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## Studies on organic boosters and their micronutrient composition

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**Abstract**

The investigation pertaining to “Studies on Organic Boosters and Their Micronutrient Composition”. was carried out during the year 2016-2017 at Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani. The experiment was undertaken to prepare the different organic boosters and to evaluate the organic boosters for its composition. The data obtained from present investigation on preparation of organic boosters and their chemical, biological and enzymatic content was critically analyzed using various standard procedures.

Panchgavya was prepared by using nine ingredients *viz.* cow dung, cow urine, cow milk, curd, jaggery, cow ghee, banana, tender coconut water and water. Amrutjal was made by using cow urine, fresh cow dung, jaggery and water, whereas Amrutmitti was prepared in pit by using ingredients like compost, FYM, cow dung, cow urine and Amrutjal. The protocol of Beejamrut was developed by using materials like cow dung, cow urine, lime, bund soil or compost and water. While, Jivamrut was prepared by using cow dung, cow urine, dicot pulse flour, jaggery and compost. The high concentration of the total iron, manganese, zinc, copper and boron was recorded in Amrutmitti. Where as lower concentration of iron and manganese was noticed in Beejamrut while, Amrutjal was low in zinc and copper.

**Keywords:** Cucumber, boron, yield, quality, Konkan

**Introduction**

In organic production systems, there is always a challenge of how to improve soil fertility, crop productivity and management of pests by organic techniques. Use of organic liquid preparations has been an age old practice in India. On farm produced *Kunapajala*, prepared by fermenting animal flesh along with herbal products used to be an established technique in ancient India. As an alternative, number of organic farmers devised organic formulations based on local experiences and gave specific names such as *Amrutpani*, *Panchgavya*, *Amrutmitti*, *Beejamruta*, *Jivamrut* etc. Similarly, in other organic farming systems, few effective preparations such as BD-500, BD-501, Cow Pat Pit, Biodynamic liquid manures and in Homa Organic Farming: Agnihotra ash enriched water and Biosol are effective tools being used by number of organizations. It is interesting to note that in all these preparations, the basic ingredients are cow based products. In order to give generic name, hence forth, these are named as Bio enhancer or Organic formulations which is almost new to the world and scientific community.

**Material and Methods**

The present investigation pertaining to “Studies on Preparation of Organic Boosters and Their Evaluation” was carried out during the year 2016-2017 at Department of Soil Science and Agriculture Chemistry, College of Agriculture, Vasantrao Nike Marathwada Agricultural University, Parbhani. The details regarding the materials used and methods followed during the course of investigation are presented in this chapter. The analytical work was done in the laboratory of Department of Soil Science and Agricultural Chemistry. College of Agriculture, Parbhani. Micronutrients *viz.*, Fe, Mn, Zn and Cu were extracted with 0.005 M DTPA in aliquot were estimated on Atomic Absorption Spectrophotometer by the method. (Lindsay and Norvell, 1978). Total boron is determined by spectrophotometer using azomthin-H. (Berger and Truog, 1939) <sup>[1]</sup>

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## Results and Discussion

### Micronutrient composition of Panchgavya and its ingredients

The data of total micronutrient composition of Panchgavya are shown in Table 1. The iron content in Panchgavya was 1442.00 mg kg<sup>-1</sup>. The iron content in different ingredients of Panchgavya varied from 60.30 to 786.90 mg kg<sup>-1</sup>. The highest iron content was found in cow dung and lowest was found in ripened banana. It was found that the total manganese content in various ingredients of panchgavya varied in the range of 1.50 to 60.00 mg kg<sup>-1</sup> in cow urine and tender coconut water, respectively. The total manganese in panchgavya was 13.10 mg kg<sup>-1</sup>, the total zinc in ingredients of panchgavya was in range of 12.30 to 37.10 mg kg<sup>-1</sup>. The highest zinc content i.e. 37.10 mg kg<sup>-1</sup> was noticed in cow dung while lowest zinc content (12.30 mg kg<sup>-1</sup>) was observed in cow urine. However, total zinc content in panchgavya was 192.00 mg kg<sup>-1</sup>. The total copper content in ingredients of panchgavya was in

