# Diversity Bread Analysis

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Research Manager Mass Spectrometry

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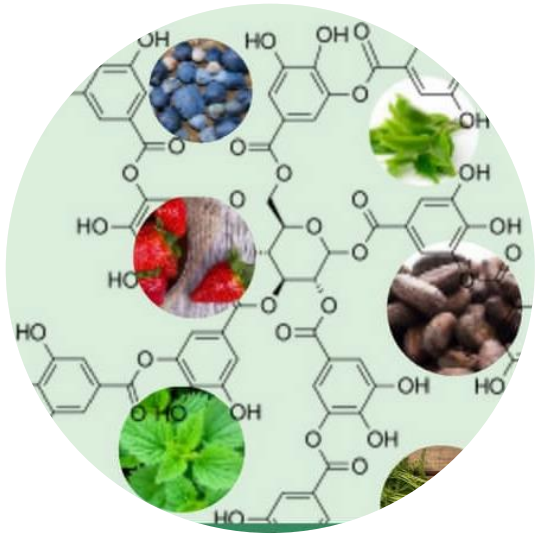
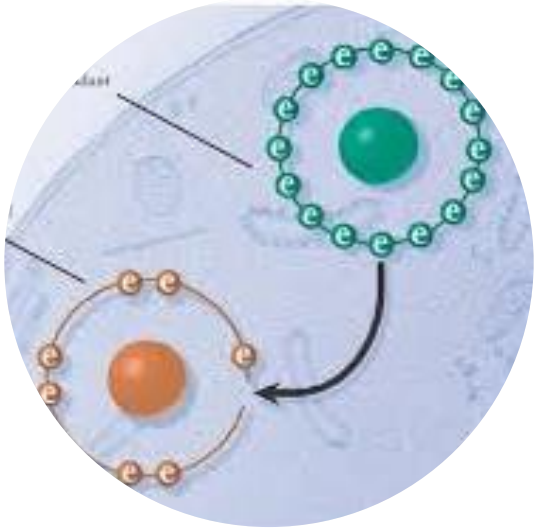
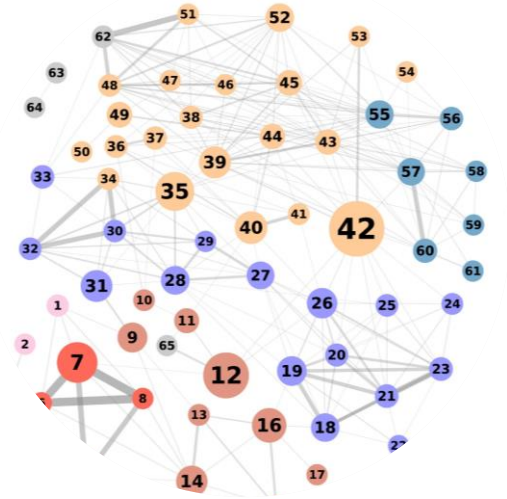
# Overview of Analysis



POLYPHENOL CONTENT



ANTI-OXIDANT ACTIVITY



FOOD METABOLOME

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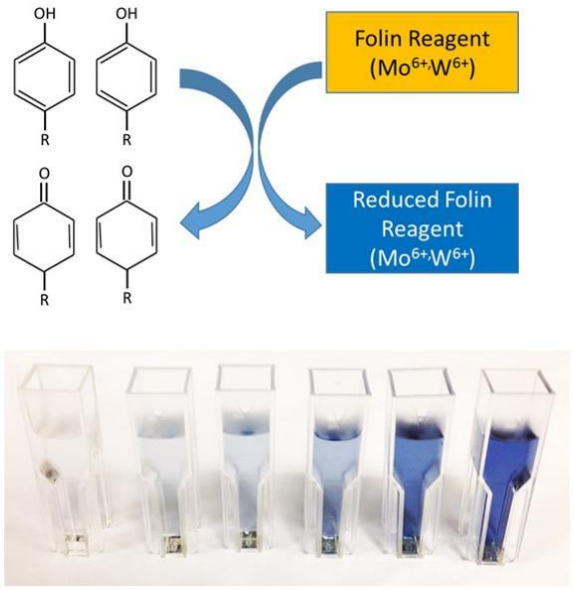
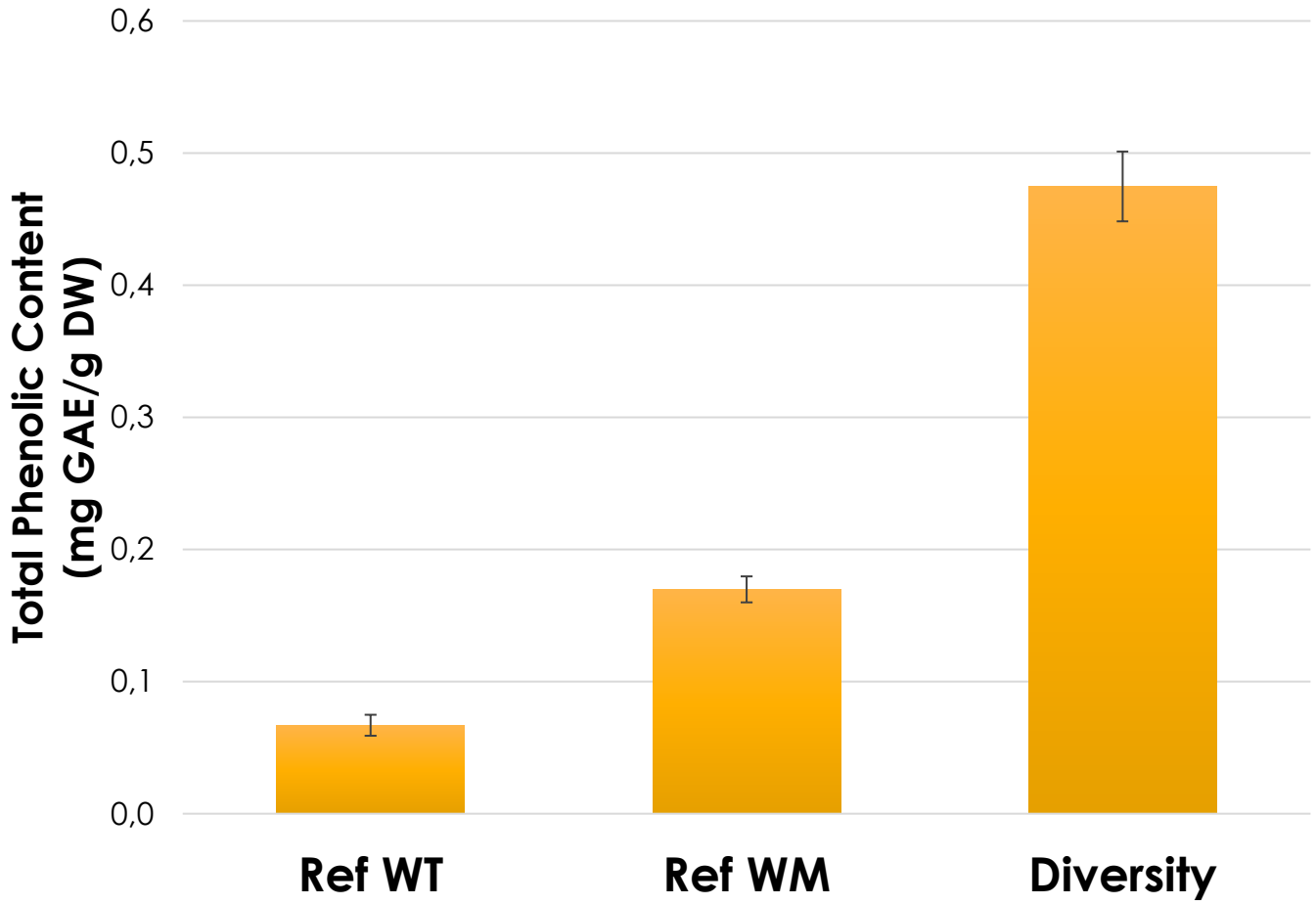
# Total Poly Phenol Content




