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Determination of Nitrogen (N), Phosphorous (P), Potassium (K), pH and Electrical Conductivity of Jeevamrutham Samples Collected from Different Places of Telangana and Andhra Pradesh

Prasanna Kumar TP[1], Thupurani Murali Krishna[1*]

[1*]*Department of Biotechnology, Chaitanya (Deemed to be University), Kishanpura, Hanamkonda, 506001, Telangana, India.*

[*]***Corresponding Author:*** *Thupurani Murali Krishna*
tmkrishna@chaitanya.edu.in

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Abstract

This investigation was carried out to investigate the nitrogen, phosphorous, potassium levels of the jeevamrutham samples collected from different regions of the Telangana and Andhra Pradesh. In continuation, the collected samples are also evaluated for pH and Electrical Conductivity. Estimation of nitrogen was conducted by the Kjeldahl method. For acid soils, the Bray's method is used to measure the amount of accessible phosphorus, whereas the Olsen's method is used for neutral, alkaline, and calcareous soils. Determination of potassium was carried out using ammonium acetate at pH 7. The nitrogen percentage of the samples collected from Telangana and Andhra Pradesh was ranged from 3.0% to 5.8% and 3.5% to 6.5% respectively. The results revealed that the samples collected from Andhra Pradesh was found to exhibit highest nitrogen percentage comparing to the nitrogen percentage of the samples collected from Telangana. The concentration of phosphorus in the samples collected from Telengana is ranged from 77 ppm to 256 ppm. Whereas the concentration of phosphorus in the samples collected from Andhra Pradesh is ranged from 132 ppm to 312 ppm. The potassium levels were ranged from 66 ppm to 84 ppm and 63 ppm to 81 ppm of the samples collected from Telangana and Andhra Pradesh respectively. The pH 5.4 to 6.7 and 5.6 to 6.3 are ranged from the samples collected from Telangana and Andhra Pradesh respectively. The EC 0.19 ds m^{-} to 0.25 ds m^{-} and 0.21 ds m^{-} to 0.28 ds m^{-} are ranged from the samples collected from Telangana and Andhra Pradesh respectively. In conclusion, all collected samples contain the sufficient concentrations of Nitrogen, Phosphorous and Potassium levels in the collected jeevamrutham samples from Telangana and Andhra Pradesh. Moreover, the values of pH and EC of the samples tested found good.

Keywords: Jeevamrutham, Kjeldahl method, Bray's method, Olsen's method, pH, EC.

1.0 INTRODUCTION

Organic farming is increasingly becoming more prevalent and holds enormous promise from a business, social, and environmental standpoint. Although, there is a progression of ideas from the past to the present, the contemporary organic movement is very different from its initial shape (Veni *et al.*, 2020) [1]. Organic farming today has a strong legal foundation with certification programmes for production and processing in many nations (Stockdale *et al*., 2001) [2]. Panchagvya, beejamrutha, and jeevamrutha are examples of liquid formulations used in organic agriculture. These fermented products are utilised as plant growth-promoting agents and are made with resources readily available to farmers. They are abundant sources of beneficial microflora that promote plant growth, encourage vegetative growth, and assist produce higher-quality crops. Farmyard manure, oil cakes, and other agricultural by products are used in formulas that are determined to be effective growth carriers and storage media (Devakumar *et al*., 2011) [3]. The utilisation of panchagavya, beejamrutha, jeevamrutha, and other liquid organic forms in organic agriculture has drawn more attention in recent years. According to Devakumar *et al*., (2008) [4] and Srinivas *et al*., (2010) [5], jeevamrutha and beejamrutha include a variety of helpful microorganisms, including nitrogen fixers, phosphorus solubilizers, actinomycetes, and fungi. Considering this, research of the microbial diversity and load in the fermented liquid formulations beejamrutha and jeevamrutha was done.

The present paper includes the evaluation of macro and micro elements such as Nitrogen (N), Phosphorous (P), Potassium (K), Magnesium (Mg) and Copper (Cu) present in the different samples of jeevamruthum. In addition, this paper also determines the pH of the collected samples. Moreover, identification and enumeration (CFU) of the microorganisms (microbial profiling) present in the collected jeevamrutham samples are also included.

