

RESEARCH ARTICLE

Scientific validation of organic liquid formulation-Jeevamruth by studying its characteristics

■ A.S. Goveanthan, M.P. Sugumaran and E. Somasundaram

SUMMARY

Jeevamruth has its good role in vegetable foods in organic farming and Jeevamru this the fermented product which is used as plant growth enhancing substances prepared by the materials available with the farmers. They are the rich sources of beneficial microbial flora which supports, stimulates the plant growth and helps in getting better vegetative growth and also good quality yield. The prepared formulation was analysed in the GCMS to characterize the traditional formulations. The results revealed that various beneficial compounds were present in the formulations. The compounds present in the formulations are Isoenanthic acid, Columbianetin and Lomatin, 1, 6-Hexanediol, Mevastatin and Gitoxigenin, Dibutoxy anthracine, Erioflorin and nagilactone, Trimegestonea, Rofe Coxib, Clupanodonic acid. The composition of jeevamurth has many scientific components which helps in the plant metabolism and also improves its growth.

Key Words : Jeevamruth, Biochemical analysis, GCMS, Green revolution

How to cite this article : Goveanthan, A.S., Sugumaran, M.P. and Somasundaram, E. (2021). Scientific validation of organic liquid formulation-Jeevamruth by studying its characteristics. *Internat. J. Plant Sci.*, 16 (1): 15-18, DOI: 10.15740/HAS/IJPS/16.1/15-18, Copyright@ 2021: Hind Agri-Horticultural Society.

Article chronicle : Received : 26.09.2020; Revised : 04.11.2020; Accepted : 03.12.2020

Green revolution had intensified agriculture to meet the ever increasing demand for food and fibre, which is a practice at great cost to the environment resulting in continuous loss of natural

ecosystems, ground water, food stuff pollution and other environmental degradation. The greatest challenge to be faced by the nation in the coming years is, to provide safe food for the growing population in the country. In this regard, organic farming which is a holistic production management system for promoting and enhancing health of agro ecosystem, has gained wide recognition as a valid alternative to conventional food production and ensures safe food for human consumption. This farming system avoids large use of synthetic fertilizers, growth regulators, livestock feed additives and relies on green manures, crop rotations, crop residues, animal manures,

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biofertilizers, different kinds of cow based liquid organic manures such as Panchagavya, Jeevamruth, Beejamruth, Amritpani etc.

Liquid formulations that are used in organic agriculture like Panchagavya, Beejamruth and Jeevamruth are the fermented products which are used as plant growth enhancing substances prepared with material available with farmers. They are the rich sources of beneficial micro flora which supports, stimulates the plant growth and helps in getting better vegetative growth and also good quality yield. Formulations prepared from agricultural by-products *viz.*, bran of grains, oil cakes, farmyard manure etc., which are found to support excellent growth carrier and storage media (Devakumar *et al.*, 2011). During the last few years, there has been an increasing interest in the use of Panchagavya, Beejamruth, Jeevamruth and other liquid organic formulations in organic agriculture. With the growing awareness for safe and healthy food, the demand for organic food is increasing. Concern for deteriorating soil health and increasing contamination in ground water and surface water bodies have also added to the need for alternative technologies which not only can ensure safe and healthy food but are also environment friendly, contribute to the long term fertility and sustainability of the soils. During the last 10 years, many farmers due to various reasons, have switched over to the organic methods of cultivation and are now successfully growing comparable productivities with much less costs. Hence, we make an approach to provide scientific validation about composition of jeevamruth through GC-MS analysis.

