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# Comparative Analysis of the Phytochemical Profile of Amaranth Leaf Varieties Using LC-MS Analysis

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**Abstract**
Amaranth leaves are a highly nutritious vegetable with high protein, vitamin, and mineral content. This study aimed to compare the chemical composition of leaves from different amaranth varieties. Leaves from three amaranth varieties were analysed for their bioactive compounds, mineral content (calcium, phosphorus, iron, and zinc), and vitamin content. Significant variations were observed among the varieties for all the parameters studied. The results indicate that amaranth leaves are a rich source of essential nutrients and that the nutritional value can vary depending on the variety. Further research is needed to identify the most nutrient-rich varieties and to promote their consumption for improved public health.

**Keywords:** Amaranth, Nutrients, Phytochemical profile.

**Introduction-**
*Amaranthus* is a worldwide genus that may be found in temperate, tropical, and subtropical, climates around the world. Grain amaranths are grown in Asia and America in a variety of species. *Amaranthus* species exhibit a wide range of morphological variability (Anjali *et al*; 2013). It is cultivated as a minor crop in Argentina, Bolivia, Ecuador, Mexico, Nigeria, and Kenya. The greatest species diversity occurs in warm, temperate, subtropical, and tropical regions of the world (Mosyakin and Robertson, 1996). Central and South East Asia are the world's major diversity hubs, with secondary variety hotspots in West and East Asia.
According to Maiyo *et al*., (2010) *A. hybridus*, *A. spinosus* and *A. caudatus* leaves contain various pharmacologically active compounds. According to Nathan *et al*., (2015) Protein, vitamin C, and mineral components are abundant in the leaves and grains of Amaranthus species. Flavonoids compounds were found in the roots, leaf, inflorescences and seeds *of Amaranthus* species. (Mitra,2015). According to Simpson (2010), the Amaranthaceae family has a global distribution, with members found

in deserts, estuary or alkaline environments, tropical areas, and temperate zones. Amaranth plants have been framed by Mesoamerican civilizations in central and South America for more than 8000 years, according to the family Amaranthaceae (Safia, 2004). Members of the Amaranthaceae family have a wide and international range, but are most common in the tropics, subtropics, and warm-temperate zones, with alpine and arctic regions clearly lacking. (Eshete *et al*., 2016).The Amaranth family has been identified as a future food source and a medicinal plant with great promise. The amaranth family is strong in nutritional content and provides the colorant betalain. (Fatinah *et al*., 2012)

**Material Method -**

**Phytochemical Studies**

1. **Plant Material:** Leaves from several *Amaranthus tricolor, Amaranthus caturus,* and *Amaranthus tenuifolius* species were collected from different localities, washed, air dried at room temperature for 4 weeks, and finely pulverized. Each sample's leaves were extracted differently.
2. **Bioactive Compound Analysis of *Amaranthus* leaves by HR-LCMS.**

A TOF/Q-TOE mass spectrometer was used to perform LC-MS analysis of an alcoholic extract of *Amaranthus* species (G6550A). A Hip Sampler (GA226A), a Binary gradient solvent pump (GA220B), and a Quadruple Time of Flight Mass Spectrometer (MS-QTOF) with twin Agilent set stream electro spray (AJS ESI) ion sources constitute the liquid chromatographic system. With needle wash, a 3.00 L sample was injected. The solvent systems used were 0.1% formic acid in water (Solvent A) and Acetonitrile (90 % acetone and 0.1 percent formic acid in water) (Solvent B). MS detection was accomplished in MS-Q-TOF at a flow rate of 0.300 ml/min. The mass spectra and distinctive mass fragmentation patterns of compounds were used to identify them. Phytochemical components were identified using Pub Chem. and Chem. Spider tools.