2.1 MATERIALS AND METHODS

2.1.1 COLLECTION OF SAMPLES

Data of the organic farmers in Telangana and Andhra Pradesh is collected where Centre for Sustainable Agriculture, Tarnaka-500017 Hyderabad, Telangana, India, is extensively working and supporting on Agroecology practices. About 220 samples of solid Jeevamrutham (110 from Telangana and 110 from Andhra region) are collected. Approximately 100 g of each sample was collected in a tight sterilized container and carried to the laboratory.

2.1.2 CODING OF SAMPLES

The coding of the samples was shown in supplementary file (Table S 1.1-S 1.22) which include farmer code village, Organic status, mandal, latitude and longitude. Approximately, 50 g of each sample was aseptically and transferred (Duplication) to 100 ml of sterilized sample collector box and used to evaluate pH, N, P, and K levels present in collected jeevamrutham samples. The details of the collected samples are shown in Supplementary file table S1.1-1.22.

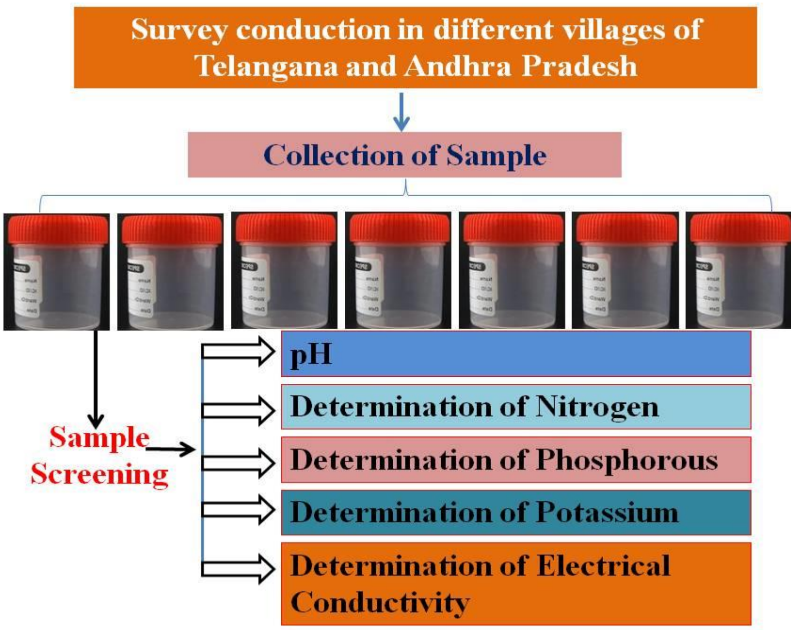

Fig2.1 Representation of Jeevamrutham sample collection and its pH and nutrient evaluation

2.2 ESTIMATION OF NITROGEN

2.2.1 ESTIMATION OF TOTAL NITROGEN BY KJELDAHL METHOD

Initially, 10g of sample was weighed aseptically and dissolved in 100 mL of Water for Injection (WFI). The solution was filtered through Whatman filter paper no 1 to separate the solids and to collect the clarified liquid.

Step-1: Digestion

Add 0.4 g anhydrous CuSO4 or 0.6 g $CuSO_4 5H_2O$, 15 g K_2SO_4 or 12 g anhydrous Na_2SO_4, and roughly 0.8 g of alundum granules. If there is adequate ventilation, add 20 mL concentrated sulfuric acid or 37 mL of diluted sulfuric acid and water (H_2SO_4 + H_2O (1+1, v/v)). Exactly 0.1000 to 2.800 g of test part mass should be added and rinse the interior wall with approximately 10 mL of water. Transfer the flasks to a Kjeldahl block digester that has been warmed to 400°C, and digest the test sections for 75 minutes.

