

BIOCONVERSION OF EUGENOL INTO FOOD FLAVORING AGENT VANILLIN

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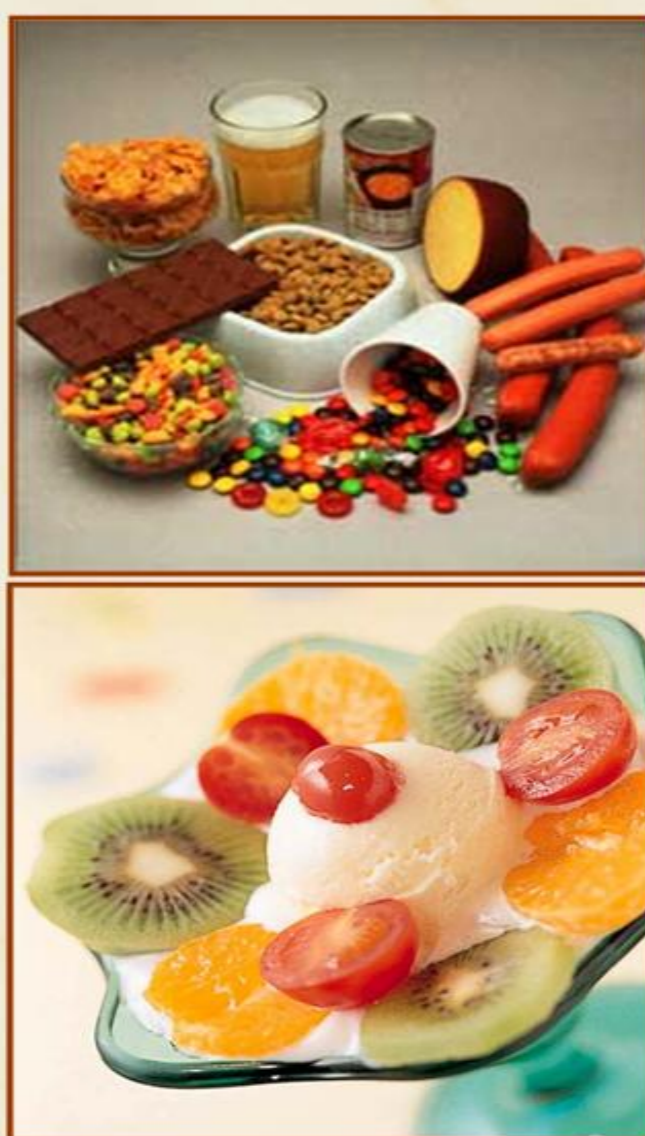
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- * Bioconversion: Process of modifying any organic compound into more water-soluble form using organisms
- * It is an emerging field of biotechnology and encompasses both enzymatic and microbial biocatalysis
- * Ecofriendly as they are less damaging to the environment than the chemical processes
- * Microbial cells accept a wide array of molecules as substrates yielding products with unparalleled chiral, positional and chemical selectivity through various biochemical reactions.
- * Microorganisms serve as *in vitro* model to predict the mammalian metabolism