range of 1.00 to 48.00 mg kg<sup>-1</sup>. The highest copper (48.00 mg kg<sup>-1</sup>) content recorded in cow dung while lowest copper content (1.00 mg kg<sup>-1</sup>) was in ripened banana. The total copper content in panchgavya was 52.0 mg kg<sup>-1</sup>. The highest and lowest total boron was observed in cow dung (171.00 mg kg<sup>-1</sup>) and cow curd (130.00 mg kg<sup>-1</sup>), respectively. The total boron in Panchgavya was 136.00 mg kg<sup>-1</sup>.

Panchgavya are rich source of micronutrient. In present investigation higher amount of micronutrients are observed in Panchgavya. This may be due to the higher amount of micronutrients present in ingredients of Panchgavya and microbial activity. Sreenivasa *et al.* (2010) [5] recorded chemical analysis of Panchgavya which showed significant concentration of micronutrients like zinc, copper, iron and manganese. The increasing amount of micronutrients in Panchgavya confirms the result recorded by Pathak and Ram (2013).

**Table 1:** Micro nutrient composition of Panchgavya and its ingredients

Sample	Total iron (mg kg <sup>-1</sup> )	Total manganese (mg kg <sup>-1</sup> )	Total zinc (mg kg <sup>-1</sup> )	Total copper (mg kg <sup>-1</sup> )	Total boron (mg kg <sup>-1</sup> )
Cow dung	786.90	26.90	37.10	48.00	171.00
Cow urine	61.30	1.50	12.30	20.00	163.00
Cow milk	63.20	19.00	16.30	3.00	149.00
Cow curd	201.10	2.10	25.80	6.00	130.00
Cow ghee	81.00	14.00	15.00	0.30	149.00
Jaggery	61.60	2.20	21.40	11.00	147.00
Banana	60.30	2.70	20.30	1.00	137.00
Tender Coconut water	96.50	60.0	17.40	13.00	163.00
Panchgavya	1442.00	13.10	192.00	52.00	136.00

### Micronutrient composition of Amrutjal

The data on total micronutrient content in Amrutjal and its ingredients was presented in Table 2. The total iron content in ingredients of Amrutjal varied from 61.3. to 786.90 mg kg<sup>-1</sup>. The maximum iron content was recorded in cow dung and minimum content was recorded in cow urine. Overall iron content of Amrutjal was 660.00 mg kg<sup>-1</sup>. The total manganese content in Amrutjal was 16.00 mg kg<sup>-1</sup>. The highest manganese was recorded in cow dung (26.90 mg kg<sup>-1</sup>) and lowest manganese was recorded in cow urine (1.50 mg kg<sup>-1</sup>).

The total zinc content in various ingredients of Amrutjal varied from 12.30 to 37.10 mg kg<sup>-1</sup>. It was noticed that the cow urine recorded lowest zinc content (12.30 mg kg<sup>-1</sup>). The zinc content of Amrutjal was 20.20 mg kg<sup>-1</sup>. The total copper content in ingredients of Amrutjal was varied from 11.00 to 48.00 mg kg<sup>-1</sup> recorded in jaggery and cow dung, respectively. Total copper and total boron in Amrutjal was 4.00 and 151.00 mg kg<sup>-1</sup> respectively. The highest total boron was observed in cow dung (171.00 mg kg<sup>-1</sup>) and lowest was in jaggery (147.00 mg kg<sup>-1</sup>).

