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Bio Chemical Analysis of Beejamruth and Its Plant Promoting Factors

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Abstract

Jeevamruth and Beejamruth have their good role in vegetable foods in organic farming. Beejamruth and Jeevamruth are the fermented products which are 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. A survey was made to gather informations on traditional formulations of Jeevamruth among organic farmers and the formulation followed by farmers was used to prepare Jeevamruth in the lab. 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 Beejamruth Mevastatin and Gitoxigenin act as bioconversion repellents. Macrocyclon and 8-heptadecene dioicacid are antimicrobial and used in cryopreservation. Erioflorin and nagilactone A are plant growth regulators. Trimegestone, RofeCoxib are antibiotic in nature. Clupanodonic acid is helpful in plant defense mechanism. Hence, Beejamruth is a valid and effective alternative fertilizer for the production of safe and good quality food produces which could cater the needs of the modern Indian requirements.

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Keywords

Jeevamruth, Beejamruth,
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Introduction

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, biofertilizers, different kinds of cow based liquid organic manures such as Panchagavya, Jeevamruth, Beejamruth, Amritpani etc. Jeevamruth and Beejamruth has their good role in vegetable foods in organic farming. Beejamruth and Jeevamruth are the fermented products which are used as plant growth enhancing substances prepared by the materials available with the farmers. Which is claimed to be having many plant promoting

compounds and traits that favours microbial growth in the plant rhizosphere (Devakumar *et al.*, 2011).

Materials and Methods

Preparation of Beejamruth

Beejamruth is used for the seed treatment and in this 'Beej' means seed and amruth' is a valuable food. To this experiment, Beejamruth was prepared in the Department of Environmental Science, Tamil Nadu Agricultural University, Coimbatore. The materials required and the methodologies involved in the preparation of Beejamruth are furnished below.

1	Cow dung	2.5 kg
2	Cow urine	2.5 litres
3	Lime	50 grams
4	Soil	50 grams
5	Water	50 litres

The raw materials are mixed and allowed to ferment for 24 hours to get the final product (Palekar, 2006).

Analysis of Beejamruth in GC-MS

500 ml of liquid sample was taken in a separating funnel (1 liter)



150 g of sodium chloride was added and shaken well to get dissolved



75 ml of Dichloromethane (DCM) was added and shaken well and the pressure released intermittently (shaken until complete pressure goes up)



Allowed for 10- 15 minutes



Decanted the organic layer into a round bottom flask by passing through early down Na₂ SO₄



Added 50 ml of Dichloromethane (DCM) and shaken well and the pressure released intermittently (shaken until complete pressure goes up)



Allowed for 10- 15 minutes



Decanted the organic layer into a round bottom flask by passing through early down Na₂SO₄



Again 50 ml of Dichloromethane (DCM) was added and shaken well and released the pressure intermittently (shaken until complete pressure goes up)



Allowed to stand for 10- 15 minutes



Organic layer was decanted in a round bottom flask by passing through early down Na₂SO₄



Concentrated the filtrate to drying by using Rotary vacuum evaporator



Added 5 ml of methanol and dried again



2 ml of methanol (HPLC grade) was added and transferred to vial for GC-MS analysis.

Results and Discussions

The results from the experiment on "Biochemical evaluation of organic inputs (Beejamruth) and their efficacy on greens" conducted at the Department of Sustainable Organic Farming, Tamil Nadu Agricultural University, Coimbatore are summarized below (Table 1 and 2).

Composition of Beejamruth

The result of the analysis of Beejamruth showed a pH is 7.51, total organic carbon to be 5.50 %, total nitrogen 5.18 %, total phosphorus 1.30 %, total potassium 1.08%, calcium 4.48% and magnesium 20.8 %. The microbial population has found to be high with bacteria 170 x 10⁶ CFU/ml, followed by fungi 3x10⁴ CFU/ml and Actinomycetes 1 10²CFU/ ml. The nutrients content were found to be higher when compared to the results reported by Devakumar *et al.*, (2014).

Table.1 Physio – chemical properties of Beejamruth

Parameters	Values
pH	7.51
Total Nitrogen (Per cent)	5.18
Total Phosphorus (Per cent)	1.30
Total Potassium (Per cent)	1.08
Total Organic Carbon (Per cent)	5.50
Bacteria (x 10 ⁶ CFU / ml)	82
Fungi (x 10 ⁴ CFU / ml)	3
Actinomycetes (x 10 ² CFU / ml)	1