**Results-**

**Bioactive compound analysis by LC/MS:**

The various bioactive compounds detected in leaf extract of selected *Amaranthus* species by LC-MS/MS analysis mainly exhibits Glycophospholipids, Fatty Acids, Alkaloids, Steroids, Carboxylic Acid, Amino Acids, Terpens, Proteins, Quinolines, Flavonoides, Glycosides, Carbohydrate, Sulfonylurea, Phenols, Lipids, Phenothiazines, and Sulfanilamide

**a. *Amaranthus tricolor* L.**

**Table.1 to 3. LC-MS Profiling of Bioactive Compounds From Ethanolic extract of *Amaranthus tricolor* leaves.**

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| 1. | Carboxylic Acid | 3alpha,7alpha- Dihydroxy-5beta-cholestan-26-oic acid | C8 H9 N O3 | 7.058 | 4.094 |
| | | Isocitrate | C6 H8 O7 | 192.0273 | 1.037 |
| | | Fluorocitric acid | C6 H7 F O7 | 210.0195 | 3.521 |
| 2. | Amino Acids | Alangimarckine | C29 H37 N3 O3 | 475.2789 | 12.103 |
| | | Isoproterenol | C11 H17 N O3 | 211.1175 | 3.254 |
| | | Oxidized dinoflagellate luciferin | C33 H38 N4 O7 | 602.2699 | 17.093 |
| | | Endomorphin-2 | C32 H37 N5 O5 | 571.2828 | 17.427 |
| | | Acetyl-L-tyrosine | C11 H13 N O4 | 223.0852 | 3.483 |
| | | Myxochelin A | C20 H24 N2 O7 | 404.1539 | 6.453 |
| | | N5-Dinitrophenyl-L-ornithine methyl este | C18 H20 N4 O6 | 388.1389 | 5.217 |
| | | N2-Maltulosylarginine | C18 H34 N4 O12 | 498.2173 | 7.075 |
| 3. | Steroides | Jervine | C27 H39 N O3 | 425.2873 | 13.125 |
| | | Hydroxyprogesterone caproate | C27 H40 O4 | 428.2916 | 13.469 |
| | | 7a,12a-Dihydroxy-5b-cholestan-3-one | C27 H46 O3 | 418.3416 | 15.622 |
| | | 1-Acetyl-3,14,20-trihydroxywitha-5,24-dienolide 3-glucoside | C36 H54 O12 | 678.3656 | 10.747 |

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| | | Solanocardinol | C27 H45 N O3 | 431.3314 | 15.352 |
| 4. | Fatty Acid | 3-Methylbutyl 2-methylpropanoate | C9 H18 O2 | 158.130 | 9.364 |
| | | 9,10-Dihydroxy-12,13-epoxyoctadecanoate | C18 H34 O5 | 330.242 | 9.216 |
| 5 | Glycophospholipids | LysoPE(18:2(9Z,12Z)/0:0 | C23 H44 N O7 P | 477.2938 | 13.206 |
| 6. | Alkaloids | Lyngbyatoxin | C27 H39 N3 O2 | 437.3011 | 15.09 |
| | | 2- Propionylpyrrole | C7 H9 N O | 123.069 | 2.746 |
| | | Debromohymenialdisine | C11 H11 N5 O2 | 245.089 | 3.518 |
| | | Irinotecan | C33 H38 N4 O6 | 586.2752 | 17.138 |
| | | Pyridoxamine | C8 H12 N2 O2 | 168.0899 | 5.073 |
| | | Somniferine | C36 H36 N2 O7 | 608.2568 | 17.485 |
| 7. | Terpens | 2,9-Bis(3-methyl-2E-pentenoyl)-2b,9a-dihydroxy-4Z,10(14)-oplopadien-3-one | C27 H38 O5 | 442.2678 | 11.434 |
| | | Absintholide | C30 H38 O8 | 526.2559 | 16.476 |
| | | Ophiobolin F | C25 H42 O | 385.328 | 7.11 |
| | | Ganoderic acid F | C32 H42 O9 | 570.28 | 18.045 |
| | | Gibberellin A39 | C20 H26 O8 | 426.1518 | 8.322 |
| | | Ganosporelactone A | C30 H40 O7 | 512.2755 | 17.986 |
| | | Dukunolide D | C26 H28 O8 | 466.158 | 5.069 |
| | | 12-epi-Scalaradial | C27 H40 O4 | 428.2971 | 14.43 |
| | | Azafrin | C27 H38 O4 | 426.2797 | 14.325 |