MATERIAL AND METHODS

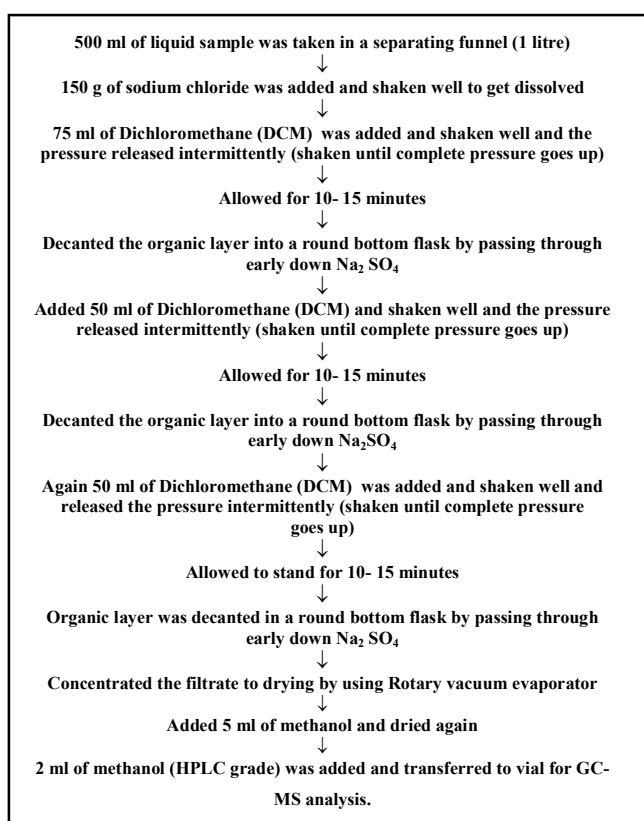
Preparation of Jeevamruth:

Jeevamruth is a bio stimulant consisting of a combination of five products, which includes cow dung, cow urine, Pulse flour, Jaggery, handful of garden soil and some amount of water. The term Jeevamruth represents 'Jeev'-life, 'amruth'- a valuable food. It acts as an immune-stimulant that promotes growth, increases the overall yield and also renders resistance to diseases and pests. To Jeevamruth was prepared in the Department of Environmental Sciences, Tamil Nadu Agricultural University, Coimbatore. The materials required and the methodologies involved in the preparation of Jeevamruth are furnished below (Palekar, 2006).

1.	Cow dung	2.5 kg
2.	Cow urine	2.5lit
3.	Pulse Flour	500 g
4.	Jaggery	500 g
5.	Soil	50 g
6.	Water	50 lit

The raw materials are mixed to get the initial mixture. Then the mixture is stirred thrice a day in clockwise and anti-clock wise direction for three days continuously. Thus the final product is obtained and it is ready to use.

Analysis of Jeevamruth in GC-MS



RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Composition of Jeevamruth:

The result of the analysis of Jeevamruth showed that the pH value is 3.91, total organic carbon is 32.9 per cent. The total Nitrogen, total Phosphorus and total

Potassium contents are 5.12 per cent, 1.40 per cent and 1.32 per cent, respectively. Calcium content is 19.9 per cent and Magnesium content is 3.84 per cent. The Bacteria, Fungi and Actinomycetes populations were 152×10^6 CFU / ml, 9×10^4 CFU / ml and 2×10^2 CFU / ml, respectively obtained are compared with previous works and are found to comply with them as reported by Deva Kumar *et al.* (2014).

Parameters	Values
pH	3.91
Total nitrogen (%)	5.12
Total phosphorus (%)	1.40
Total potassium (%)	1.32
Total organic carbon (%)	32.9
Bacteria ($\times 10^6$ CFU / ml)	152
Fungi ($\times 10^4$ CFU / ml)	9
Actinomycetes ($\times 10^2$ CFU / ml)	2

Biochemical analysis of Jeevamruth through GCMS:

The biochemical analysis of Jeevamruth by GCMS revealed that the following compounds were present.

- Diffractaic acid
- Isoenanthic acid
- D-Glucoheptose
- Carboxybenzene
- Daphnin (daphnetin-7-O-glucoside)

- Columbianetin and Lomatin
- Fumaric acid
- 1,6-Hexanediol
- 1,4-Cyclohexanediol
- Benzoic acid