Step-1: Determination

After cooling (the reaction mixture must be close to room temperature), remove the flasks from the heating block, wash the inner wall with 20–30 mL of water, and combine. To trap the anticipated total nitrogen in the test fraction, prepare the distillate receiving flask (a 300 mL Erlenmeyer flask) by adding 30 mL of 0.25 N standardised sulfuric acid. Install the receiver on the distillation unit's output tube after adding two or three drops of methyl purple indicator, making ensuring the distillate outlet tube end is completely submerged in the standardised acid solution. On the distillation unit, install the digesting tube. Start the steaming process, and then slowly pour 80 mL (30–35%) of sodium hydroxide into the flask. Steam distillation should continue until at least 250 mL of steam condensate have been collected in the receiving flask. Usually, this takes 6 to 8 minutes. If the colour turns green, add another 0.25 N H_2SO_4 to restore the purple colour while keeping track of the amount of acid used. Titrate with 0.25 N standard NaOH to a grey end point (pH 5.7).

Step-3: Calculation

The amount of total nitrogen in the test fraction, which is a function of the amount of ammonia trapped in the receiver flask, determines the colour of the distillate. If the colour is green, the ammonia in the trap has successfully neutralised the acid. To reach the grey end point at this stage, add an additional known quantity of standardised H_2SO_4. The total amount of acid poured to the receiving flask at the beginning plus the amount of acid added during distillation to reach the grey end point would equal the net volume (in mL) of standardised acid. If the receiving flask is blue or purple in colour, there is still acid present and a back titration with NaOH is necessary. The amount of acid in the receiving flask less the amount of base injected after distillation to get to the grey end point would be the net volume standardised (std) acid.
Calculations for weight percent total nitrogen are as follows:

$$\boxed{\frac{1.4\ V\ X\ N}{W\ (g)}}$$

Where,
V= volume of acid used in the titration (mL)
N= Normality of Standard acid used in experiment (0.25N)
W=Weight of the sample (g)
Weight of the solid jeevamrutham is = 1.4 (g)

2.3 EXTRACTION AND DETERMINATION OF PHOSPHOROUS

2.3.1 EXTRACTION OF PHOSPHOROUS

The extraction depends on the type of extractant, the makeup of the soil, and the kinds of phosphorous compounds that are present in the soil. The choice of the right extractant is crucial because different extractants extract various kinds of phosphorous compounds that are present in the soil.

2.3.2 QUANTIFICATION OF EXTRACTED PHOSPHOROUS

For acid soils, the Bray's method is used to measure the amount of accessible phosphorus, whereas the Olsen's method is used for neutral, alkaline, and calcareous soils. Soils with free caco3 are often next.

2.3.2.1 PRINCIPLE

Acid forms of phosphorous, primarily Ca phosphates and AI & Fe phosphates, are designed to be easily extracted using the combination of Hcl and NH4F. By creating complex ions in an acidic solution with the metal ions AI, Fe, and Mn phosphates, NH4F dissolves them, releasing the phosphate ions into the solution. The phosphate ion forms a heteropoly complex compound of phosphorous in the presence of chloromolybdic acid in an acidic media. This product, when reduced, gives the solution a blue hue. A spectrophotometer can be used to measure the intensity of blue at 660 nm.

2.2.3.1 PROCEDURE

Approximately, 5 g of solid jeevamrutham sample add 50 ml of Bray's extractant, mix and vigorously shaken the contents for 5min and subject for filtration. To 5 ml of filtrate add 5 ml of ammonium molybdate solution and shake well until the evolution of CO_2 ceases. Following, 1 ml of stannous chloride solution was transferred, and the total volume was made to 25 ml with distilled water. The absorbance of the sample was measured using colorimeter at 660nm.

The concentration of the phosphorous was determined by preparing the plotting standard curve. The absorbance values were taken on y-axis and concentration on x-axis.

2.4 DETERMINATION OF POTASSIUM

Initially, 1g of solid Jeevamrutham is weighed and dissolved using 10 ml of 1N ammonium acetate (pH7). The vessels were vigorously shaken for about 5min. During this step the potassium is extracted in to the ammonium acetate solution. The solution is filtered using whatman filter paper. The available potassium in the samples is determined by using atomic absorption spectrometer at 776 nm. The concentration of available potassium is shown as ppm (parts per million) by plotting standard curve using OD values and concentration values of standard phosphorus.