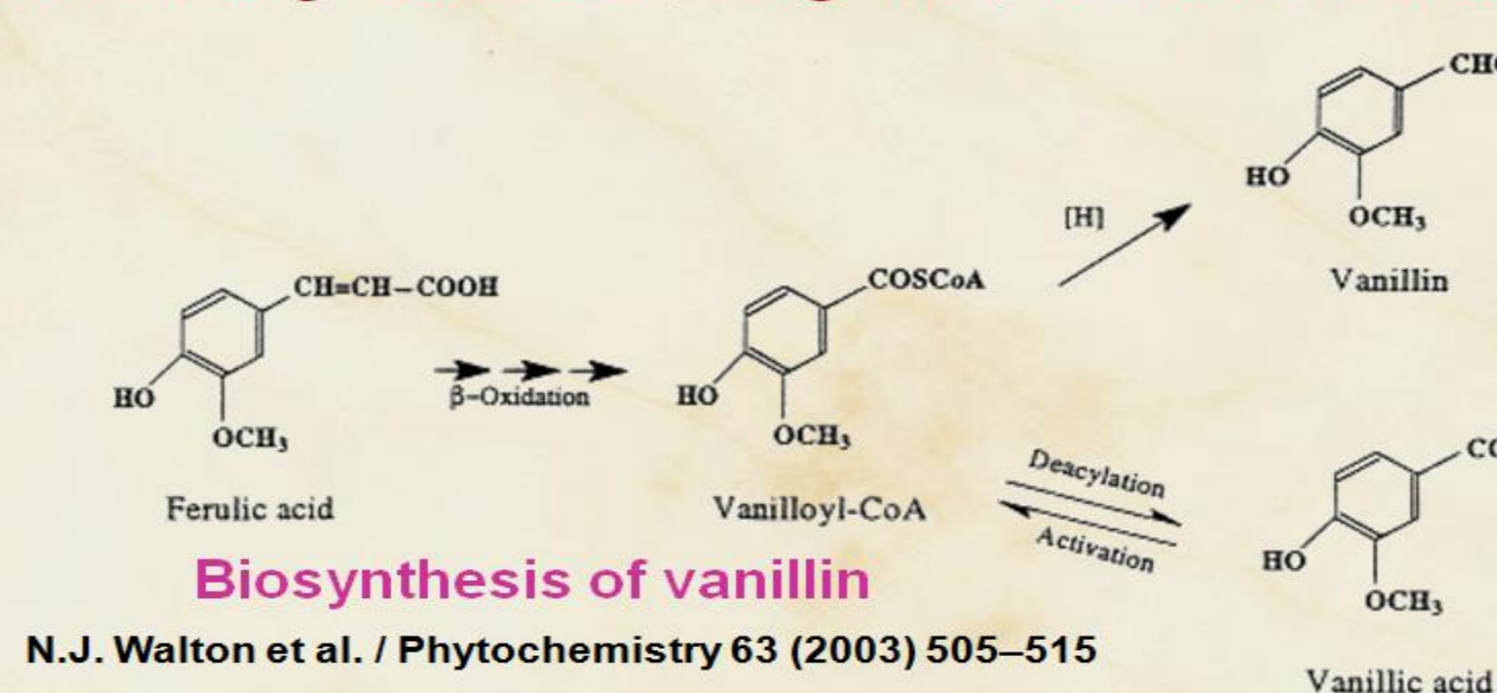
Food flavoring agents

- * Flavors and fragrances have wide application in the food, feed, cosmetic, and pharmaceuticals
- * The food industry uses over 4,500 different flavoring agents to disguise or improve the flavor of processed foods and drinks
- * We eat about 14 pounds (6.5kg) of food additives every year on an average



Vanillin

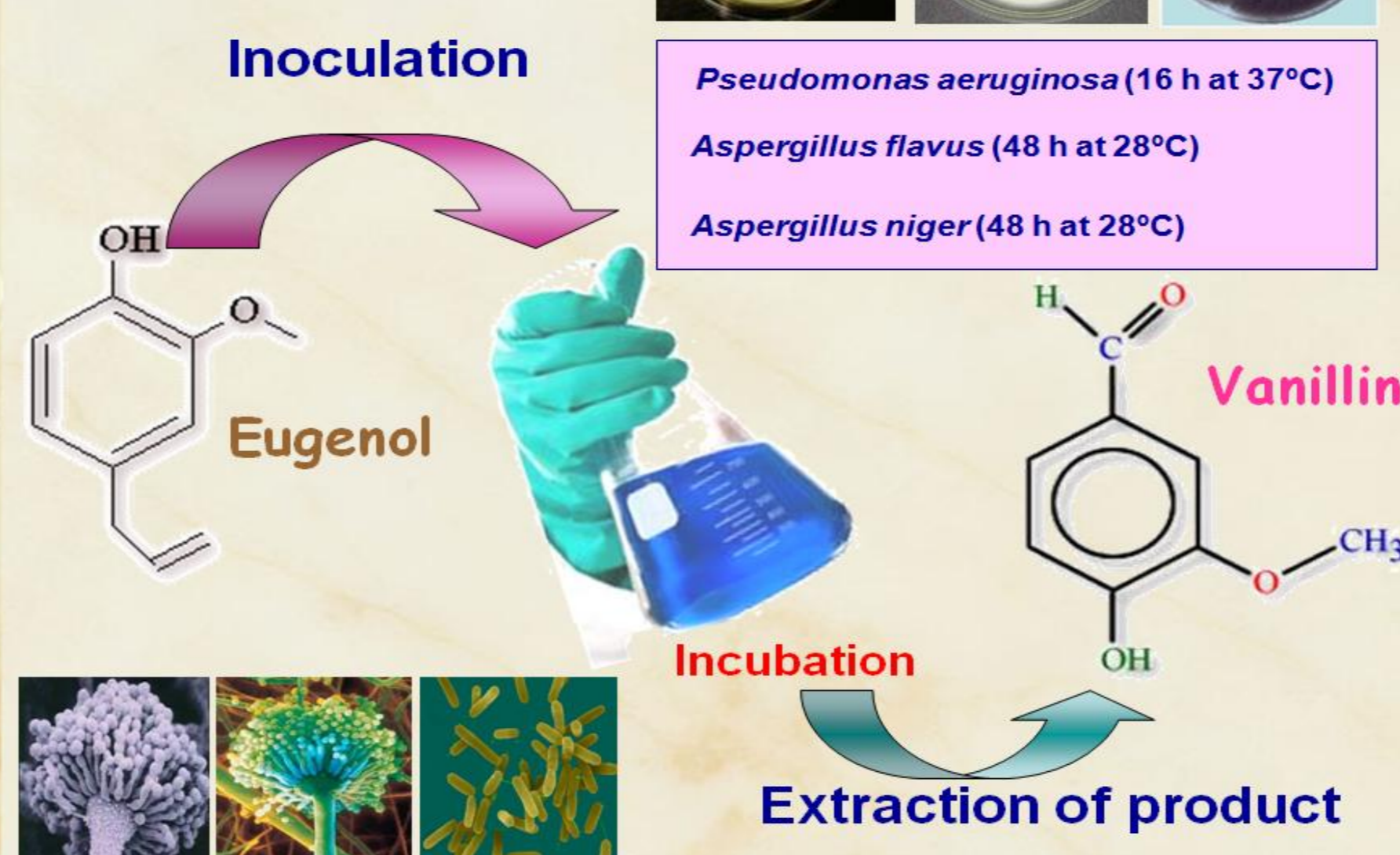
- * Natural vanillin (4-hydroxy-3-methoxybenzaldehyde) is one of the most commonly used food flavoring agents. It has its application in the perfumery industry too
- * Vanillin is extracted from pods of *Vanilla planifolia* belonging to the family Orchidaceae
- * Vanillin is a metabolic intermediate in the biodegradation of a variety of natural products, including stilbenes, eugenol, ferulic acid and lignin



