

Short Abstract

The Ph.D. thesis targets to develop a nutrient-rich Jeevamrutha bio-fertilizer for its wider applicability in rural sectors of Assam characterized by highly diverse summer and winter climatic conditions in the region. To obtain better shelf life of the developed bio-fertilizer formulations, solid Jeevamrutha bio-fertilizer has been targeted. A time-dependent study shall be addressed for the screening and optimization of the compositional set. Thereby, further optimization of the compositional set is desired by considering the inclusion of other natural resources for the improvisation of nutrient characters. Additionally, jaggery-based modified Jeevamrutha was replaced using other carbon sources such as sugarcane juice and starch rice water. Further, an integrated farming technique using vermicompost and solid Jeevamrutha bio-fertilizer was deployed to achieve higher growth characteristics in *Phaseolus vulgaris*, nutritional content and the presence of a good microbial population. Also, in the entire PhD thesis, the evaluation of total Kjeldahl nitrogen (TKN) in the conventional approach was replaced with ammonium nitrogen (AN) due to its comparatively rigorous and quicker assessment. Thus, the thesis primary objectives that were fulfilled refer to (a) screening and optimization of Jeevamrutha bio-fertilizer (b) optimality of naturally available rural precursors (vermicompost, neemcake, tea waste and water hyacinth) in Jeevamrutha bio-fertilizer systems, (c) replacing jaggery carbon source with sugarcane juice and starch rice water and (d) assessment of integrated farming system. Accordingly, the outcomes of the thesis will serve as a useful guideline for the application of Jeevamrutha bio-fertilizer for organic farming in Assam and especially the application efficacy of the system in the winter season.