2.5 DETERMINATION OF pH

Approximately, 10g of solid jeevamrutham sample is transferred in to a clean 1L beaker and diluted with 100 mL of deionised water. The diluted jeevamrutham is well agitated using magnetic stirrer for about 30 min. The sample kept constant without shaking for about 1 h to attain the room temperature. The pH electrode is washed with deionised water and placed into the sample for measuring the pH of the sample.

2.5 DETERMINATION OF ELECTRICAL CONDUCTIVITY

Weigh 10g of each solid jeevamrutham sample is transferred into a 250 mL conical flask. Following, 100 mL of deionized (1:5, w/v) water was added and placed in the orbital shaker for 1h at 180 rpm. All the samples were taken out maintained at room temperature for about 30min. The supernatant is separated without interrupting the sediment and transferred in to another 250 mL conical flask. The conductivity cell is inserted in the supernatant to measure the reading.

3.0 RESULTS

3.1 ESTIMATION OF NITROGEN

The determination of nitrogen from the collected samples was performed according to Kjeldal method. Samples collected from different regions of Telangana and Andhra Pradesh exhibited good percentage of nitrogen. The nitrogen percentage of the samples collected from Telangana and Andhra Pradesh was ranged from 3.0% to 5.8% and 3.5% to 6.5% respectively. The results revealed that the samples collected from Andhra Pradesh was found to exhibit highest nitrogen percentage comparing to the nitrogen percentage of the samples collected from Telengana. Results are represented in the tables 1.1-1.5.

3.2 DETERMINATION OF PHOSPHOROUS

The determination of phosphorus from the collected samples was performed according to Bray's No. 1 method. The concentration of available phosphorus is shown as ppm (parts per million). The concentration of phosphorus in the samples collected from Telangana is ranged from 77 ppm to 256 ppm. Whereas the concentration of phosphorus in the samples collected from Andhra Pradesh is ranged from 132 ppm to 312 ppm. The results are represented in the tables 1.1-1.5.

3.3 DETERMINATION OF POTASSIUM

The concentration of potassium in the samples collected from the different places of Telangana was slightly found high comparing to the concentration of potassium of the samples collected from Andhra Pradesh. The potassium levels were ranged from 66ppm to 84ppm and 63ppm to 81ppm of the samples collected from Telangana and Andhra Pradesh respectively. The results are represented in the tables1.1-1.5.

3.4 DETERMINATION OF pH

The pH 5.4 to 6.7 and 5.6 to 6.3 are ranged from the samples collected from Telangana and Andhra Pradesh respectively. The results are shown in the tables 1.1-1.5..

3.5 DETERMINATION OF ELECTICAL CONDUCTIVITY (EC)

The EC 0.19 ds m^- to 0.25 ds m^- and 0.21 ds m^- to 0.28 ds m^- are ranged from the samples collected from Telangana and Andhra Pradesh respectively. The results are shown in the tables 1.1-1.5.

Table 1.1 Determination of NPK, pH, EC of the Jeevamrutham samples collected from different places of Andhra Pradesh.

