

Studies on Testing the Efficacy of Liquid Organic Inputs (Panchagavya and Jeevamruth) on Maize (*Zea mays* L.) Germination

S. Akila¹, M. P. Sugumaran^{1*}, K. Suganya¹ and E. Somasundaram²

¹Department of Environmental Sciences Tamil Nadu Agricultural, University Coimbatore.

²Department of Sustainable Organic Agriculture Tamil Nadu Agricultural, University Coimbatore.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i2330861

Editor(s):

(1) Dr. Farjana Sultana, College of Agricultural Sciences, International University of Business Agriculture and Technology (IUBAT University), Bangladesh.

Reviewers:

(1) Habu Saleh Hamisu, National Horticultural Research Institute, Nigeria.

(2) A. Orluchukwu, Joseph, University of Port Harcourt, Nigeria.

(3) Cristina Hegedüs, University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, România.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/52004>

Short Communication

Received 24 August 2019

Accepted 29 October 2019

Published 18 August 2020

ABSTRACT

Organic farming is based on the system-oriented approach and the use of an organic liquid product like Panchagavya resulted in higher growth, yield and quality of crops and hence there had been an increasing interest in the use of liquid formulations. The present study was carried out to validate the shelf life of panchagavya and jeevamruth by screening scientifically under *in vivo* condition using maize (*Zea mays*). The liquid organic formulations like jeevamruth, panchagavya and the panchagavya formulations with groundnut oil cake and sesame oil as a substitute to ghee were freshly prepared and used for further studies. In all the panchagavya formulations, the root length and shoot length of the maize plants increased as compared to other treatments. The maximum shoot length 20.67 cm and root length of 9.14 cm were recorded in panchagavya treatment and minimum shoot length 18.39 cm and root length of 6.15 cm was recorded in jeevamruth treated seeds. The panchagavya treated seeds registered the maximum vigour index of 2980.

Keywords: Vigour index; jeevamruth; panchagavya; shelf life.

*Corresponding author: E-mail: Sugumaran.mp@tnau.ac.in;

1. INTRODUCTION

Organic farming is based on the system-oriented approach and can be a promising option for sustainable agricultural intensification in the tropics. Organic farmers rely on crop rotation, green manures, compost, biological pest control and mechanical cultivation to maintain the soil productivity and for controlling the pests [1]. It may offer several potential benefits such as a greater yield stability especially in risk-prone tropical ecosystems, higher incomes in traditional farming systems, an improved soil fertility and long-term sustainability of farming systems, a reduced dependence of farmers on external inputs, the restoration of degraded or abandoned land, the access to attractive markets through certified products and new partnerships within the whole value chain, self-confidence and autonomy of farmers (Mendez *et al.*, 2010).

The liquid formulations such as panchagavya, jeevamruth and beejamruth were ecofriendly organic preparations made from products of the cow. Among these, panchagavya is one of the widely used traditional liquid organic formulations, which is a fermented product made from five ingredients obtained from cow, such as milk, urine, dung, curd and clarified butter [2]. In panchagavya, the number of beneficial microorganisms was found to be high under higher acidity. They have not only enhanced the microbes in the environment but also acted as a catalysts with a synergistic effect to promote all the useful microbes of the environment and these microorganisms secrete proteins, organic acids and antioxidants in the presence of organic matter and converted them into energy thereby the soil microflora and fauna changed a disease-inducing soil to a disease suppressive soil [3].

2. MATERIALS AND METHODS

2.1 Testing of the Effective Liquid Organic Input on Plant Growth under Laboratory Condition Roll Towel Method

The plant growth-promoting liquid organic inputs viz., panchagavya, panchagavya (groundnut oil cake instead of ghee, panchagavya (sesame oil) and jeevamruth were tested preliminarily on maize. These maize seeds were assessed based on the seedling vigour index by the standard roll towel method (ISTA, 1993). Ten maize seeds were kept over the pre-soaked

germination paper. The seeds were held in position by placing another pre-soaked germination paper strip and gently pressed. The polythene sheet covered with pre-soaked germination paper was then rolled and incubated in the growth chamber for 15 days. Three replications were maintained for each treatment. The root length and shoot length of individual seedlings were measured and the germination percentage of seeds was also calculated. The vigour index was calculated by using the formula as described by Abdul Baki and Anderson [4].