Based on Christopher et al., 2021, Applied Microbiology




Diversity ~ x 2.8 **WM** (**W**hole **M**eal)

Diversity ~ x 8 **WT** (**W**hi**T**e)

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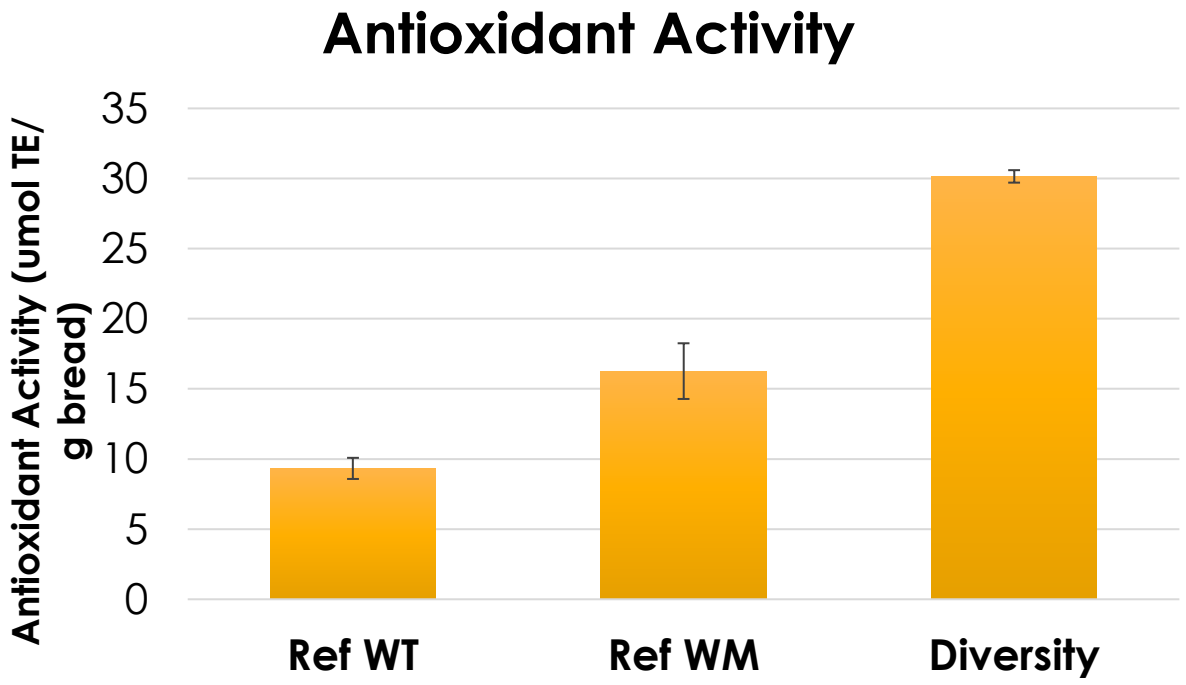
# Total Anti-Oxidant Capacity Assay Kit

- Based on $Cu^{2+}$ to $Cu^{+}$ conversion (Sigma, MAK187)
- Diversity Bread ~ x2 WM Breads ~x3 WT Bread