Some of the fatty acids, alkanes, alconols and alcohols are also found. They are

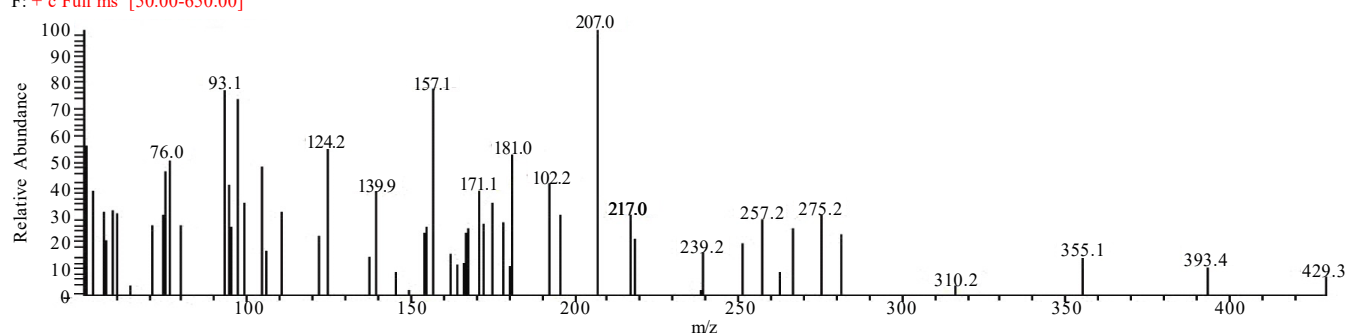
- Ar-turmerone
- Stigmasterol
- Benzoic acid
- 2-Ethyl Hexane Dioldiester.

Biochemical characteristics of Jeevamruth and its role in plant metabolism:

The biochemical characterization of Jeevamruth reveals that many compounds are present in the organic liquid formulations. The major compounds present and their role in plant metabolism is discussed hereunder. The Diffractaic acid which is a secondary metabolite present in seeds and plants act as antifungal compound. Carboxybenzene present is fungistatic in nature. Daphnin (daphnetin-7-O-glucoside) is a strong antibacterial agent and protects the plant system from microbial attack. Columbianetin and Lomatin increases seed longevity. Fumaric acid acts as a pesticide. 1,6-Hexanediol is commonly used as a coating material and also as an adhesive. 1,4-Cyclohexanediol is an insect repellent while benzoic acid has preservative characteristics by inhibiting bacterial growth. Linoleic acid activates peroxisome

Sr. No.	Retention time (min)	Peak area (%)	Molecular formula	Common name (fatty Acid)	Activity of compound	Nature of compounds
1.	4.00	2.98	C ₂₀ H ₂₂ O ₇	Diffractaic acid	Secondary metabolites	Fatty acid
2.	37.07	1.70	C ₂₀ H ₂₈ O ₂	Retinoic acid	Herbicide	Fatty acid
3.	5.65	2.03	C ₇ H ₁₄ O ₂	Isoenanthic acid	Capsules for seed	Fatty acid
4.	9.22	4.21	C ₇ H ₆ O ₂	Carboxybenzene	Fungistatic compound	Fatty acid
5.	34.72	4.37	C ₁₄ H ₁₄ O ₄	Columbianetin, lomatin	Increase seed longevity	Fatty acid
6.	37.07	1.70	C ₂₁ H ₃₀ O ₂	Methylester	Herbicide	Fatty acid
7.	5.65	2.03	C ₄ H ₄ O ₄	Fumaric acid	Pesticide	Fatty acid
8.	34.17	4.16	C ₆ H ₁₄ O ₂	1,6-Hexanediol	Coatings, Adhesives	Fatty acid
9.	34.17	4.16	C ₆ H ₁₂ O ₂	1,4-Cyclohexanediol	Insect repellent	Fatty acid
10.	10.21	4.21	C ₇ H ₆ O ₂	Benzoic acid	Preservatives inhibit bacteria	Fatty acid
11.	7.44	3.69	C ₁₈ H ₁₈ O ₂	Linoleic acid	Activates Peroxisome	Fatty acid
12.	20.85	1.74	C ₉ H ₁₂	Trimethylbenzene	Component of herbicides	Alkanes
13.	11.86	4.13	C ₁₅ H ₂₄	á-Selinene	Insecticidal	Alkanes
14.	20.85	1.74	C ₁₀ H ₁₆	Pseudolimonene	Insecticide	Alkanes
15.	32.46	2.21	C ₁₇ H ₁₆	9 - propyl – anthracene	Insecticides	Alkanes
16.	11.86	4.13	C ₁₅ H ₂₀ O	ar-turmerone	Insecticide	Alcohol
17.	37.07	1.70	C ₂₉ H ₄₈ O	Stigmasterol	Growth promoter Salt stress tolerance	Alconol
18.	38.78	2.82	C ₈ H ₁₈ O ₂	2-ethyl hexanedioldiester	Defence response	Ester