**Table 2:** Micro nutrient composition of Amrutjal and its ingredients

Sample	Total iron (mg kg <sup>-1</sup> )	Total manganese (mg kg <sup>-1</sup> )	Total zinc (mg kg <sup>-1</sup> )	Total copper (mg kg <sup>-1</sup> )	Total boron (mg kg <sup>-1</sup> )
Cow dung	786.90	26.90	37.10	48.00	171.00
Cow urine	61.30	1.50	12.30	20.00	163.00
Jaggery	61.60	2.20	21.40	11.00	147.00
Amrutjal	660.00	16.00	20.20	4.00	151.00

The data presented in Table 2 showed the sufficient amount of micronutrients is present in Amrutjal. Pathak and Ram (2013) reported the Amrutjal are rich source of nutrients and beneficial microbes. Further, Deshpande (2003) reported the use of Amrutjal in soil fertility improvement.

### Micronutrient composition of Amrutmitti

The data on micronutrient composition of Amrutmitti are

narrated in 3. The total iron, total manganese, total zinc and total copper varied from 61.30 to 1452.00 mg kg<sup>-1</sup>, 1.50 to 572.10 mg kg<sup>-1</sup>, 12.30 to 202.00 mg kg<sup>-1</sup> and 4.00 to 56.50 mg kg<sup>-1</sup>, respectively in the ingredients of Amrutmitti. While, total boron ranged from 151.00 to 296.00 mg kg<sup>-1</sup> in Amrutmitti ingredients. Total iron, total manganese, total zinc, and total copper and total boron 1477.00, 460.00, 848.00, 49.00 and 349.00 mg kg<sup>-1</sup>, respectively in Amrutmitti.

**Table 3:** Micro nutrient composition of Amrutmitti and its ingredients

Sample	Total iron (mg kg <sup>-1</sup> )	Total manganese (mg kg <sup>-1</sup> )	Total zinc (mg kg <sup>-1</sup> )	Total copper (mg kg <sup>-1</sup> )	Total boron (mg kg <sup>-1</sup> )
Amrutjal	660.00	16.00	202.00	4.00	151.00
Cow dung	786.90	26.90	37.10	48.00	171.00
Cow urine	61.30	1.50	12.30	20.00	163.00
Compost	1452.00	572.10	102.10	56.50	296.00
Amrutmitti	1477.00	460.00	848.00	49.00	349.00

In present investigation the Amrutmitti have sufficient amount of organic matter which is major source of micronutrients. Therefore, Amrutmitti contains more amounts of micronutrients. These results are in accordance with the findings of Suchde Deepak (2009)<sup>[6]</sup>.

#### Micronutrient composition of Beejamrut

The results pertaining to micronutrient composition of Beejamrut are given in Table 4. The total iron content in ingredients of Beejamrut varied from 61.30 to 1452.00 mg kg<sup>-1</sup>. The maximum iron (1452.00 mg kg<sup>-1</sup>) was recorded in compost. The cow urine recorded lowest iron (61.30 mg kg<sup>-1</sup>)

content. The total manganese content in Beejamrut varied in the range of 1.50 to 572.00 mg kg<sup>-1</sup>. The highest manganese content was noticed in compost (572.00 per cent) and lowest manganese content was noticed in cow urine (1.50 mg kg<sup>-1</sup>). The manganese content in Beejamrut was 3.00 mg kg<sup>-1</sup>. It was found that total zinc content in Beejamrut ingredients ranged from 12.30 to 102.10 mg kg<sup>-1</sup>. Overall zinc content in Beejamrut was 127.00 mg kg<sup>-1</sup>. Total copper and total boron content ranged from 3.30 to 56.5 mg kg<sup>-1</sup> and 144.00 to 297.00 mg kg<sup>-1</sup> in ingredients of Beejamrut. The total copper and boron content in Beejamrut were 41.00 and 138.00 mg kg<sup>-1</sup>, respectively.