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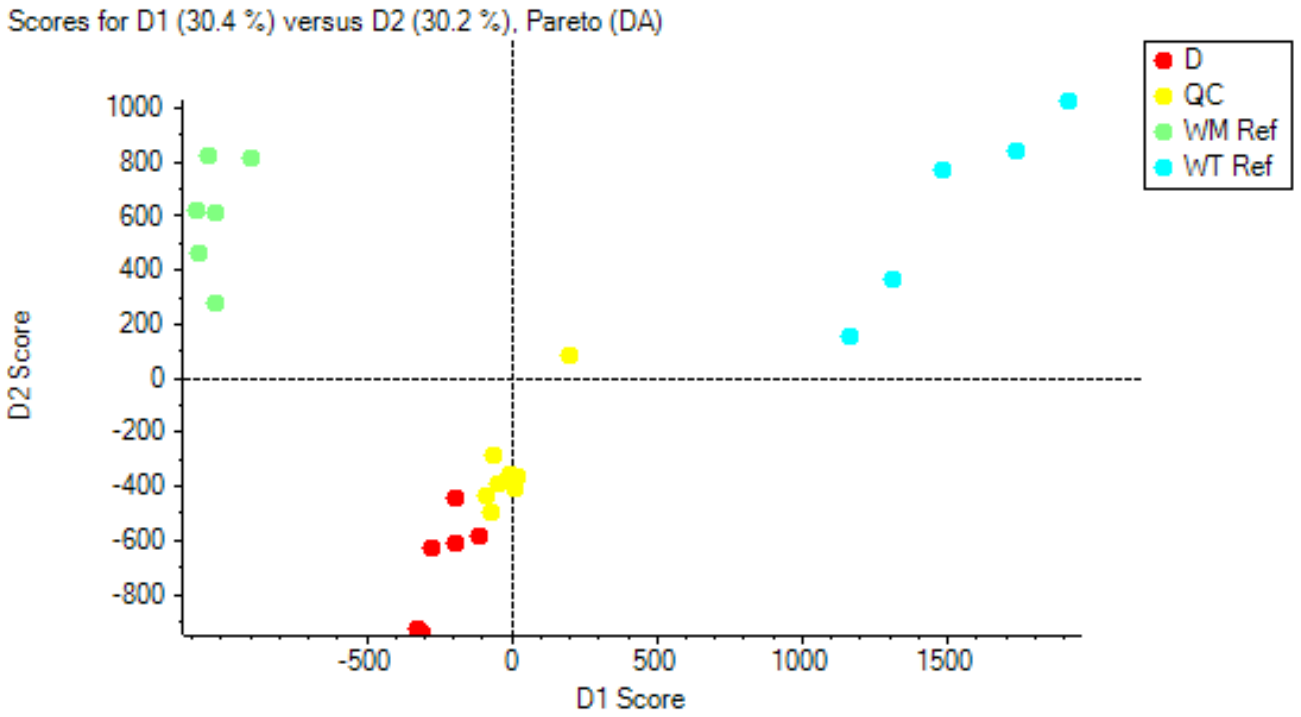
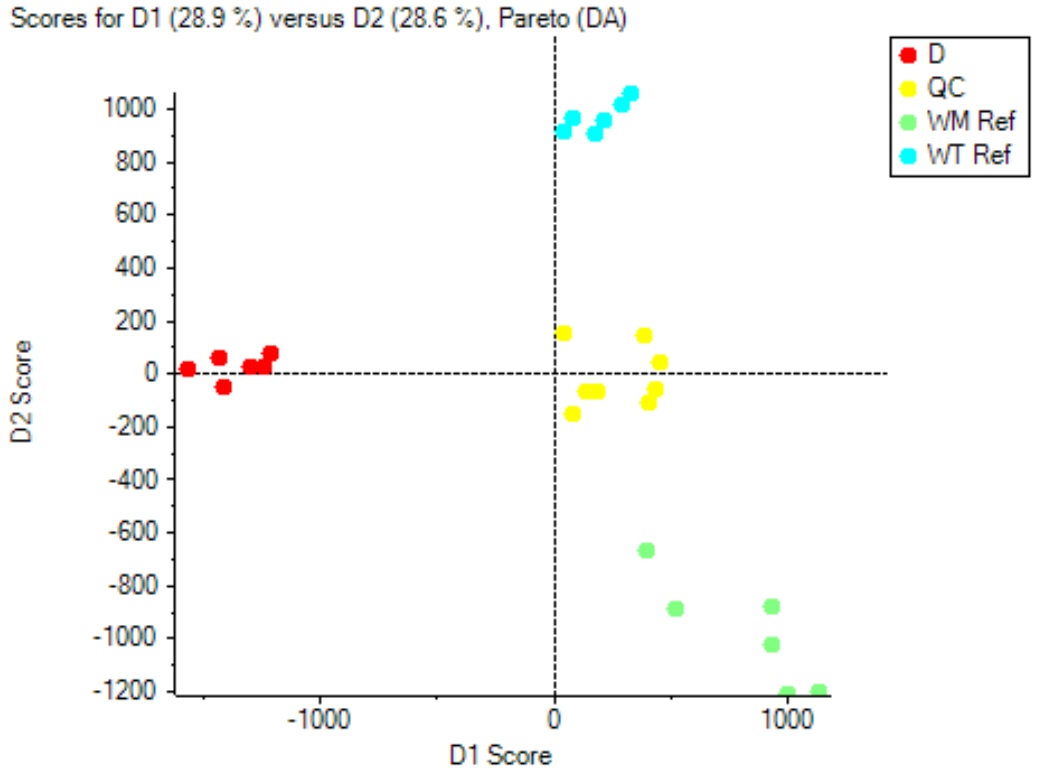
# LC-MS Metabolomics Analysis: PCA

## Pos Mode




## Neg Mode




Diversity Bread is more similar to a WM (wholemeal) bread and less to WT (white).
Logic as 15% of Bran added to the reciepe.