EM-716#1649 RT: 36.58 AV: 1 RF: 6.00.5 NL: 3.12E3
F: + c Full ms [50.00-650.00]



EM-716#1558 RT: 34.72 AV: 1 RF: 6.00.5 NL: 3.48E3
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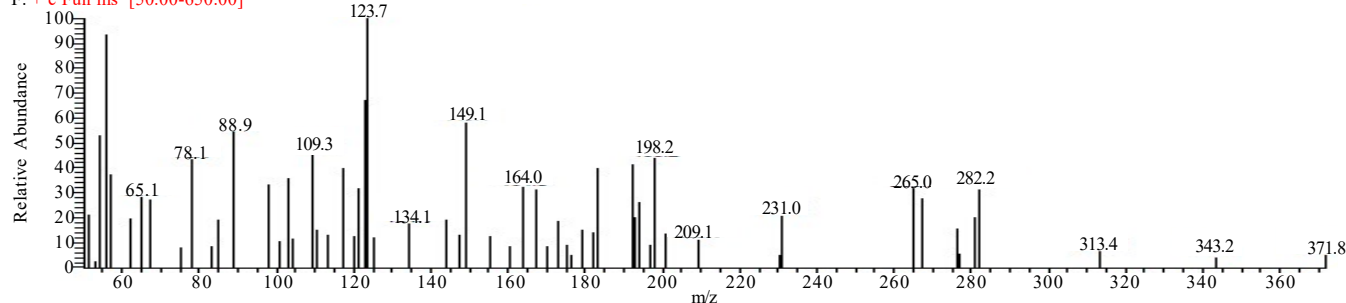


Fig. 1 : The major chemical constituents with high peak area percentage in Jeevamruth

which contains oxidative enzymes, such as catalase and D-amino acid oxidase.

Some of the alconols and alcohols were also found and ar-turmerone has insecticidal and antimicrobial properties. Stigmasterolis present is a known growth promotor and salt stress tolerance component. Benzoic acid, 2-ethyl hexane dioldiester promotes defense response. These results are found to be relevant to the findings (Mahadkar *et al.*, 2013 and Vinoth Kumar, 2014) and that the fatty acids, alconals and alcohols are responsible for growth promotion and antimicrobial activity

Conclusion:

Based on the present investigation it was concluded that the composition of jeevamurthas many scientific components which helps in the plant metabolism and also improves its growth.

REFERENCES

Deva Kumar, N., Shubha, S., Gouder, S.B. and Rao, G.G.E. (2014). Microbial analytical studies of traditional organic preparations Beejamrutha and Jeevamrutha.

In : Proceedings of the 4th ISOFAR Scientific Conference. 'Buliding Organic Bridges', at the Organic World Congress. Oct. 13-15. pp. 639-642.

Deva Kumar, N., G.G.E., Rao and Shuba, S. (2011). Evaluation of locally available media for the growth and development of nitrogen fixing micro-organisms. In: Proceedings of the 3rd scientific conference of ISOFAR Organic are life knowledge for tomorrow, held on 28th September-01 October 2011, Korea. PP 504- 509.

Mahadkar, S., Valvi, S. and Jadhav, V. (2013). Gas chromatography mass spectroscopic (GCMS) analysis of some bioactive compounds form five medicinally relevant wild edible plants. *Asian J. Pharm. Clin. Res.*, 6(1): 136-139.

Palekar, S. (2006). Text book on Shoonya Bandovalada Naisargika Krushi, Published by Swamy Anand, Agri Prakashana, Bangalore.

Vinoth Kumar, S. (2014). Biological and chemical control of stem rot and foliar diseases of carnation under protected cultivation. M.Sc. (Ag.) Thesis. Department of Plant Pathology. Tamil Nadu Agricultural University, Coimbatore.