**Table 4:** Micronutrient composition of Beejamrut and its ingredients.

Sample	Total iron (mg kg <sup>-1</sup> )	Total manganese (mg kg <sup>-1</sup> )	Total zinc (mg kg <sup>-1</sup> )	Total copper (mg kg <sup>-1</sup> )	Total boron (mg kg <sup>-1</sup> )
Cow dung	786.90	26.90	37.10	48.00	171.00
Cow urine	61.30	1.50	12.30	20.00	163.00
Lime	884.20	25.40	22.20	3.30	144.00
Compost	1452.00	572.10	102.10	56.50	297.00
Beejamrut	460.00	3.00	127.00	41.00	138.00

Beejamrut, a mix of cow dung, cow urine, water, lime and handful of soil are rich source of nutrients. It is rich source of micronutrients like iron, manganese, zinc, copper and boron. Similar findings were also quoted by Sreenivasa *et al.* (2010)<sup>[5]</sup> and Gore and Sreenivasa (2011) who had reported higher number of micronutrients in Beejamrut.

#### Micronutrient composition of Jivamrut

The results regarding micronutrient composition of Jivamrut and its ingredients are narrated in Table 5. The total iron content in ingredients of Jivamrut varied from 61.30 to 1452.00 mg kg<sup>-1</sup>. The maximum iron content was recorded in compost and minimum content was recorded in cow urine.

Overall iron content of Jivamrut was 1334.00 mg kg<sup>-1</sup>. The total manganese content in Jivamrut was 77.00 mg kg<sup>-1</sup>. The highest manganese was recorded in compost (572.00 mg kg<sup>-1</sup>) and lowest manganese was recorded in cow urine (1.50 mg kg<sup>-1</sup>). The total zinc content in various ingredients of Jivamrut varied from 12.30 to 102.10 mg kg<sup>-1</sup>. It was noticed that the cow urine recorded lowest zinc content (12.30 mg kg<sup>-1</sup>). The zinc content of Jivamrut was 255.00 mg kg<sup>-1</sup>. The total copper content in ingredients of Jivamrut was varied from 11.00 to 56.50 mg kg<sup>-1</sup> recorded in jaggery and compost, respectively. Total copper and total boron in Jivamrut were 39.00 and 155.00 mg kg<sup>-1</sup> respectively. The lowest total boron was observed in jaggery (147.00 mg kg<sup>-1</sup>).

**Table 5:** Micro nutrient composition of Jivamrut and its ingredients

Sample	Total iron (mg kg <sup>-1</sup> )	Total manganese (mg kg <sup>-1</sup> )	Total zinc (mg kg <sup>-1</sup> )	Total copper (mg kg <sup>-1</sup> )	Total boron (mg kg <sup>-1</sup> )
Cow dung	786.90	26.90	37.10	48.00	171.00
Cow urine	61.30	1.50	12.30	20.00	163.00
pulse flour	20.14	19.30	57.20	12.40	163.00
Jaggery	61.60	2.20	21.40	11.00	147.00
Compost	1452.00	572.10	102.10	56.50	297.00
Jivamrut	1334.00	77.00	255.00	39.00	155.00

In present research, Jivamrut was prepared by fermenting cow dung, urine, jaggery and pulse flour. These Jivamrut is a rich bio-formulation contains consortia of beneficial microbes and rich in macro and micronutrients. Pathak and Ram (2013) in their investigation reported that Jivamrut contains 2.96, 0.52, 15.35 and 3.32 mg kg<sup>-1</sup> total zinc, total copper, total iron and total manganese, respectively. Similar results were also quoted by Sreenivasa *et al.* (2010)<sup>[5]</sup> and Gore and Sreenivasa (2011).

#### Conclusion

From the above study it can be concluded that Amrutmitti and Panchgavya are rich in micronutrients. The high concentration of the total iron, manganese, zinc, copper and boron was recorded in Amrutmitti. Whereas lower concentration of iron and manganese was noticed in Beejamrut while, Amrutjal was low in zinc and copper.

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