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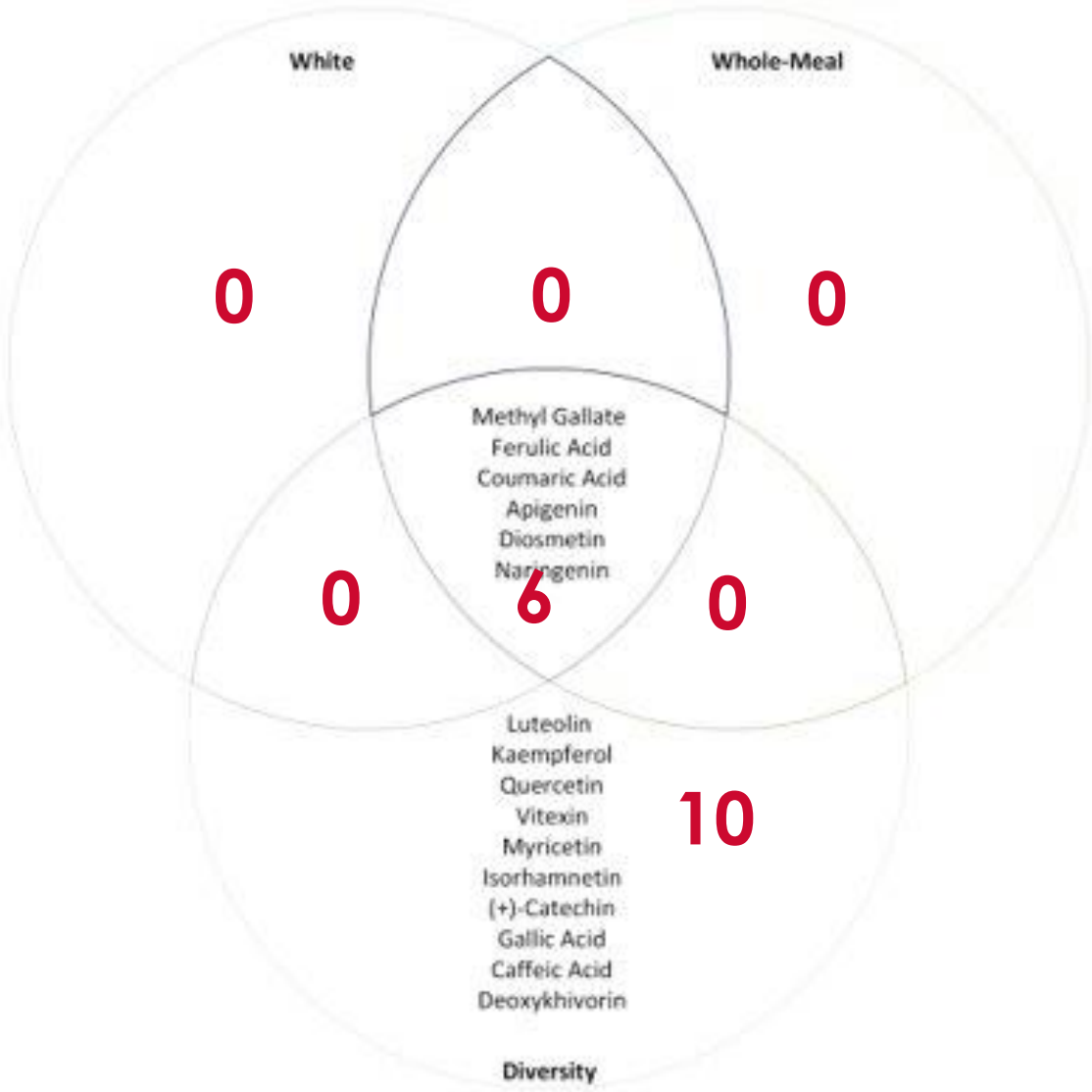
# Metabolomics Analysis: Poly Phenols

## LC- MS Analysis



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parsley, celery, basil, chamomile, cilantro, and oregano

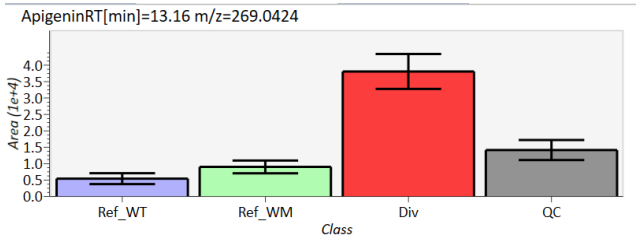
Citrus fruit

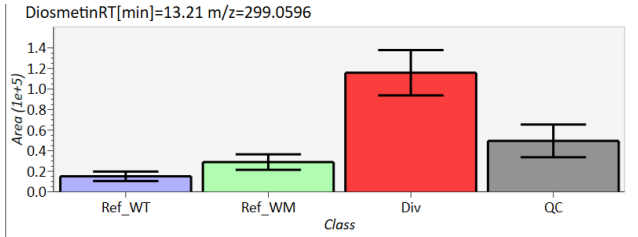
Lotus ucrainicus, Strychnos pseudoquina Quercetin 3'-methyl ether

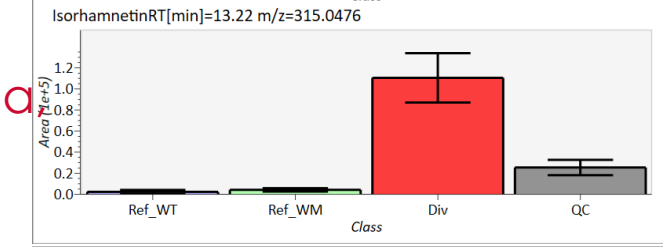
Onion & Red Wine

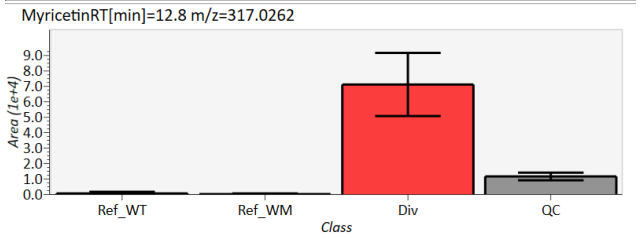
Citrus fruits, bergamot, tomatoes and other fruits

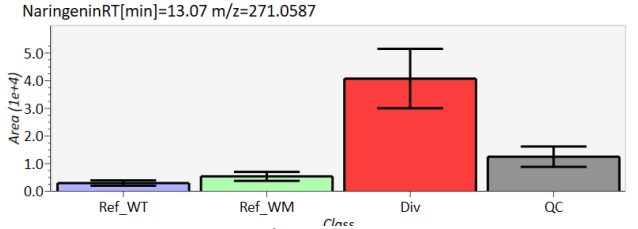
rice, wheat, oats, and pineapple), grasses, grains, vegetables, flowers,