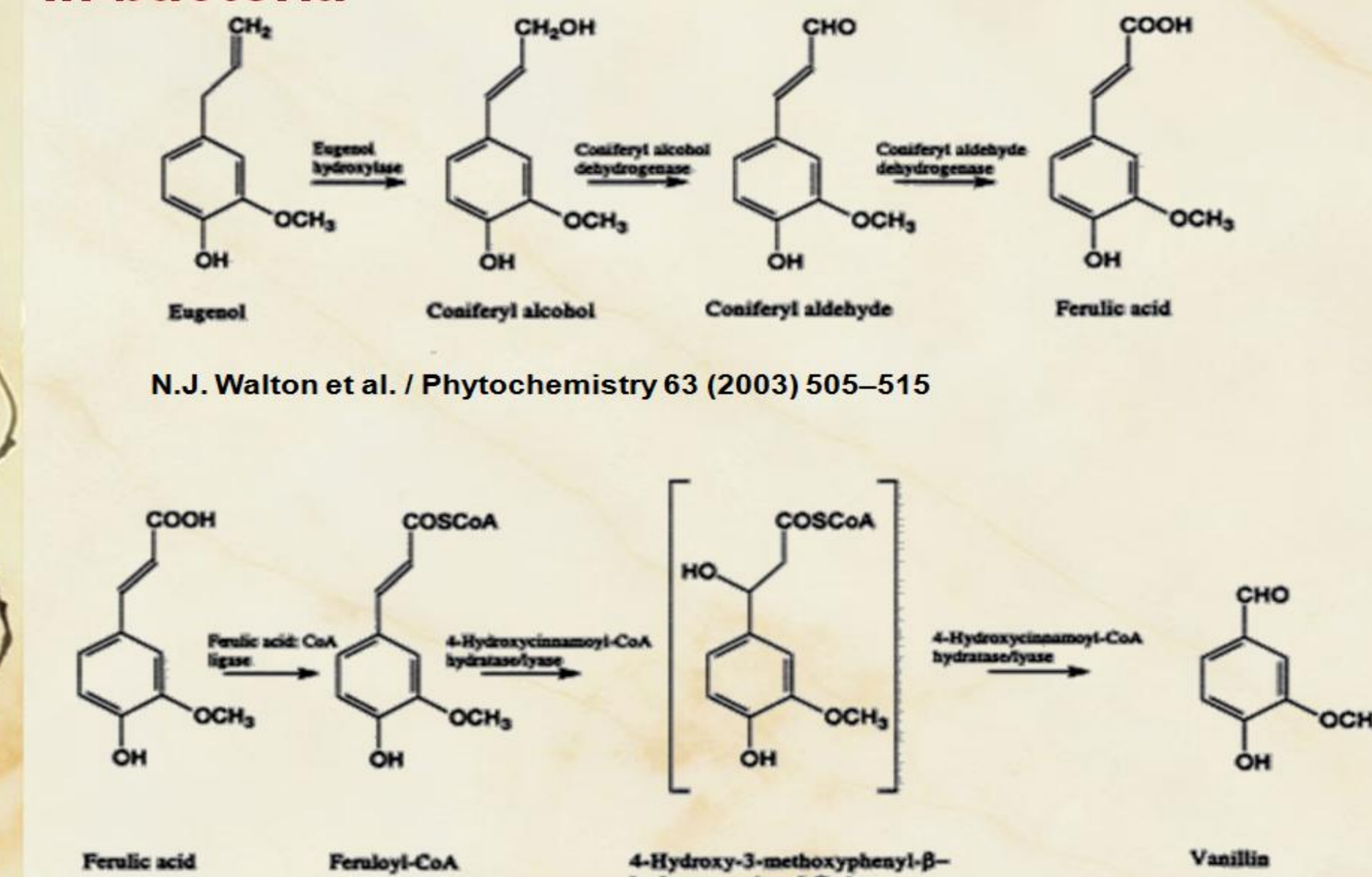
Objective

- * The increasing demand for healthy and natural food, there is a growing interest to produce vanillin from natural raw materials by biotransformation at cost-effective rates
- * The present study was formulated on the objective of the conversion of abundantly available phytochemical eugenol into vanillin using microorganisms:
 - Aspergillus flavus*
 - Aspergillus niger*
 - Pseudomonas aeruginosa*