S. No	Farmer Code	N (%)	P (ppm)	K (ppm)	pH	EC (ds m^-)
1	AP1226000009	4.4	256	72	5.8	0.26
2	AP1226000018	5.9	298	66	6.2	0.21
3	AP1226000019	6.5	310	80	6.0	0.28
4	AP1226000021	3.8	159	63	5.9	0.22
5	AP1226000020	4.1	223	79	5.3	0.25
6	AP1214000002	5.5	312	81	5.6	0.22
7	AP1214000001	3.5	298	80	6.1	0.24
8	AP1226000010	6.2	158	77	5.5	0.28
9	AP1226000008	5.9	208	80	6.3	0.27
10	AP1226000012	6.3	132	82	6.0	0.23
11	AP1226000005	4.8	249	63	5.9	0.21
12	AP1226000003	3.5	309	70	5.4	0.24
13	AP1226000017	6.0	280	65	6.1	0.26
14	AP1226000002	6.4	193	72	5.7	0.26
15	AP1226000004	3.9	236	81	5.6	0.25
16	AP1226000006	4.2	270	80	5.3	0.23
17	AP1226000029	5.0	182	79	6.1	0.28
18	AP1226000024	5.9	311	70	5.9	0.26
19	AP1226000025	3.6	305	68	6.0	0.21
20	AP1226000016	4.4	218	66	5.8	0.28
21	AP1226000076	4.9	257	65	6.3	0.27
22	AP1226000026	3.5	300	68	6.0	0.21
23	AP1226000023	4.9	295	74	5.4	0.23
24	AP1226000022	5.6	288	70	5.9	0.25
25	AP1226000027	6.0	220	81	5.6	0.27
26	AP1226000045	6.4	151	73	6.0	0.26
27	AP1226000075	6.0	310	78	6.2	0.22
28	AP1226000073	5.8	259	64	5.9	0.28
29	AP1226000037	5.2	246	81	5.7	0.24
30	AP1226000044	5.7	306	80	6.0	0.23
31	AP1226000039	5.9	296	76	6.1	0.27
32	AP1226000043	6.3	270	66	5.7	0.25
33	AP1226000040	4.9	164	79	5.8	0.23
34	AP1226000074	5.8	193	71	6.0	0.24
35	AP1226000046	6.1	218	76	5.5	0.21
36	AP1226000053	6.4	239	74	6.1	0.22
37	AP1226000036	5.5	304	70	5.8	0.26
38	AP1226000035	5.9	251	78	5.5	0.28

39	AP1226000047	3.8	260	80	6.0	0.23
40	AP1214000003	4.7	183	75	6.1	0.27
41	AP1226000033	5.0	305	70	5.8	0.25
42	AP1226000232	4.4	224	74	5.5	0.22
43	AP1226000233	6.0	281	63	5.9	0.21
44	AP1226000234	5.5	236	69	5.7	0.23
45	AP1226000235	3.8	279	75	5.9	0.24
46	AP1226000236	4.0	300	80	6.0	0.23
47	AP1226000237	4.3	310	82	6.2	0.21
48	AP1226000238	3.8	308	80	5.7	0.28
49	AP1226000239	4.9	139	77	5.8	0.27

Table 1.2 Determination of NPK, pH, EC of the Jeevamrutham samples collected from different places of Andhra Pradesh continued

S. No	Farmer Code	N (%)	P (ppm)	K (ppm)	pH	EC (ds m^{-})
50	AP1226000240	6.2	148	73	6.3	0.22
51	AP1226000241	6.0	214	76	5.4	0.26
52	AP2107000013	5.5	233	83	5.6	0.27
53	AP2107000071	5.9	140	78	5.8	0.22
54	AP2107000012	4.3	237	79	5.9	0.25
55	AP2107000002	4.0	280	80	5.7	0.21
56	AP2107000018	4.5	144	83	5.5	0.27
57	AP2107000034	6.0	256	70	5.8	0.26
58	AP2107000016	5.7	281	79	5.6	0.27
59	AP2107000023	5.2	164	75	6.0	0.22
60	AP2107000014	4.9	305	80	6.3	0.21
61	AP2107000031	6.4	149	68	5.7	0.24
62	AP2107000043	3.7	289	74	5.9	0.28
63	AP2107000033	4.0	260	77	5.8	0.27
64	AP2107000041	5.8	256	83	5.4	0.22
65	AP2107000008	5.2	300	72	5.8	0.23
66	AP2107000027	5.9	231	80	5.9	0.27
67	AP2122000006	5.7	270	81	6.0	0.26
68	AP2107000040	4.8	255	76	5.4	0.21
69	AP2122000005	6.2	132	79	5.8	0.24
70	AP2107000038	4.0	159	75	6.2	0.23
71	AP2107000006	6.3	310	80	5.5	0.27
72	AP2107000039	5.5	247	73	5.7	0.25
73	AP2107000048	6.0	265	67	5.3	0.22
74	AP2107000005	6.4	280	75	6.2	0.23
75	AP2107000037	5.5	157	80	5.9	0.24
76	AP2107000045	4.9	269	79	6.0	0.21
77	AP2122000009	5.8	283	72	5.8	0.27
78	AP2107000042	6.2	228	70	5.5	0.24
79	AP2107000044	6.0	162	79	6.3	0.25
80	AP2107000004	4.7	183	74	5.6	0.21
81	AP2107000003	5.0	176	76	5.4	0.26
82	AP2107000039	5.2	234	80	5.7	0.24
83	AP2107000048	5.9	267	81	6.0	0.23
84	AP2107000005	6.0	250	74	5.9	0.28
85	AP2107000037	5.5	294	80	6.2	0.21
86	AP2107000045	4.9	306	79	6.0	0.27
87	AP2122000009	6.0	294	68	5.9	0.23
88	AP2107000042	5.9	255	64	5.7	0.25
89	AP2107000044	5.5	231	76	5.5	0.21