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| 8. | Proteins | Biliverdin-IX-α | C33 H34 N4 O6 | 582.2411 | 14.628 |
| | | 1-Methylhistidine | C7 H11 N3 O2 | 169.0856 | 3.75 |
| 9. | Quinolines | Cepharanthine | C37 H38 N2 O6 | 606.2762 | 18.817 |
| | | Fabianine | C14 H21 N O | 219.1595 | 5.748 |
| 10. | Flavonoids | Catechin | C15 H14 O6 | 290.0807 | 3.833 |
| | | Lilaline | C20 H17 N O7 | 383.1032 | 2.478 |
| 11. | Glycosides | Deoxycytosine | C4 H7 N3 | 97.0648 | 4.557 |
| | | Niazimin A | C18 H25 N O8 | 383.1546 | 10.498 |
| | | Perilloside E | C17 H22 O9 | 370.1324 | 9.177 |
| 12. | Carbohydrates | 4-Methoxybenzenepropanol 1-(2-sulfoglucoside) | C16 H24 O10 S | 408.1124 | 4.398 |
| 13. | Sulfonylurea | Sulfometuron methyl | C15 H16 N4 O5 S | 364.0851 | 5.517 |
| | | Sulfometuron | C14 H14 N4 O5 S | 350.0683 | 4.403 |
| 14. | Phenols | Dihydrocapsaicin | C18 H29 N O3 | 307.2106 | 7.505 |
| | | Neogrifolin | C22 H32 O2 | 328.2336 | 8.775 |
| | | Lancerin | C19 H18 O10 | 406.0948 | 7.277 |
| 15. | Lipids | Sulfoglycolithocholate | C26H43 N O7 S | 513.2735 | 6.949 |
| 16. | Phenothiazines | Triflupromazine | C18 H19 F3 N2 S | 352.1236 | 5.585 |
| 17. | Sulfanilamide | Sulfadiazine | C10 H10 N4 O2S | 250.0526 | 5.425 |
| | | Citalopram-N-Oxide | C20 H21 F N2 O2 | 340.1558 | 5.493 |

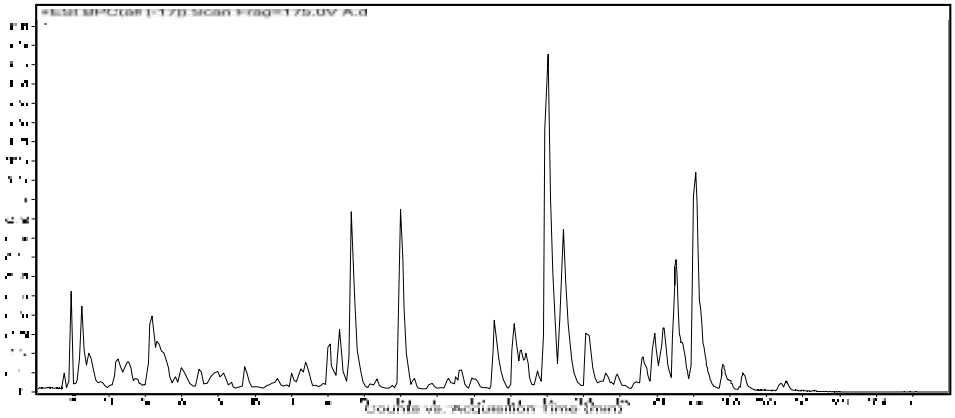

**Plate 1: (HR)-LCMS Spectrogram of Leaves of (a) *Amaranthus tricolor* L.**

The ethanol extract of *Amaranthus tricolor* was discovered to contain 54 chemicals of around 17 classes using high resolution liquid chromatography-mass spectrometry analysis (HR)-LCMS. The structure of unknown chemicals eluted at different periods is examined using a mass spectrometer and summarized in Table 1-3,Glycophospholipids, Fatty Acids, Alkaloids, Steroids, Carboxylic Acid, Amino Acids, Terpens, Proteins, Quinolines, Flavonoides, Glycosides, Carbohydrate, Sulfonylurea, Phenols, Lipids, Phenothiazines, and Sulfanilamide were among the important 17 classes of Phytochemical confirmed by (HR)-LCMS analysis. The spectrum profile of ethanol extract of *Amaranthus tricolor* (HR)-LCMS High-Resolution Liquid Chromatography Mass Spectrometer study (Plate-1) indicates 41 components, of which 19 main compounds were verified based on their retention time, mass, and molecular formula.