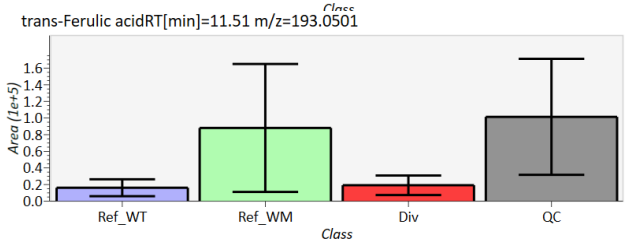


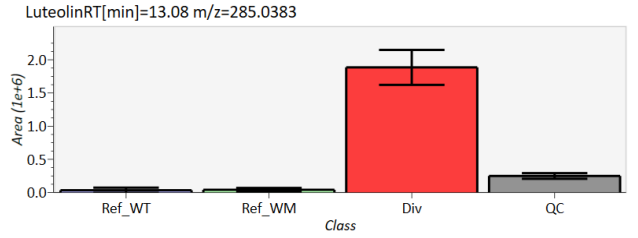



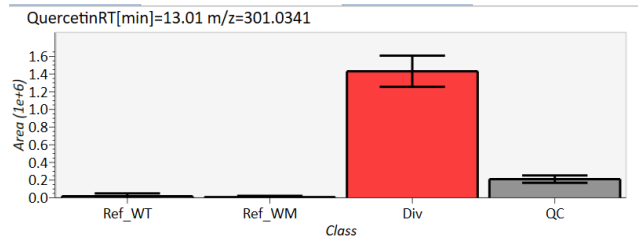



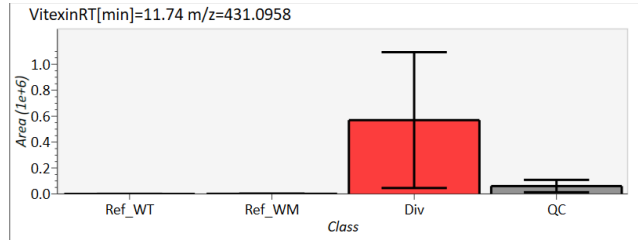



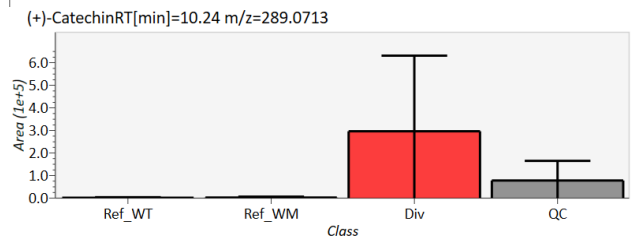



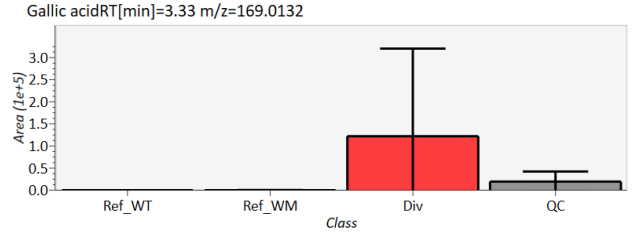



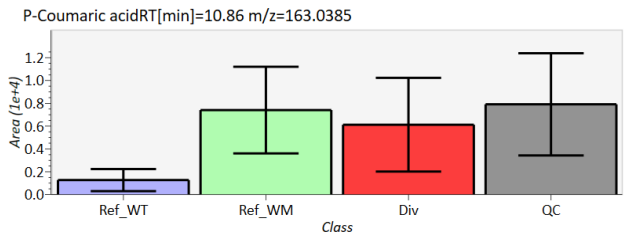




celery, parsley, broccoli, onion leaves, carrots, peppers, cabbages, apple skins, and chrysanthemum flowers

onions, grapes, berries, cherries, broccoli, and citrus fruits

passion flower, bamboo leaves and pearl millet

tea, apples, persimmons, cacaos, grapes, and berries

Most present Polyphenol in fruits, berries

peanuts, navy beans, tomatoes, carrots, basil and garlic

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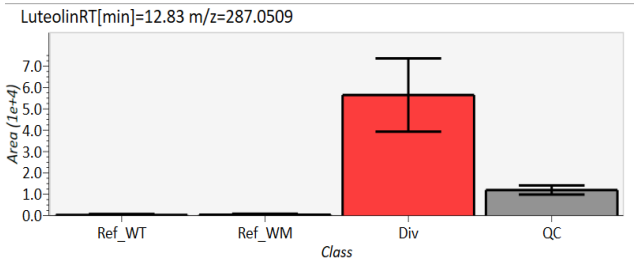
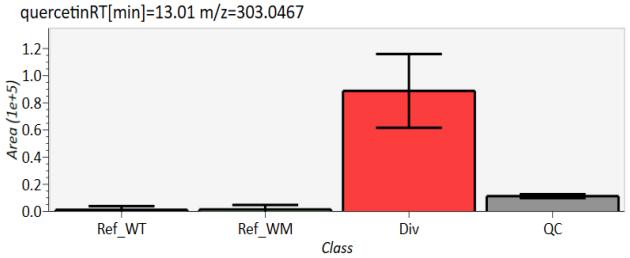
rinds, barks, clover blossom, and ragweed pollen

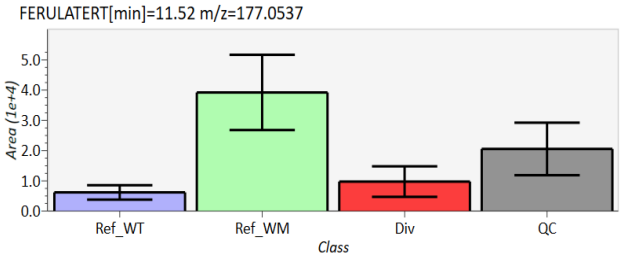
onions, grapes, berries, cherries, broccoli, and citrus fruits