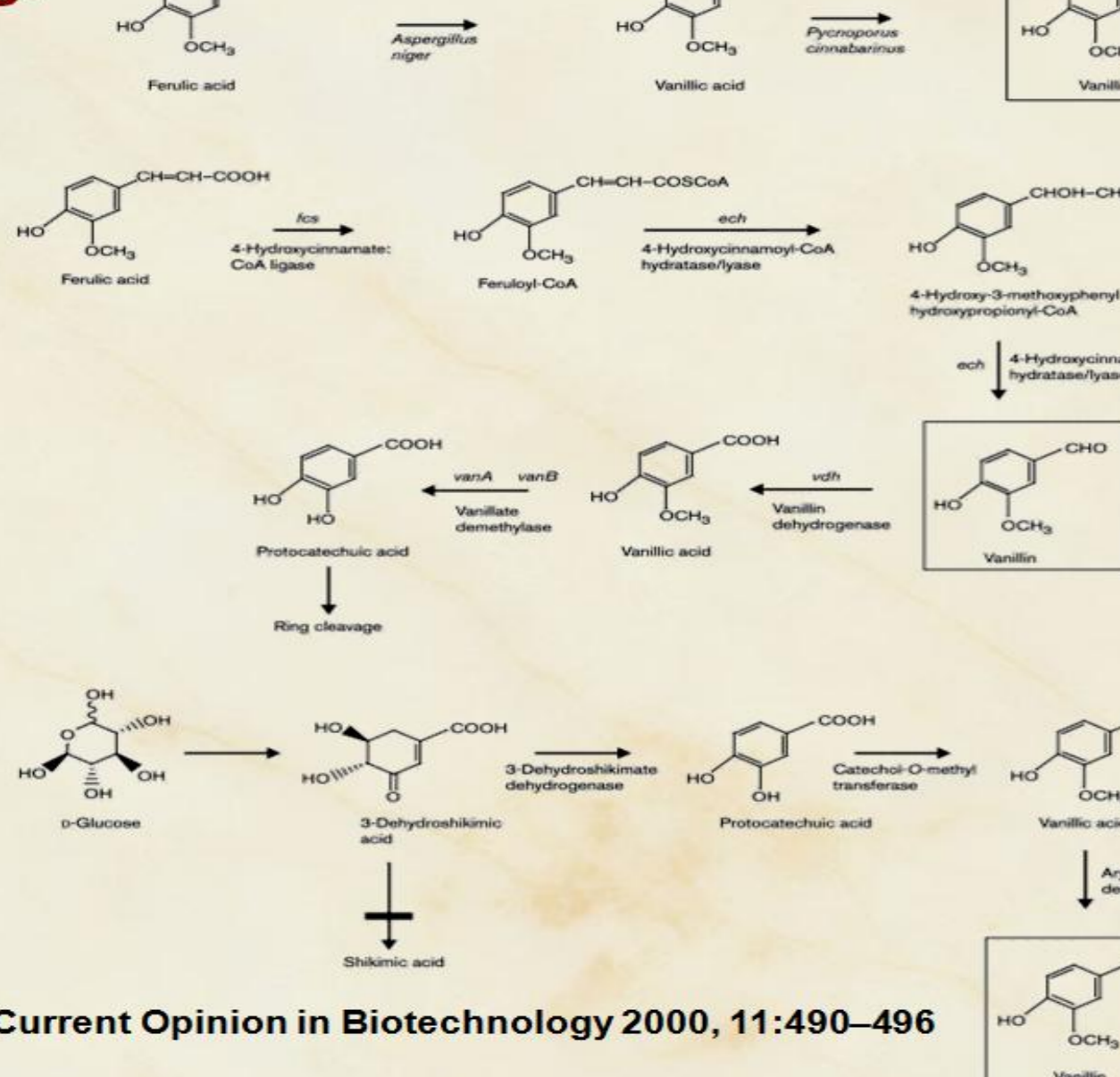
Experiment



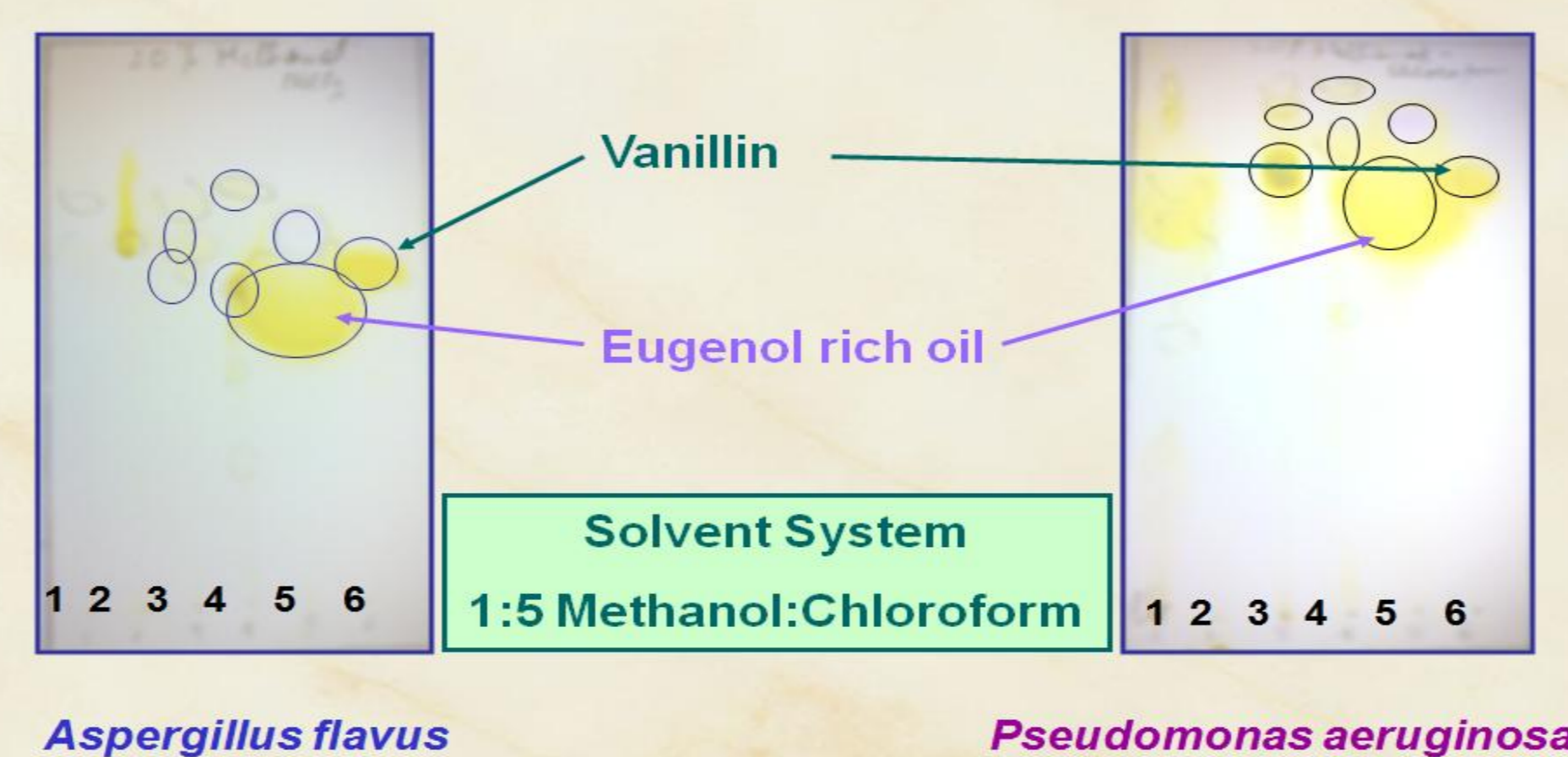
Bioconversion pathway of eugenol to vanillin in bacteria