**b. *Amaranthus caturus* Heyne ex Hooker**

**Table.4 to 7. LC-MS Profiling of Bioactive Compounds From Ethanolic extract of *Amaranthus caturus* leaves.**

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| 1. | Carboxylic Acid | cis-Aconitic acid | C6 H6 O6 | 74.0172 | **1.179** |
| | | Syringic acid | C9 H10 O5 | 198.0535 | **3.394** |
| | | Nonate | C9 H16 O4 | 188.1056 | **6.571** |
| | | 9,10-Dihydroxy-12,13-epoxyoctadecanoate | C18 H34 O5 | 330.2437 | 9.185 |
| 2. | Amino Acids | Ureidoglycine | C3 H7 N3 O | 133.0505 | 0.931 |
| | | Oxidized dinoflagellate luciferin | C33 H38 N4 O7 | 602.27 | 14.381 |
| | | Gabapentin | C9 H17 N O2 | 171.126 | 11.552 |
| | | LysoPE(0:0/20:1(11Z)) | C25 H50 N O7 P | 507.3287 | 9.746 |
| | | DL-Ornithino-L-alanine | C8 H17 N3 O4 | 219.123 | 4.907 |
| | | (2S)-2-[[1-(R)-Carboxyethyl] amino]pentanoate | C8 H15 N O4 | 189.0996 | 2.949 |
| 3. | Steroids | 1alpha,3beta,22R-Trihydroxyergosta-5,24E-dien-26-oic acid 3-O-b-D-glucoside 26-O-b-D-glucosyl ester | C40 H64 O15 | 784.4198 | 9.877 |
| | | Jervine | C27 H39 N O3 | 425.2873 | 13.125 |
| | | Withaperuvin H | C30 H42 O9 S | 578.2548 | 16.866 |

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| 4. | Fatty Acid | 2 -Oxo-10-methylthiodecanoicacid | C11 H20 O3 S | 232.1151 | 7.175 |
| | | Corchorifatty acid F | C18 H32 O5 | 328.2254 | 7.986 |
| | | Colnelenic acid | C18 H28 O3 | 292.2058 | 9.911 |
| | | 0-Oxo-11-octadecen-olide | C18 H30 O3 | 294.2221 | 12.923 |
| 5. | Alkaloids | 2-Hexylbenzothiazole | C13 H17 N S | 219.1077 | 2.498 |
| | | 2-Propionylpyrrole | C7 H9 N O | 123.0687 | 3.483 |
| | | Fabianine | C14 H21 N O | 219.1596 | 5.752 |
| | | Icaceine | C22 H33 N O4 | 375.2363 | 7.922 |
| | | Somniferine | C36 H36 N2 O7 | 608.2566 | 17.697 |
| | | Irinotecan | C33 H38 N4 O6 | 586.2751 | 16.657 |
| | | Epivoacorine | C43 H52 N4 O6 | 720.3786 | 10.696 |
| 6. | Terpens | Ganosporelactone A | C30 H40 O7 | 512.2752 | 17.918 |
| | | Ganoderic acid F | C32 H42 O9 | 570.2794 | 18.009 |
| | | Lucidenic acid E2 | C29 H40 O8 | 516.2695 | 16.71 |
| | | Absintholide | C30 H38 O8 | 526.255 | 17.79 |
| | | Limonoate | C26 H34 O10 | 506.2148 | 13.083 |
| | | Glucosyl (2E,6E,10x)-10,11-dihydroxy-2,6-farnesadienoate | C21 H36 O9 | 432.238 | 7.069 |