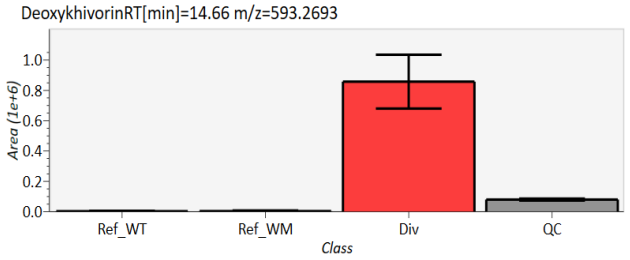
Cereal bran and bran-enriched products

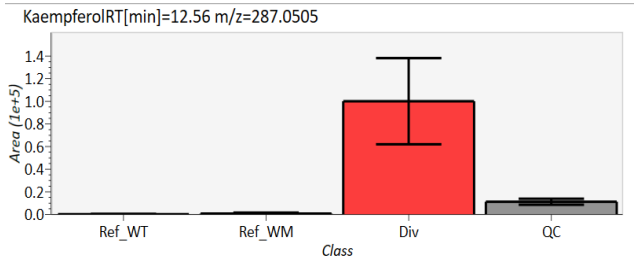
Acalypha Indica Root

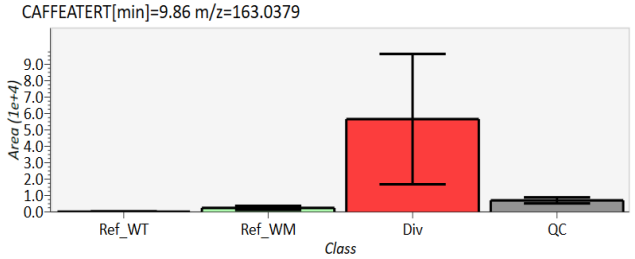


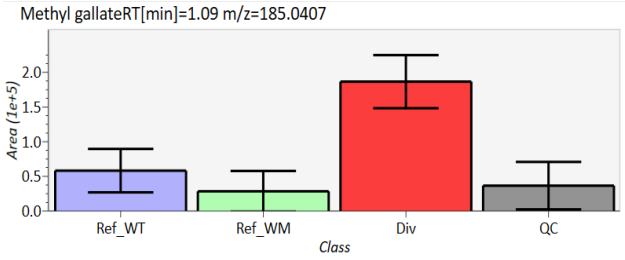



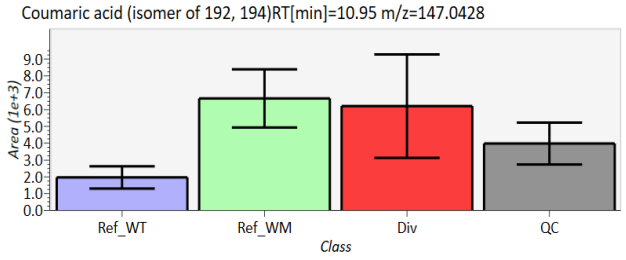




kale, beans, tea, spinach and broccoli.

Coffee

peach and pomegranate

peanuts, navy beans, tomatoes, carrots, basil and garlic



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| Class | Metabolite | Type of Ion | m/z | Retention Time/min | Potential Health Benefits |
|---|---|---|---|---|---|
| **Positive Ionization** | | | | | |
| Flavone | Luteolin | [M+H]+ | 287.0509 | 12.83 | Anti-oxidant |
| Flavonol | Kaempferol | [M+H]+ | 287.0505 | 12.53 | |
| | Quercetin | [M+H]+ | 303.0467 | 13.01 | |
| Phenolic Acids | Caffeic Acid | [M-H2O+H]+ | 163.0379 | 9.89 | Anti-inflammatory & Anti-carcinogenic |
| | Ferulic Acid | [M-H2O+H]+ | 177.0537 | 11.53 | Anti-oxidant |
| | Methyl Gallate | [M+H]+ | 185.0407 | 1.07 | Anti-platelet action |
| Anthocyanin | Deoxykhivorin | [M+Na]+ | 593.2693 | 14.66 | Reduce Localized Fat |
| Other | Coumaric Acid | [M+H-H2O]+ | 147.0428 | 10.96 | Anti-inflammatory & Anti-microbial |
| **Negative Ionization** | | | | | |
| Flavone | Apigenin | [M-H]- | 269.0424 | 13.16 | Anti-oxidant |
| | Luteolin | [M-H]- | 285.0383 | 13.16 | |
| | Diosmetin | [M-H]- | 299.0596 | 13.21 | |
| Flavonol | Quercetin | [M-H]- | 301.0341 | 13.01 | |
| | Isorhamnetin | [M-H]- | 315.0476 | 13.20 | Anti-inflammatory |
| | Myricetin | [M-H]- | 317.0262 | 12.79 | |
| | Vitexin | [M-H]- | 431.0958 | 11.69 | Anti-oxidant |
| Flavan-3-ol | (+)-Catechin | [M-H]- | 289.0713 | 10.24 | |
| Flavanone | Narigenin | [M-H]- | 271.0587 | 13.09 | |
| Phenolic Acids | Gallic Acid | [M-H]- | 169.0135 | 3.33 | |
| | Ferulic Acid | [M-H]- | 193.0501 | 11.52 | |
| Other | P-Coumaric Acid | [M-H]- | 163.0385 | 10.88 | Anti-inflammatory & Anti-microbial |