Reported bioconversion pathways of eugenol in fungi



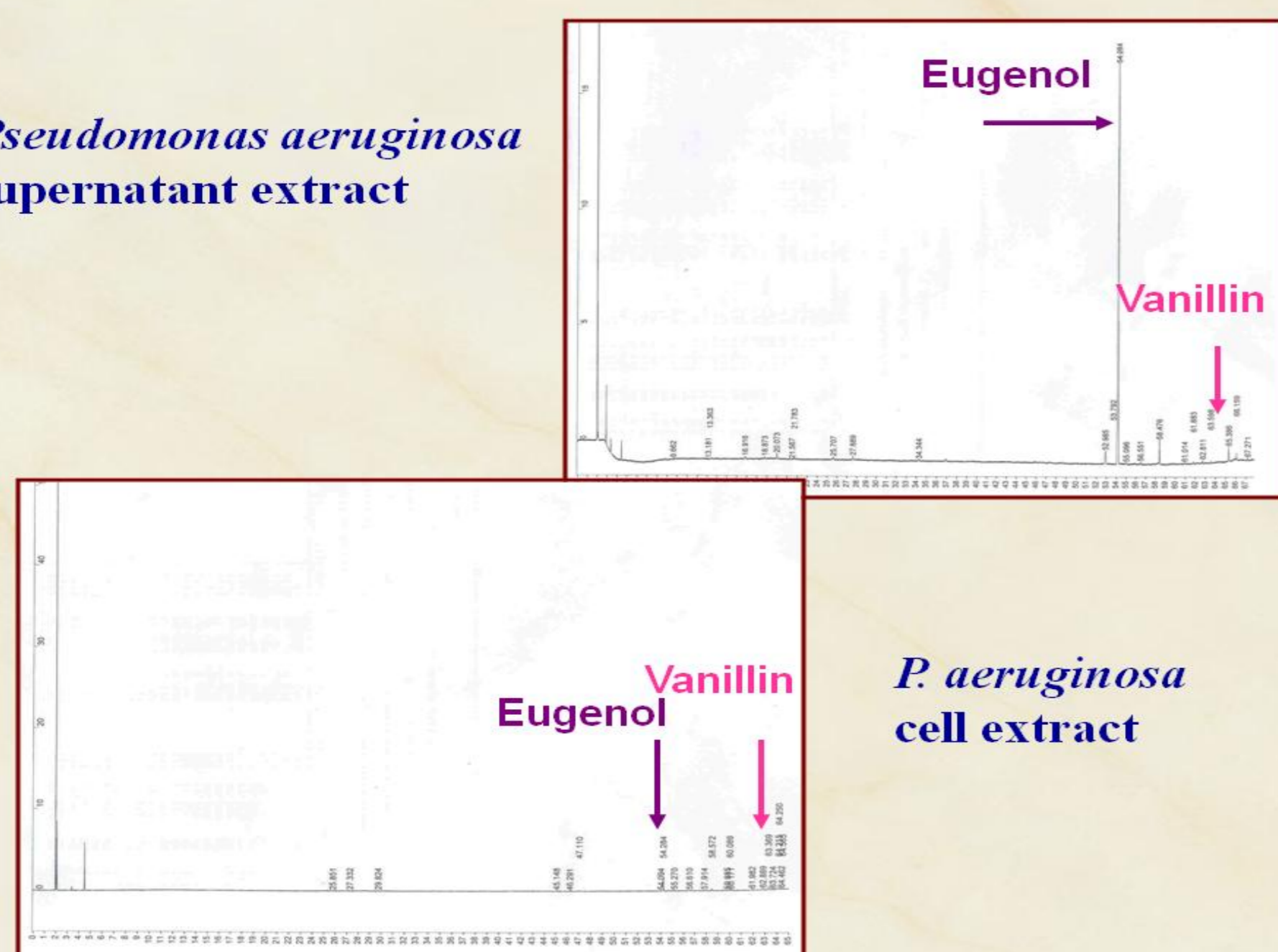
Thin Layer Chromatographic Profile of Eugenol and Vanillin