Table.2 Biochemical composition of Beejamruth

S.No	Retention time (min)	Peak area(%)	Molecular formula	Common name (fatty Acid)	Activity of compound	Nature of compounds
1	30.55	6.73	C ₂₃ H ₃₄ O ₅	Mevastatin, Gitoxigenin	Bioconversion, Repellents	Fatty acid
2	36.29	0.49	C ₁₄ H ₁₄ O ₄	Columbianetin, Lomatin	Increase seed longevity	Fatty acid
3	36.29	0.49	C ₂₂ H ₂₆ O ₂	Dibutoxyanthracine	Pesticide	Fatty acid
4	36.29	0.49	C ₂₄ H ₃₂ O ₆	Prednacinolone	Insecticides	Fatty acid
5	22.36	0.75	C ₁₄ H ₂₀ O ₄	Ubiquinol, Dupical	Antioxidant, reduces reductase activity	Fatty acid
6	23.31	0.95	C ₁₇ H ₃₀ O ₄	Macrocyclon	cryopreservation	Fatty acid
7	36.70	3.75	C ₁₉ H ₂₄ O ₆	Erioflorin, Nagilactone A	Plant growth regulators	Fatty acid
8	34.78	11.86	C ₂₂ H ₃₀ O ₃	Trimegestone	Antibiotic	Fatty acid
9	38.45	2.66	C ₁₇ H ₁₄ O ₄	Rofecoxib	Antibiotic	Fatty acid
10	38.45	2.66	C ₂₂ H ₃₄ O ₂	Clupanodonic acid	Plant defense	Fatty acid
11	39.10	2.95	C ₂₂ H ₄₀ O ₄	cyclohexyl dodecyl euceinate	Plant pesticide	Fatty acid
12	30.95	0.51	C ₃₀ H ₅₀ O ₅	Eldecalcifol	Insecticide	Fatty acid
13	31.28	1.77	C ₂₇ H ₄₀ O ₆	Petrosaspongiolide m, hyatolide a	Lipid signaling pathway	Fatty acid
14	31.93	3.94	C ₁₅ H ₂₂ O ₁₀	Catalpol	Plant defense	Fatty acid
15	32.22	0.66	C ₂₄ H ₂₈ O ₇	Garcinone-d	Prevention and treatment of diseases	Fatty acid
16	32.97	4.92	C ₂₇ H ₃₈ O ₄	Subglutinol a	Immunosuppressive agent	Fatty acid
17	36.09	2.97	C ₂₂ H ₂₆ O ₄	Benzoic acid, 2-ethyl hexanedioldiester	Defense response	Fatty acid
18	39.43	1.20	C ₂₆ H ₃₀ O ₆	Kuraidin, Oxogedunin	Insecticide	Fatty acid
19	37.78	1.82	C ₂₀ H ₂₈	Decylnaphthalene	Plant growth regulating compound	Alkanes
20	32.97	4.92	C ₃₀ H ₂₂	P-quinquephenyl	Fungicide	Alkanes
21	36.29	0.49	C ₃₀ H ₅₄	Tetrahydrosqualene	Fungicides	Alkanes
22	34.44	1.17	C ₁₅ H ₂₄ O	Farnesal, Isoacolamone	Assist in the pollination	Alconol
23	31.93	3.94	C ₁₅ H ₂₂ O	Curlone, Ggermacrone	Antiviral Activity	Alconol
24	36.29	0.49	C ₁₀ H ₁₈ O	Eucalyptol, Gexanid	Insecticide, assist in the pollination	Alcohols
25	37.78	1.82	C ₁₀ H ₁₆ O	Camphor	Biopesticide	Alcohols

The reason may be due to the use of desi cow's urine and dung used in the preparation of the product.

Biochemical analysis of Beejamruth

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

Biochemical characteristics of Beejamruth

Mevastatin and Gitoxygenin present in Beejamruth act as bioconversion repellents. Macrocyclon and 8-heptadecene dioic acid are antimicrobial and used in cryopreservation. Erioflorin and nagilactone A are plant growth regulators. Trimegestone, RofeCoxib are antibiotic in nature. Clupanodonic acid is helpful in plant defense mechanism. Cyclohexyl Dodecyl euceinate is a plant pesticide. Catalpol is helpful in plant defense mechanism. Garcinone-Dhelsin is an antimicrobial agent and protects the plants from diseases. Subglutinol A acts as an immune suppressive agent. Decyl naphthalene is a plant growth regulating compound. P-Quinquephenyl and Tetrahydrosqualene acts as fungicide.

Curlone and Germacrone have antiviral properties. Eucalyptols, Gexanid are with insecticide properties and also assist in pollination. Camphor is a biopesticide. Taraxerone and Arborinone are antimicrobial agents. Farnesal is naturally an antifungal agent (Avis, 2007; Avis and Belanger, 2001). There antimicrobial compounds present in the Beejamruth, enriches the bio protectant value of the compound and when applied in

the field will protect the crop from soil borne biotic stresses.

Based on present investigation it was concluded that the composition of Beejamruth is a valid and effective alternative fertilizer for the production of safe and good quality food produces which could cater the needs of the modern Indian requirements.

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