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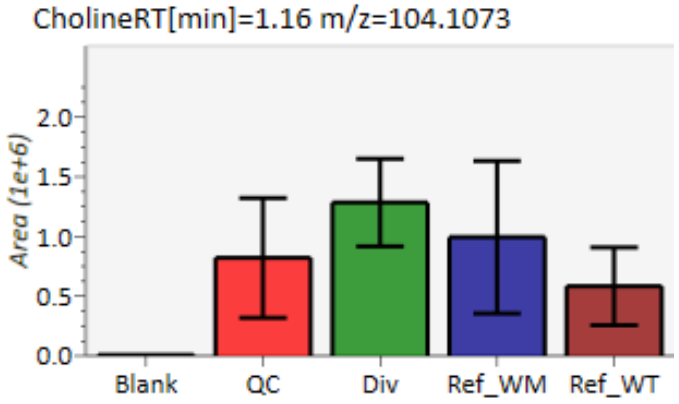
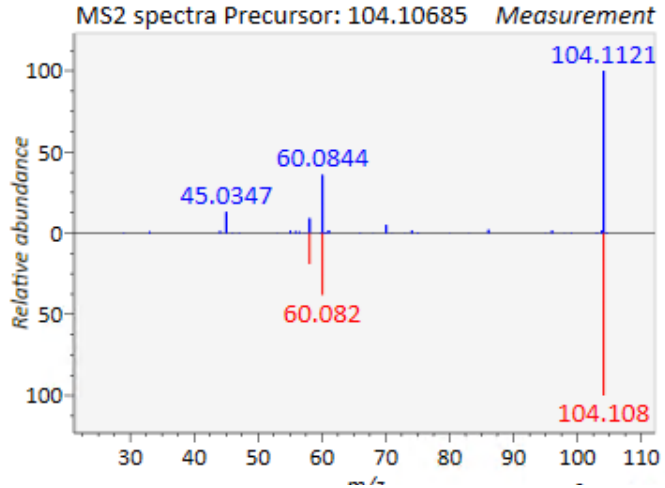
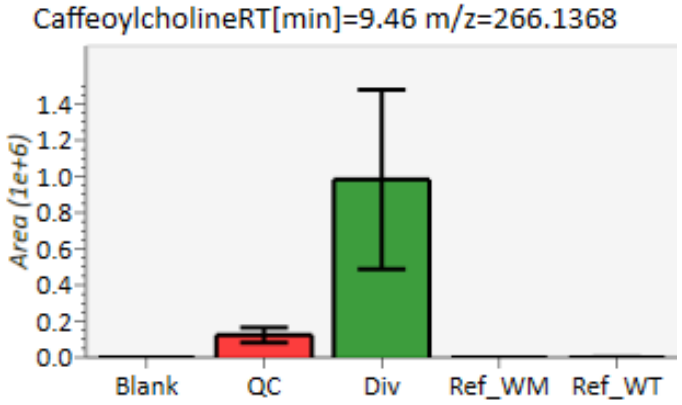
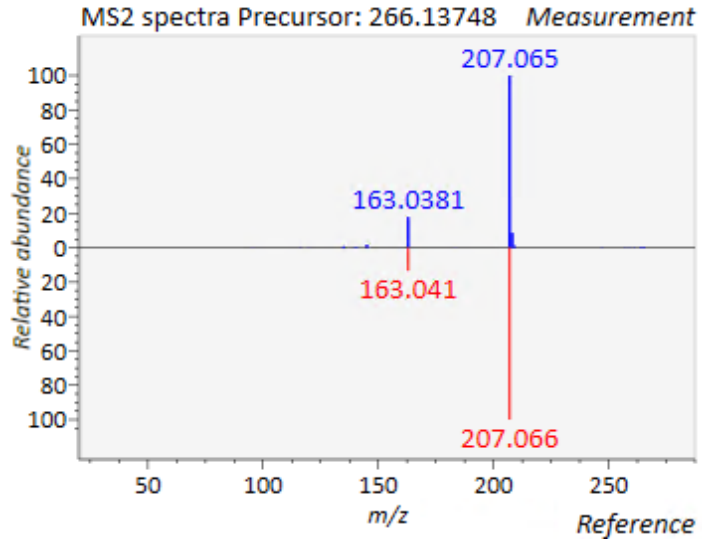
# Other Metabolites



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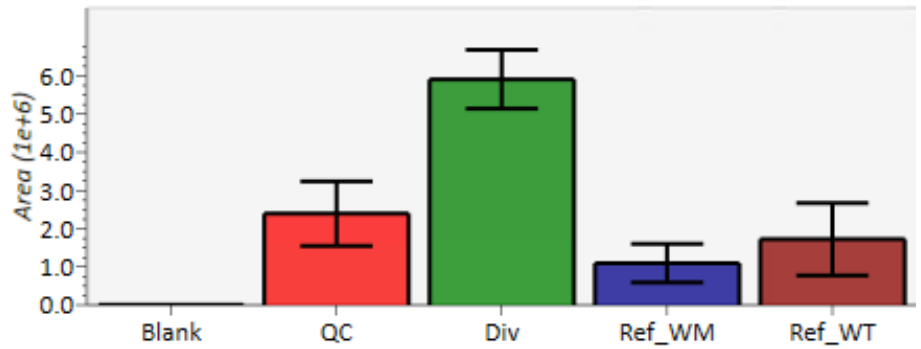
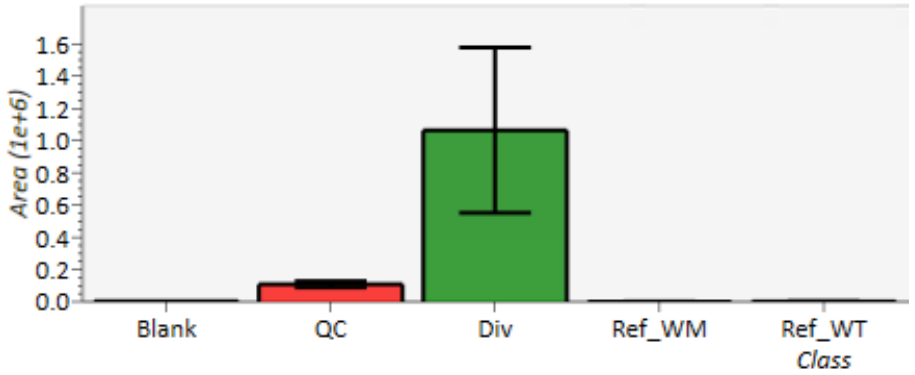
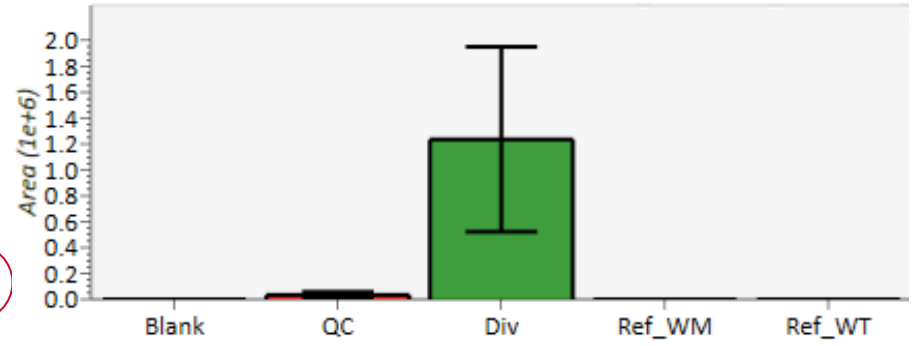
maltotrioseRT[min]=1.13 m/z=527.1527