Results of Biotransformation from Eugenol to Vanillin

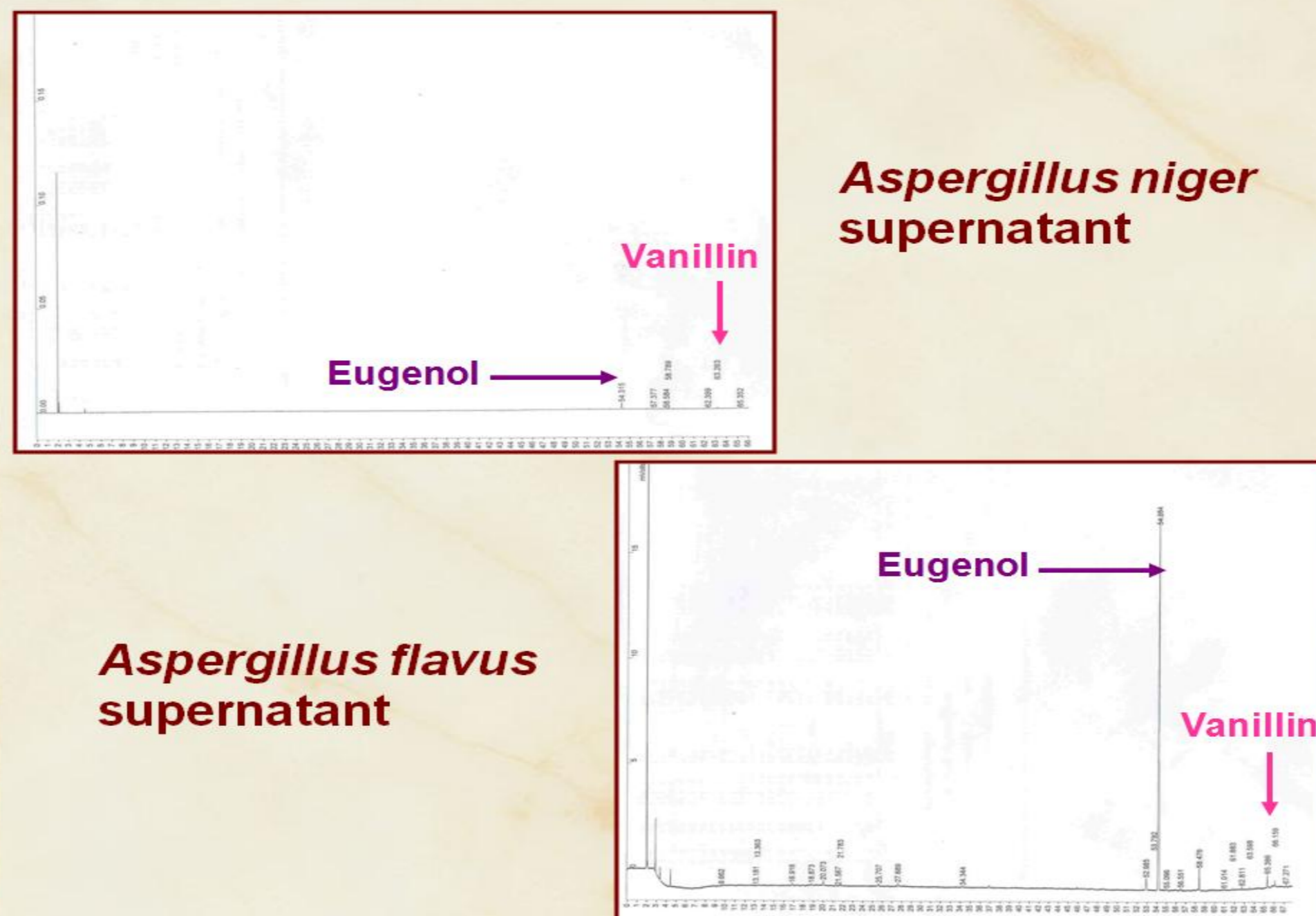
| Microorganism used | Percent vanillin (supernatant) | Percent vanillin (cell) |
|-------------------------------|--------------------------------|-------------------------|
| <i>Pseudomonas aeruginosa</i> | 1.01 | 15.0 |
| <i>Aspergillus flavus</i> | 12.53 | - |
| <i>Aspergillus niger</i> | 7.95 | - |

