

SUSTAINABLE FLOWER PRODUCTION USING EFFECTIVE MICROORGANISMS (EM) AND JEEVAMRUTHA

Laishram Hemanta* and S. Romen Singh¹

*Department of Horticulture, School of Agricultural Sciences and Rural Development, Nagaland University, Medziphema, Nagaland-797106.

¹College of Horticulture & Forestry, Central Agricultural University, Pasighat, Arunachal Pradesh -791 102.

*Corresponding author's email: hemanta.horti@gmail.com

Abstract

Floriculture is associated with the heavy use of chemical fertilizers and pesticides resulting in degradation of soil and environmental pollution. For achieving sustainability, the need of the hour is to reduce or replace with some non-chemical alternatives. Many organic inputs are utilized as substrate media in floriculture like cocopeat, vermicompost, FYM, panchgavya, biofertilizers, livestock waste manures etc. Recently, use of effective microorganisms (EM) and jeevamrutha in agriculture as organic inputs has been gaining momentum and many researchers have reported its usage can improve the quality of soil, plant growth and yield.

Introduction

Floriculture is a multi-billion dollar global industry which includes the production of bedding plants, potted ornamentals, foliage plants, cut flowers, loose flowers, cut greens, dry flowers etc. This industry is huge and very profitable and it is estimated that the present worth stands at around \$33 billion. Mass production has become a serious threat to the environment. These commercial flowers crops are cultivated with heavy application of chemical fertilizers and pesticides. The major chunk of nutrients required by these crops are nitrogen, phosphorous and potassium which are met by using chemical fertilizers. These has led to the neglect of the traditional good practices. Many scientists working in the field of agriculture have expressed their concern that any more efforts to persist with this chemical farming model will only prove counterproductive and cause irreparable damage to soil health and environment. The indiscriminate use of fertilizers and pesticides immensely harm biological activity of the soil in vast areas rendering it almost lifeless. Pesticides which are not easily degradable have entered the food chain and pose a number of health hazards. These pesticides secrete into soils and groundwater ending up in drinking water. Hazardous chemicals like methyl bromide is used as fumigant for disinfestation of soil in cut flower production. Apart from this, chloropicrin, dazomet, metam etc. are also used for fumigation. They are very effective against termites, insects, nematodes, weeds and soil-borne diseases but harmful. It is high time that the issue of chemical pollution coming from the cut-flower industry is addressed and move towards a practice focused on the welfare of ecosystem not only on quality and profits. Restoring soil health by reverting to non-chemical farming has assumed great importance to attain sustainability. This quest for sustainability has led to the idea of different methods of farming like integrated farming, organic farming, eco farming, natural farming etc. Though the names are different but the objective is same for all i.e to avoid or reduce the use of chemicals so as to prevent the environmental pollution.

Effective Microorganisms (EM)

Effective micro-organism (EM) was developed at the University of Ryukyus, Japan in 1989 by Prof. Dr. Terou Higa. EM is a fermented live mixed culture of 83 bacterial and fungal strains of different

species naturally isolated from the soil. The use of EM as an addition to manure or as a spray directly in the field increase the micro-fauna biodiversity of the soil, leading to an improvement in field production. The main species involved in EM include Lactic acid bacteria (*Lactobacillus plantarum*, *L. casei*, *Streptococcus lactis*), Photosynthetic bacteria (*Rhodospseudomonas palustris*, *Rhodobacter spaeroides*), Yeast (*Saccharomyces cereviasiae*, *Candida utilis*), Actinomycete (*Streptomyces albus*, *S.griseus*) and Fermenting fungi (*Aspergillus oryzae*, *Mucor hiemalis*). There are many uses of EM. It can be in applied in different preparations either as soil drench or directly onto plants during crop production. It can also be spread on leaves or the seeds can be soaked in its solution for disease and insect control. There are organic inputs supplemented with EM like EM enriched bokashi, EM compost etc. EM can act as a bio-control agent for suppressing and controlling insect pests through the introduction of useful microorganisms into the planting environment. EM emit odours which may repel harmful insects and can be used as a prophylactic spray. EM in FPE or EM-5 have been used for repelling insect as it is not toxic to ladybirds, spiders, dragonflies, or frogs (Ncube, 2008). Foliar application of Effective Microorganisms had a positive effect on the diameter of flowers in roses and the number of formed inflorescences and the number of leaves in case of gerberas Górski and Kleiber (2010). Prisa (2019) studied the possibility of using effective microorganisms for germination and root growth in *Kalanchoe daigremontiana* and the results showed a significant increase in the agronomic and physiological parameters. The experiment also showed an increase in the percentage of seed germination and a significant reduction in the average germination time.