Vigour Index = (Mean root length + Mean shoot length) x Germination (%)

3. RESULTS AND DISCUSSION

3.1 Roll Towel Method

The germination study was conducted to find the effect of liquid organic formulation on maize seeds. The overall results revealed that the seedlings growth and seedling vigour recorded high in panchagavya treated seeds when compared to jeevamruth. The maximum shoot length 20.67 cm and root length of 9.14 cm were recorded in panchagavya treatment and minimum shoot length 18.39 cm and root length of 6.15 cm was recorded in jeevamruth treated seeds. The maximum vigour index of 2980 was observed in panchagavya applied treatment and minimum value of 2451 was observed in jeevamruth treatment (Table 1) (Fig 1). The highest germination percentage, shoot length, root length and vigour index of maize seedling was significantly influenced by per cent panchagavya formulation. Computation of vigour index using germination percentage and seedling growth characters derived a consolidated value which was used to delineate best treatments from others. Srimathi *et al.* [5] reported that seeds of *Jatropha curcas* and *Pongamia pinnata* fortified with panchagavya at the rate of 2, 3 and 5 per cent showed best in growth over control. The better seed invigoration and metabolic activity were due to the reason that panchagavya encompasses almost all the major nutrients, micronutrients and growth hormones [6] and the number of beneficial microorganisms protected it from seed infections. Vigour assumed greater importance in storage and potential production of any crop. Thus the panchagavya formulations could be better utilized for crop production of maize. This eco-friendly liquid organics (panchagavya) could help to obtain the best yield of maize and so the shelf life was also studied.

**Table 1. Testing the efficacy of different formulations of liquid organic inputs on plant growth under *invitro* condition (Germination study)
(*Mean of three replications)**

Treatments	Germination*(%)	Shoot length* (cm)	Root length* (cm)	Vigour index*
T ₁ - Panchagavya	100	20.67	9.14	2980
T ₂ – Panchagavya (ground nut oil cake)	100	19.86	8.73	2859
T ₃ – Panchagavya (sesame oil)	100	19.38	8.66	2803
T ₄ - Jeevamruth	100	18.39	6.15	2451
SEd	0.45	0.04	0.11	178.77
CD (0.05)	0.97	0.08	0.24	389.51

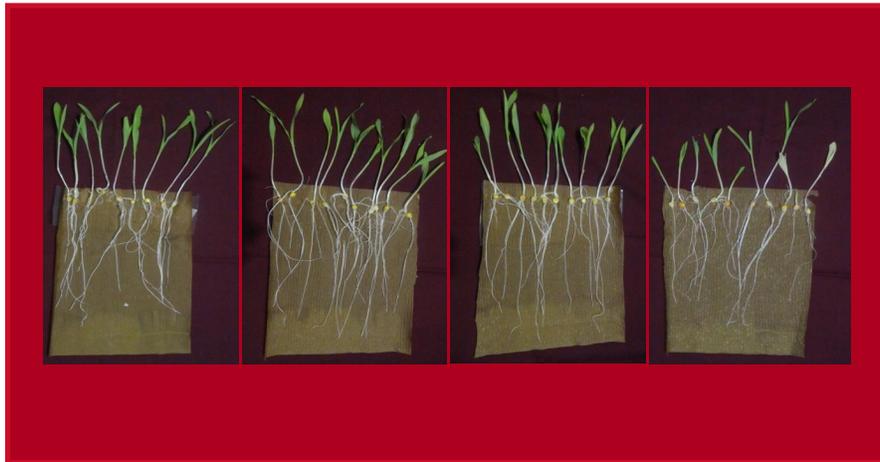


Fig. 1. Efficacy of liquid organic formulations on plant growth under *in vitro* condition (Germination study)

4. CONCLUSION

The overall results revealed that the seedlings growth and seedling vigour recorded high in panchagavya treated seeds when compared to jeevamruth. Thus the panchagavya formulations could be better utilized for crop production of maize.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Sugumaran MP, Akila S, Somasundaram E. Studies on analyzing the shelf life of panchagavya with different alternatives for ghee, International Journal of Agriculture Sciences. 2018;10(24): 7655-7656.
2. Amalraj ELD, Praveen KG, Mir Hassan Ahmed SK, Abdul R, Kishore N. Microbiological analysis of panchagavya, vermicompost, and FYM and their effect on plant growth promotion of pigeon pea (*Cajanus cajan* L.) in Indian. Organic Agriculture. 2013;3:23–29.
3. Somasundaram E. Evaluation of organic sources of nutrients and panchagavya spray on the growth and productivity of maize-sunflower-green gram system. Ph.D. Thesis, Tamil Nadu Agricultural University, Coimbatore; 2003.
4. Abdul-Baki AA, Anderson JD. Vigor Determination in Soybean Seed by Multiple Criteria. Crop Science. 1973;13:630-633.
5. Srimathi P, Mariappan N, Sundaramoorthy L, Paramathma M. Efficacy of Panchagavya on seed invigoration of biofuel crops. Scientific Research and Essays. 2013;8(41):2031-2037.
6. Pathak PK, Chander M. Farmers' Existing Livestock Production Practices In Relation To Organic Production Standards: An Indian Study. National Workshop on Organic Animal Husbandry Standards, IVRI, Izatnagar; 2002.

© 2020 Akila et al.; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/52004>