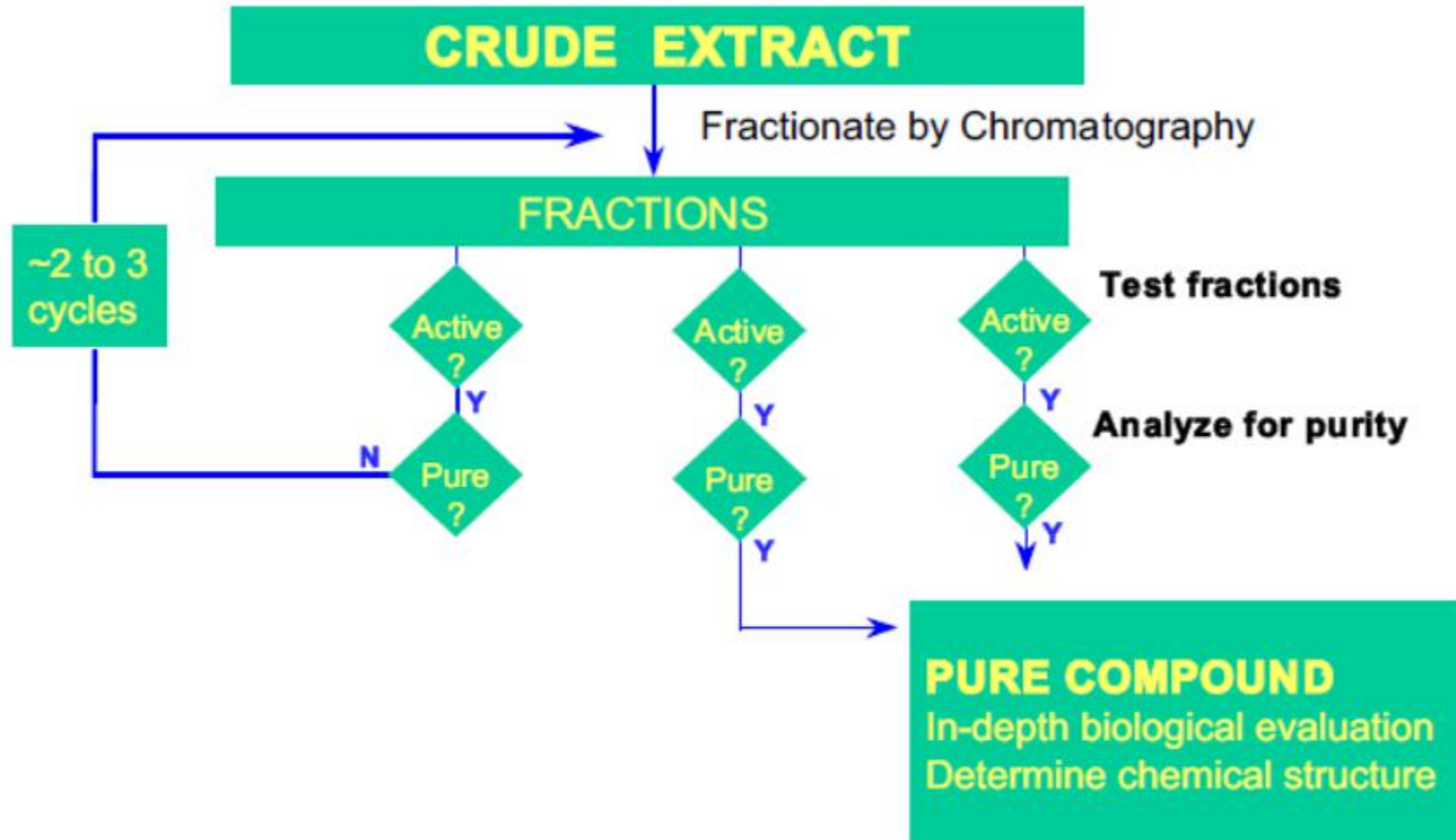
Actual Factor

A: Temperature = 50.00



Response surface and contour plots for interaction effects of temperature, air velocity and drying time on bioactivity of a medicinal herb





(Koehn et al, 2020)

Conclusion

- Metabolomics open the possibility to fasten the identification of novel bio- and chemical markers.
- Validated calibration model can be used to predict the bioactivity of new set of sample.
- Comprehensive study on mode of action.
- Toxicity of samples can be detected earlier.

*Thank
you*



and lets collaborate