Jeevamrutha

Jeevamrutha is a fermented microbial culture of water, desi cow dung, desi cow urine, jaggery, flour of any pulse and handful of soil from farm which promotes biological activity in the soil and makes the nutrient available to the crop. Its nutrients, but most significantly, act as a catalytic agent that promotes the activity of microorganisms in the soil, as well as increase its activity. During 48 hour fermentation process, the aerobic and anaerobic bacteria present in the cow dung and urine multiply as they get to eat up organic ingredients like pulse flour. It also helps to prevent fungal and bacterial plant diseases (Babu, 2014). It is a component of Zero Budget Farming developed by Subhash Palekar. Vivili 2019 evaluated the performance of seven gladiolus (*Gladiolus grandiflorus* L.) cultivars under natural farming using jeevamrutha as an input and found that cultivars Candyman, Shagun, Psittacinus hybrid and Green Star were suitable for commercial cultivation under natural farming.

The question now is whether flowers can be grown commercially and sustainably using EM and jeevamrutha as inputs. The answer is yes but for hybrid cut flowers, use of others organic inputs and supplements are needed to meet the standards of both domestic and international markets. There are some commercial cut flower crops suitable for growing under natural farming using EM and jeevamrutha like chrysanthemum, gladiolus, tuberose, dahlia, liliium etc. and almost all seasonal flowers including indigenous flowers and local genotypes. For successful cultivation and quality production both in open and protected conditions, screening and selection of suitable varieties or genotypes is important as all will not be suitable. Considering the complexities and limitations of both organic and natural farming, it is better to come out with a more refined and cost effective ecofriendly flower cultivation or farming where the benefits from both can be taken up. The challenge is meeting the nutritional requirement of the flowers which are heavy feeders and protecting it from damages by biotic factors. EM and Jeevamrutha usually work on the mechanism

of nutrient supply by beneficial or useful microbes and can be used together with organic manures so that the quantity required is reduced.

Conclusion

The sustainable flower market is still tiny but it is growing specially in developed countries. According to the USDA, there is an increase in the number of small flower farms by about 20 percent during the past five years. From the 2012 census, it was reported that nearly 6,000 flower farms were there across the country. Many small flower growers have taken a cue from organic food growers who have successfully harnessed the farm-to-table trend. It is challenging but not impossible to go for eco-friendly cultivation. For moving towards sustainable flower farming, focus should be on flowers that thrive in local area and more native and local genotypes should be promoted. Eco friendly and farmer friendly flower farming may not replace flower cultivation using conventional practices but it is certainly a road for sustainability and a green healthy planet. More awareness is required to change the mindset of the growers as well as consumers. There is a long way to go and will always need strong demand particularly from the consumer driven to eco-friendly produce that the health of the planet and its inhabitant is more important than profit and quality.

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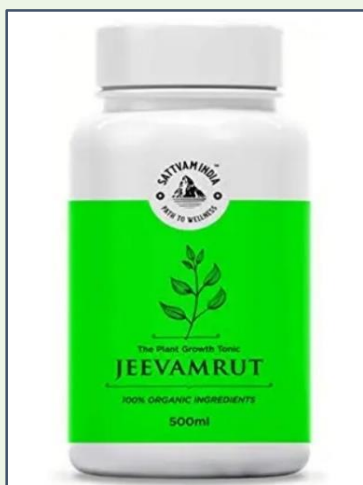
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Indigenous effective microorganisms (IEM)



IEM solution



Jeevamrutha sold in market



Preparation of Jeevamrutha



EM sold in market

Fig. 1 Formulations of EM, IEM and Jeevamrutha