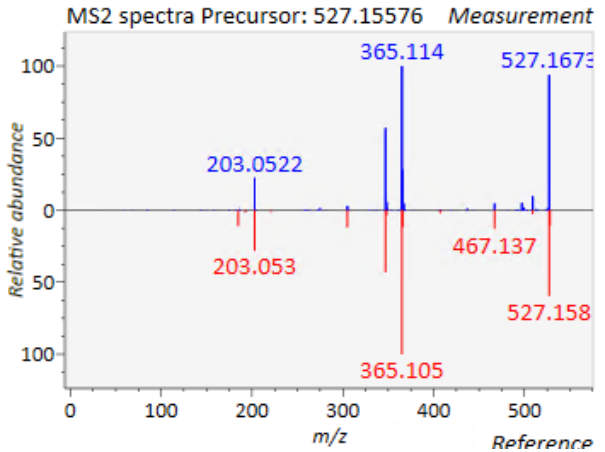


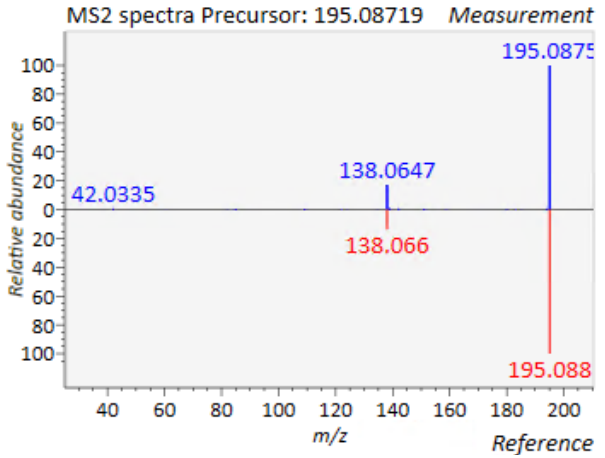

CaffeineRT[min]=10.06 m/z=195.0867

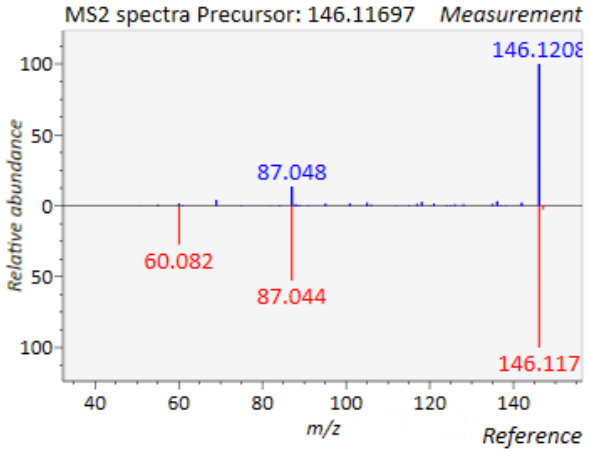



DEOXYCARNITINERT[min]=2.14 m/z=146.1168



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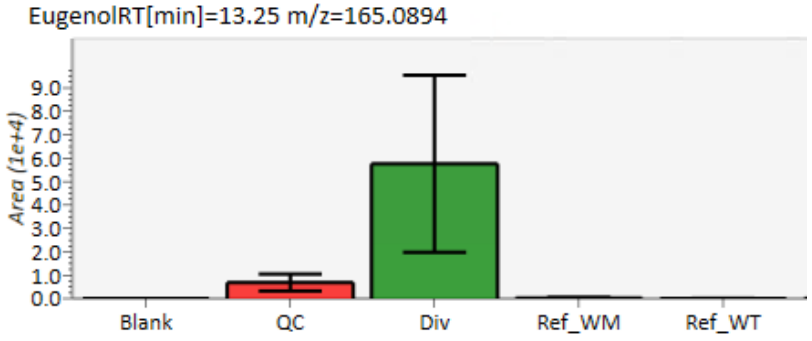
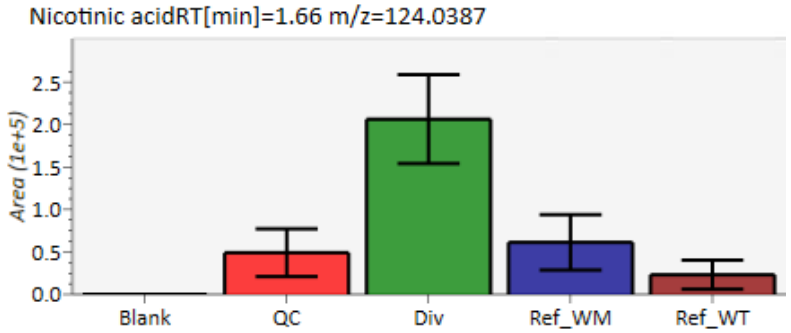
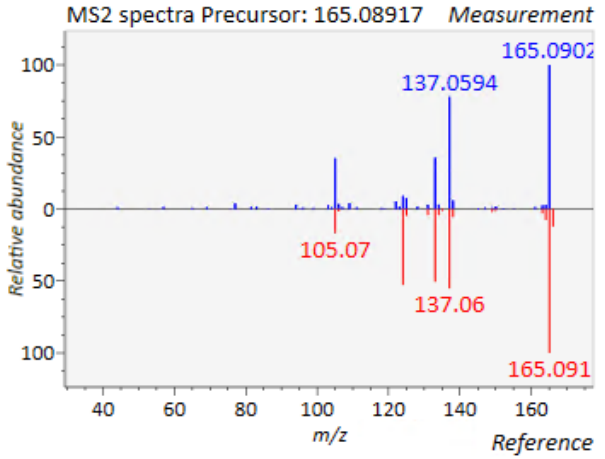
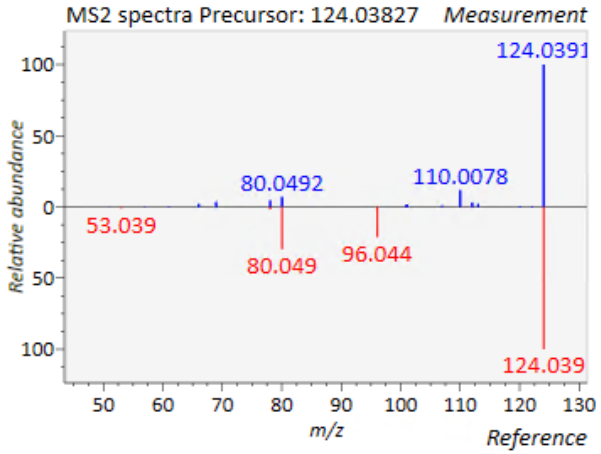



clove, nutmeg, cinnamon, basil and bay leaf. antibacterial, antifungal, antioxidant and antineoplastic activity




Vitamine B3



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# THANK YOU

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