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| | | Lamioside | C18 H28 O11 | 420.164 | 11.513 |
| | | 2,8-Dehydroastaxanthianthin | C40 H50 O4 | 594.3725 | 12.803 |
| | | 8-Epideoxyloganin tetraacetate | C25 H34 O13 | 542.1993 | 13.092 |
| | | delta-Maslinic acid | C30 H48 O4 | 472.3588 | 13.226 |
| | | Liquiritic acid | C30 H46 O4 | 470.3428 | 14.307 |
| 7. | Quinolines | Cepharanthine | C37 H38 N2 O6 | 606.2764 | 18.806 |
| | | Calafatimine | C38 H40 N2 O7 | 636.2751 | 11.401 |
| | | Sparfloxacin | C19 H22 F2 N4 O3 | 392.1674 | 10.2 |
| 8. | Flavonoides | Lilaline | C20 H17 N O7 | 383.1028 | 2.838 |
| 9. | Glycosides | Phenylethyl primeveroside | C19 H28 O10 | 416.1706 | 5.084 |
| | | Canavalioside | C26 H42 O12 | 546.2676 | 17.489 |
| 10. | Sulfonylurea | Sulfometuron methyl | C15 H16 N4 O5 S | 364.0858 | 5.498 |
| 11. | Lipids | 9(S)-HpOTrE | C18 H30 O4 | 310.2167 | 9.908 |
| 12. | Sulfanilamide | Sulfadiazine | C10 H10 N4 O2 S | 250.0517 | 5.354 |
| 13. | Diacylglycerols | Glycerol 1,2-diacetate | C7 H12 O5 | 176.0673 | 3.803 |
| 14. | Umbelliferones | 7,8-Dihydroxycoumarin | C9 H6 O4 | 178.0265 | 4.348 |

| | | | | | |
|---|---|---|---|---|---|
| 15. | Lactone | alpha-Carboxy-delta-decalactone | C11 H18 O4 | 214.121 | 4.952 |
| 16. | Naphthofuran | (3b,6b,8a,12a)-8,12-Epoxy-7(11)-eremophilene-6,8,12-trimethoxy-3-ol | C18 H30 O5 | 326.210 | 9.826 |
| 17. | Gamma-keto acids | Diplodiatoxin | C18 H28 O4 | 308.201 | 10.197 |
| 18. | Saponins | Amaranthussaponin IV | C47 H70 O20 | 954.455 | 10.271 |
| | | Tragopogonsaponin B | C50 H70 O16 | 926.461 | 10.625 |
| | | Spinacoside C | C46 H70 O19 | 926.458 | 11.025 |
| | | Elaterinide | C38 H54 O13 | 718.360 | 12.318 |
| | | Oleanolic acid 3-O-beta-D-glucosiduronic acid | C36 H56 O9 | 632.397 | 12.683 |
| | | Elaterinide | C38 H54 O13 | 718.362 | 14.096 |
| 19. | Guanidine | Hordatine A | C28 H38 N8 O4 | 550.294 | 13.469 |
| 20. | Porphyrin | Harderoporphyrin | C35 H36 N4 O6 | 608.2659 | 17.14 |
| 21. | Sesquilignan | Lappaol D | C31 H36 O10 | 568.2254 | 17.479 |

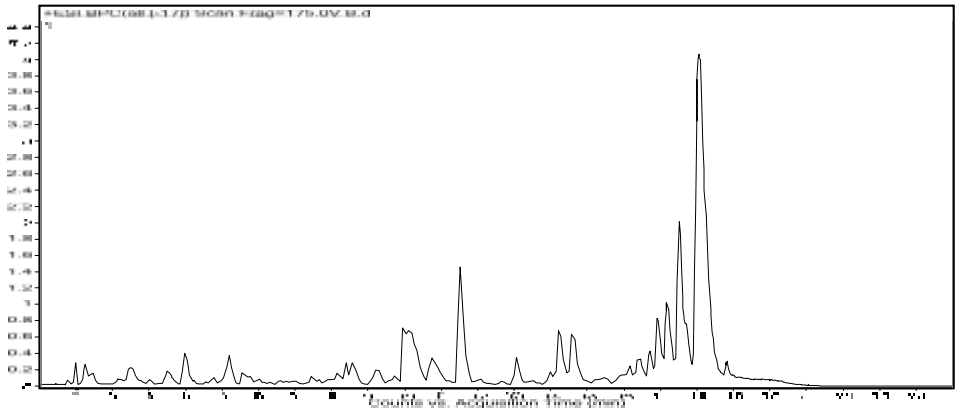

**Plate 2: (HR)-LCMS Spectrogram of Leaves of (b) *A.caturus* Heyne ex Hooker**

The ethanol extract of *A. caturus* was found to contain 54 components of around 17 classes using high resolution liquid chromatography-mass spectrometry analysis (HR)-LCMS. The structure of unknown chemicals eluted at different periods is examined using a mass spectrometer and summarized in Table no. 4-7.