90	AP2107000004	4.7	308	80	5.3	0.27
91	AP2107000003	6.2	247	82	5.8	0.25
92	AP2022000005	6.0	290	76	6.2	0.23
93	AP2035000370	5.8	254	63	5.8	0.25
94	AP2035000363	5.5	238	81	5.9	0.28
95	AP2035000357	5.1	279	75	6.2	0.24
96	AP2016000001	6.1	281	79	6.0	0.25
97	AP2016000032	4.8	310	68	6.2	0.21
98	AP2016000011	6.2	305	70	5.9	0.25
99	AP2237000009	5.9	312	79	5.8	0.27
100	AP2237000012	6.3	288	80	5.4	0.21
101	AP2237000014	5.5	293	82	6.2	0.28
102	AP2237000016	4.0	267	76	6.3	0.24
103	AP2237000018	6.0	199	73	5.9	0.27
104	AP2237000019	6.5	267	70	6.0	0.25

Table 1.3 Determination of NPK, pH, EC of the Jeevamrutham samples collected from different places of Andhra Pradesh continued………………

S.No	Farmer Code	N (%)	P (ppm)	K (ppm)	pH	EC (ds m^{-})
105	AP2237000021	6.0	301	83	6.1	0.21
106	AP2035000428	5.9	304	80	5.7	0.26
107	AP2016000027	6.3	294	79	5.8	0.28
108	AP2022000027	6.0	299	75	6.0	0.21
109	AP1611000187	5.5	307	81	6.2	0.26
110	AP2035000437	6.2	300	82	5.9	0.24

Table 1.4 Determination of NPK, pH, EC of the Jeevamrutham samples collected from different places of Telangana.

S. No	Farmer Code	N (%)	P (ppm)	K (ppm)	pH	EC (ds m^{-})
1	TE0929000017	3.1	241	80	5.2	0.19
2	TE0929000016	3.5	250	83	5.8	0.25
3	TE0929000049	3.1	238	77	6.0	0.22
4	TE0929000035	3.9	256	68	5.4	0.19
5	TE0929000018	3.5	198	80	6.2	0.21
6	TE0929000044	3.0	228	81	5.9	0.23
7	TE0929000027	42	240	74	6.7	0.22
8	TE0929000036	3.0	200	69	5.4	0.20
9	TE0929000050	3.8	153	73	5.8	0.25
10	TE0929000029	4.8	181	66	5.6	0.23
11	TE0929000047	4.1	112	79	5.9	0.24
12	TE0929000001	4.4	252	69	5.1	0.24
13	TE0929000043	3.8	88	77	5.8	2.20
14	TE0929000041	3.4	155	81	5.9	0.24
15	TE0929000026	4.0	201	84	6.0	0.26
16	TE0929000005	3.1	231	65	6.4	0.21
17	TE0923000028	3.3	159	70	5.5	0.20
18	TE0929000014	3.9	244	78	5.8	0.19
19	TE0929000006	3.0	237	66	5.7	0.19
20	TE0923000027	3.7	249	70	6.3	0.20
21	TE0929000030	5.5	222	80	6.0	0.21
22	TE0929000040	3.1	155	82	6.1	0.23
23	TE0929000037	4.8	80	81	5.8	0.28
24	TE0929000013	4.5	77	74	6.0	0.22
25	TE0929000011	4.7	111	79	5.5	0.21
26	TE0929000007	5.8	120	80	6.3	0.23