Pseudomonas aeruginosa supernatant extract



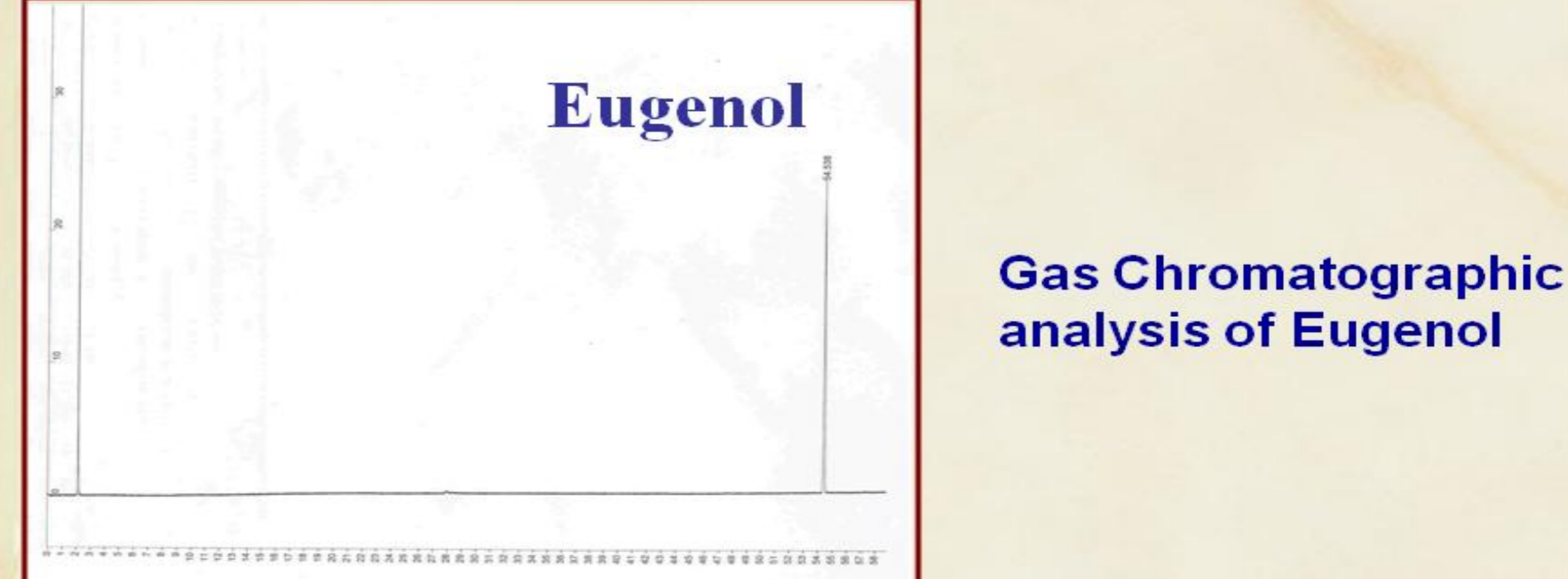
P. aeruginosa cell extract

Aspergillus niger supernatant



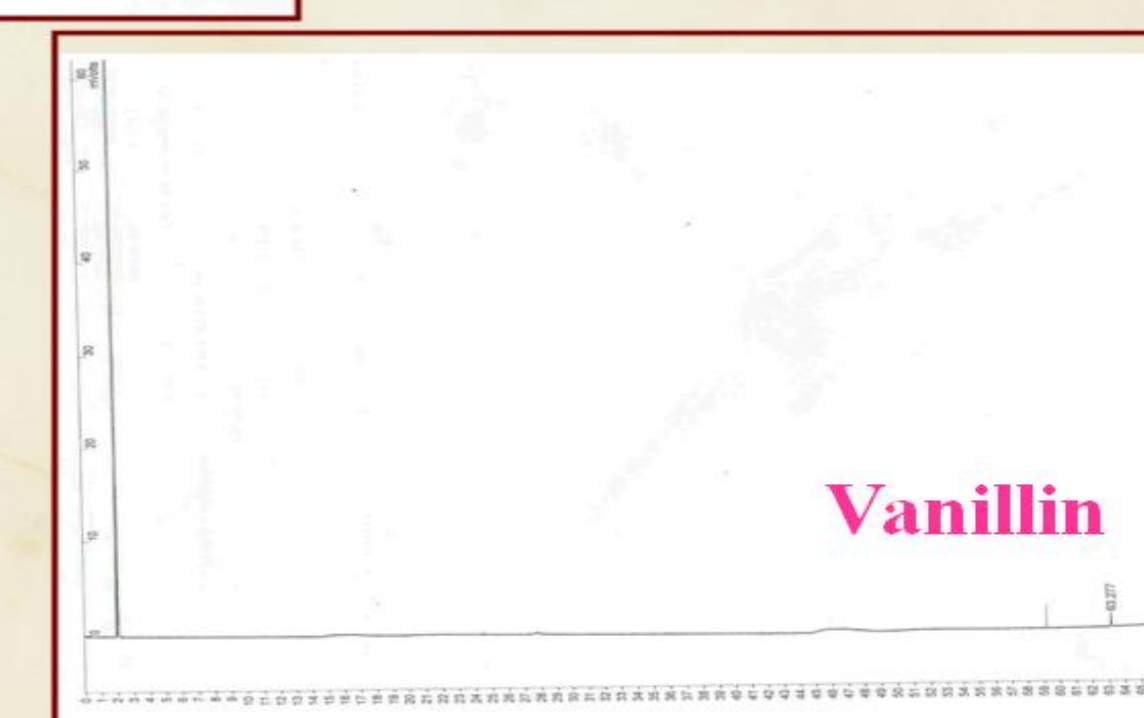
Aspergillus flavus supernatant

Eugenol



Gas Chromatographic analysis of Eugenol

Gas Chromatographic Analysis of Vanillin



Vanillin

CONCLUSION

- * From the present set of experiments we conclude that the microorganisms *Aspergillus flavus*, *Aspergillus niger* and *Pseudomonas aeruginosa* were found to transform eugenol into vanillin.
- * Our findings pave a novel path for the production of the food flavoring agent, vanillin at the cost-effective rate using microorganisms in an ecofriendly manner

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