Carboxylic Acid, Amino Acids, Steroids, Fatty Acids, Alkaloids, Terpens, Quinolines, Flavonoides, Glycosides, Sulfonylurea, Lipids, Phenothiazines, Sulfanilamide, Diacylglycerols, Umbelliferones, Lactone, Naphthofuran, Gamma-keto acids, Saponins and Guanidine were among the important 17 classes of Phytochemical confirmed by (HR)-LCMS analysis. The spectrum profile of an ethanol extract of *Amaranthus tricolor* (HR)-LCMS research (Plate-2) reveals 54 compounds, of which 12 main compounds were verified based on their retention time, mass, and molecular formula.

1. ***Amaranthus tenuifolius* Wild.**

**Table. 8 to 10. LC-MS Profiling of Bioactive Compounds From Ethanolic extract of *Amaranthus tenuifolius* leaves.**

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| 1. | Carboxylic Acid | 2,4-Dichloro-3-oxoadipate | C6 H6 Cl2 O5 | 227.9615 | 0.85 |
| | | Malic acid | C4 H6 O5 | 134.0222 | 1.053 |
| | | Benexate | C23 H27 N3 O4 | 409.1923 | 5.902 |
| 2. | Amino Acids | Alangimarckine | C29 H37 N3 O3 | 475.2789 | 12.103 |
| | | Carvedilol | C24 H26 N2 O4 | 406.1876 | 6.727 |
| | | Octopine | C9 H18 N4 O4 | 246.1325 | 7.168 |
| | | Argiotoxin 659 | C31 H53 N11 O5 | 659.4197 | 9.61 |
| 3. | Steroids | 23-Acetoxysoladulcidine | C29 H47 N O4 | 473.3443 | 15.637 |
| | | Halcinonide | C24 H32 Cl F O5 | 454.1908 | 5.902 |
| 4. | Thia Fatty Acid | (±)-2-Hydroxy-4-(methylthio)butanoic acid | C5 H10 O3 S | 150.0354 | 1.018 |
| 5. | Alkaloids | Jubanine A | C40 H49 N5 O6 | 695.3805 | 10.857 |
| | | Septentriodine | C37 H52 N2 O11 | 700.3608 | 9.644 |
| | | Retronecine | C8 H13 N O2 | 155.0925 | 1.18 |
| | | Irinotecan | C33 H38 N4 O6 | 586.2752 | 17.138 |
| | | Convolamine | C17 H23 N O4 | 305.1607 | 6.934 |
| 6. | Terpens | Ganosporelactone A | C30 H40 O7 | 512.2752 | 17.918 |

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| | | Ganoderic acid F | C32 H42 O9 | 570.2794 | 18.009 |
| | | Euphornin | C33 H44 O9 | 584.2958 | 18.752 |
| 7. | Flavonoides | Lilaline | C20 H17 N O7 | 383.1028 | 2.738 |
| | | Gallocatechin-4beta-ol | C15 H14 O8 | 322.071 | 5.767 |
| | | Allivicin | C27 H30 O16 | 610.1604 | 5.619 |
| | | Sophoranone | C30 H36 O4 | 460.2613 | 8.359 |
| 8. | Glycosides | Caffeic acid 3-O-glucuronide | C15 H16 O10 | 56.0764 | 2.315 |
| | | Alangiside | C29 H47 N O7 | 505.1888 | 6.144 |
| 9. | Lactone | Mycinamicin VII | C29 H47 N O7 | 521.3416 | 16.417 |
| 10. | Sulfones | 2,3,5,7,9-Pentathiadecane 2,2-dioxide | C5 H12 O2 S5 | 263.9404 | 0.84 |
| 11. | Carbohydrates | D-Glucarate | C6 H10 O8 | 210.038 | 1.517 |
| | | O-Feruloylgalactarate | C16 H18 O11 | 386.0875 | 3.239 |
| | | beta-D-Glucopyranosyl-11-hydroxyjasmonic acid | C18 H28 O9 | 24.1808 | 4.664 |
| 12. | Pteridines | Lumazine | C6 H4 N4 O2 | 164.0333 | 1.919 |
| 13. | Vitamin | Folic acid | C19 H19 N7 O6 | 441.1317 | 2.728 |