27	TE0929000012	55	224	80	5.1	0.21
28	TE0929000004	4.8	250	84	6.6	0.26
29	TE0929000042	5.2	175	77	6.2	0.24
30	TE0929000002	5.0	250	79	6.6	0.22
31	TE0929000031	4.9	108	74	5.8	0.20
32	TE0929000003	5.1	138	71	6.0	0.19
33	TE0923000029	5.7	217	83	6.1	0.19
34	TE0929000033	5.3	198	80	5.8	0.19
35	TE0929000032	4.4	93	68	5.8	0.28
36	TE0929000009	5.0	151	71	5.5	0.29
37	TE0929000039	4.9	254	70	6.2	0.25
38	TE0929000024	5.5	138	78	6.5	0.20
39	TE0929000025	3.2	210	77	5.7	0.19
40	TE0929000021	5.3	233	69	5.2	0.22
41	TE0929000022	3.8	240	70	6.0	0.23
42	TE0929000019	4.0	251	80	5.4	0.25
43	TE0929000023	4.4	210	81	5.9	0.27
44	TE0929000028	5.1	198	84	6.2	0.23
45	TE0929000020	3.8	201	82	6.0	0.26
46	TE0929000010	4.2	85	79	5.1	0.21
47	TE0929000034	3.8	236	74	5.8	0.28
48	TE0929000038	5.0	240	70	5.3	0.22
49	TE0929000045	5.4	228	71	5.9	0.19
50	TE0929000046	4.9	246	75	6.2	0.20
51	TE0929000046	5.1	202	79	6.4	0.26
52	TE0929000001	4.4	236	80	5.8	0.22
53	TE1203000001	3.7	142	71	6.0	0.20
54	TE1203000002	4.3	250	73	6.5	0.21
55	TE1203000003	3.0	255	82	5.8	0.28
56	TE1203000004	4.8	250	67	6.4	0.26
57	TE1203000005	5.5	250	80	6.0	0.29
58	TE0928000001	5.1	144	81	5.3	0.26
59	TE1203000006	4.9	132	69	5.9	0.28
60	TE0929000051	3.1	205	71	5.6	0.20
61	TE0929000054	5.0	191	68	6.2	0.23
62	TE0929000051	4.8	246	83	6.4	0.25
63	TE0929000060	5.2	230	80	5.9	0.29
64	TE0929000052	5.8	222	77	6.1	0.19
65	TE0929000061	4..6	127	66	5.2	0.20
66	TE0929000053	5.0	254	70	6.1	0.22
67	TE0929000062	4.8	236	83	5.9	0.25
68	TE0929000055	5.3	240	81	5.8	0.23
69	TE0929000056	4.9	248	79	5.5	0.28
70	TE0929000057	5.5	176	68	6.3	0.26
71	TE0436000092	5.5	145	70	6.2	0.21
72	TE0436000091	4.8	209	77	5.8	0.23
73	TE0436000113	4.9	230	82	6.3	0.25
74	TE0436000089	5.5	241	81	6.6	0.22
75	TE0436000088	5.1	238	69	5.8	0.24
76	TE0436000086	5.5	183	74	5.4	0.19
77	TE0436000087	5.7	214	79	5.7	0.19
78	TE0436000116	4.2	243	71	6.0	0.21
79	TE0436000112	4.0	248	80	6.6	0.26
80	TE0436000115	4.9	256	83	6.1	0.24
81	TE0436000076	4.6	250	79	6.3	0.28

82	TE0436000082	4.4	145	82	6.3	0.23
83	TE0436000078	3.8	190	80	6.4	0.27
84	TE0436000075	4.6	123	80	6.0	0.20
85	TE0436000077	5.6	219	81	5.8	0.25
86	TE0436000080	5.0	187	77	5.6	0.23
87	TE0436000081	5.7	226	75	6.1	0.27
88	TE0436000084	5.4	241	66	5.9	0.22
89	TE0436000119	5.3	156	70	5.5	0.21
90	TE0436000118	5.0	200	76	6.5	0.29
91	TE0436000120	5.4	243	79	6.0	0.25
92	TE0436000121	5.2	139	70	6.2	0.20
93	TE0436000108	3.8	240	72	5.9	0.19
94	TE0436000079	4.2	124	80	5.4	0.20
95	TE0436000107	5.7	231	84	6.0	0.20
96	TE0436000111	4.8	192	71	5.8	0.23
97	TE0436000104	4.4	251	73	6.1	0.28
98	TE0436000109	3.5	240	80	6.3	0.24
99	TE0436000105	4.6	239	73	6.5	0.26
100	TE0436000110	5.8	244	81	6.2	0.21

Table 1.5 Determination of NPK, pH, EC of the Jeevamrutham samples collected from different places of Telangana continued

S. No	Farmer Code	N (%)	P (ppm)	K (ppm)	pH	EC (ds m^{-})
101	TE0436000103	4.2	183	80	6.0	0.27
102	TE0436000100	3.9	255	68	5.8	0.29
103	TE0436000095	4.9	228	81	5.4	0.25
104	TE0436000096	4.7	242	83	6.0	0.20
105	TE0436000097	5.5	248	80	6.4	0.27
106	TE0436000094	5.0	156	84	6.2	0.23
107	TE0436000001	5.4	250	80	5.9	0.28
108	TE0436000007	5.6	241	79	5.7	0.29

4.0 DISCUSSION

The present investigation was carried out to evaluate the levels of Nitrogen (N), Phosphorous (P), and Potassium (K) of the collected Jeevamrutham samples from various places of Telangana and Andhra Pradesh. In addition to N, P, and K determination, the studies are also extended to determine the pH and EC of collected samples. We observed that, the nitrogen levels of the samples collected from the different places of Andhra Pradesh found slightly higher than the nitrogen content of the samples collected from different places of Telengana. On the other side, the phosphorous levels of the samples collected from the different regions of Andhra Pradesh also resulted high comparing to the samples collected from the different places of Teangana. However, the potassium levels of the samples collected from Telangana and Andhra Pradesh approximately showed equal levels. In continuation to N, P, K determination, we have also evaluated the pH and EC of the collected Jeevamrutham samples. However, the variation in the N, P, K or pH, and EC of the collected samples might depend on the type of soil, elements present in the urine, Protein powder which used are used in the preparation of Jeevamrutham. In addition, type of microorganism present in the soil also one of the determinants of the N, P, K value variation. On the other hand, the variations in the pH and EC might be due to different elements (other than N, P, K) or the salts present all the components of collected samples.

Determination of the above said parameters is most important for sustainable organic farming. The finest substitute for chemical fertiliser that we have is jeevamrutham. Jeevamrutham is entirely organic and is appropriate for use in organic farming. The bacteria that fix nitrogen and solubilizes phosphorus is abundant in Jeevamrutham. Additionally, it is a rich source of numerous micronutrients, including potassium, phosphorus, nitrogen, and carbon (Devakumar et al. 2014; Sreenivasa et al. 2010) [6, 5]. Jeevamrutham is a rich supply of beneficial microorganisms, including bacteria that fix nitrogen and dissolve phosphate. Such organic liquid manure (Jeevamrutham) would be added to enable microbial consortia becomes more effective, increasing NPK content and plant growth-promoting elements. With reference to the future prospects of regaining of soil fertility and its protection, Jeevamrutham holds great importance.

5.0 CONCLUSION

All collected samples contain the sufficient concentrations of Nitrogen, Phosphorous and Potassium levels in the collected jeevamrutham samples from Telangana and Andhra Pradesh. Moreover, the values of pH and EC of the samples tested found good.

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CONFLICT OF INTEREST

The authors disclose no conflict of financial or nonfinancial interest.

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