| Sr.No. | Class | Identified Compound | Molecular Formula | Mass | RT (Min.) |
|---|---|---|---|---|---|
| 14. | Pyrrolizines | Crotanecine | C8 H13 N O3 | 171.0902 | 3.381 |
| 15. | Antioxidant | Esculetin | C9 H6 O4 | 178.028 | 4.249 |
| 16. | Tricaboxylic Acid | 2-Caffeoylisocitrate | C15 H14 O10 | 54.0624 | 4.735 |
| | | cis-Aconitic acid | C6 H6 O6 | 174.0172 | 4.773 |
| 17. | Arene | Dibenzo [h,rst]pentaphene | C28 H16 | 352.1241 | 5.512 |
| 18. | Triazole fungicide | Fluotrimazole | C22 H16 F3 N3 | 379.132 | 5.587 |
| 19. | Phenols | N-trans-Feruloyloctopamine | C18 H19 N O5 | 329.1274 | 5.866 |
| | | Vanillin acetate | C10 H10 O4 | 194.0591 | 6.765 |
| | | Gossypol | C30 H30 O8 | 518.1935 | 5.007 |
| 20. | Imidazoles | Imidapril | C20 H27 N3 O6 | 405.195 | 4.533 |
| 21. | Coumaric Acids | Grossamide | C36 H36 N2 O8 | 622.231 | 7.963 |
| 22. | Antibiotic | Lymecycline | C29 H38 N4 O10 | 602.2583 | 8.872 |

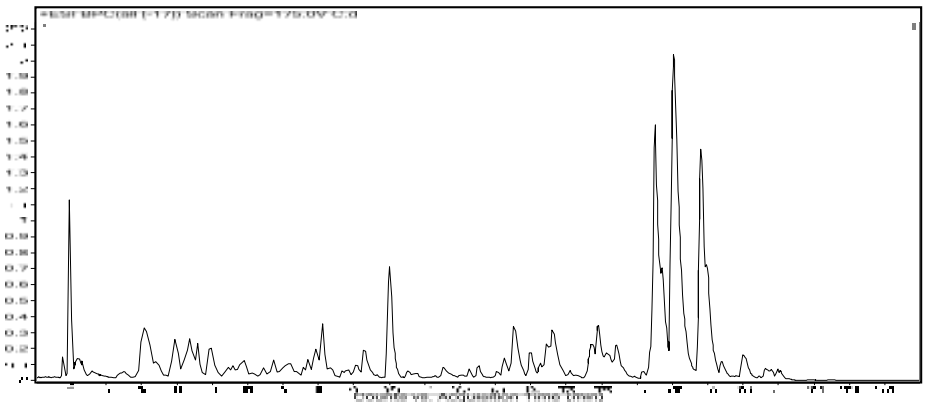

**Plate 3: (HR)-LCMS Spectrogram of Leaves of (c) *A.tenuifolius* Wild.**

The ethanol extract of *A.tenuifolius* was discovered to contain 43 Phytochemical of around 21 classes using (HR)-LCMS. The structure of unknown chemicals eluted at different periods is examined using a mass spectrometer and summarized in Table no.8 to 10.

Carboxylic Acid, Amino Acids, Steroids, Thia Fatty Acid, Alkaloids, Terpens, Flavonoides, Glycosides, Lactone, Sulfones, Carbohydrates, Vitamin, Pyrrolizines, Antioxidant, Tricaboxylic Acid, Arene, Triazole fungicide, Phenols, Imidazoles, Coumaric Acids, and Antibiotics were among the important 21 classes of phytochemicals. The spectrum profile of an ethanol extract of *Amaranthus tenuifolius* (HR)-LCMS research (Plate-3) reveals 54 compounds, of which 16 main compounds were verified based on their retention time, mass, and molecular formula.

## Conclusion

This study aimed to investigate the Phytochemical profile of different amaranth leaf varieties using LC-MS analysis. The results revealed the presence of various bioactive compounds, including flavonoids, Phenolic acids, and other Phytochemicals, across all varieties. However, significant variations were observed in the abundance and composition of these compounds among the different varieties. These findings highlight the potential of amaranth leaves as a rich source of natural antioxidants and other beneficial compounds. Further studies are needed to elucidate the specific health benefits associated with the unique phytochemical profile of each variety.

**Reference:**

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