Organic Margosa: A Natural Green Input for Increasing Crop Productivity

Ajay Kumar[1], Sunil Solomon[2], Neetu Singh[3], and Sanjeev Mukherjee[4]

***Abstract*—**Margosa is purely Organic and Natural Eco-friendly Nitrogen fertilizer saver for enhancing crop productivity through sustainable routes. Organic Margosa is not only a nutrient supplement, but also acts as natural soil binder and helps to eliminate the denitrifying bacteria. The successful & productive agriculture practices reside more strongly around the economic comprehensive of the product. Therefore, apart from increasing crop productivity, economic utility was also considered so as to gain the wider acceptability of Margosa in public domain. Organic Margosa reduces the leaching of essential nutrients in soil and thus enhances the nutrient availability to the initial developmental stage of the crops which results in maximum utilization and uptake of chemical fertilizers. Thus, ultimately reducing the cost of growing plants and proved to be a more sustainably and economically viable alternative. Margosa significantly increases the NPK uptake and effectively managed the several insect/pests and plant-parasitic nematodes.

***Keywords*—**Organic Margosa, *Pongamia pinnata* and *Azadirachta indica.*

I. Introduction

UNDOUBTLY chemical fertilizer increased agriculture production and contributed much in growth of the Indian economy by contributing a better share in country's GDP, but on the other hand, there are several negative impacts of fertilizers on the environment like decrease in soil fertility, ground water contamination, acid rain and depletion of ozone layer, etc [1]. Inorganic fertilizer use must be combined with other agronomic management practices for efficient nutrient utilization [2]. Green manuring, wherever feasible, is the principal supplementary means of adding organic matter to the soil [3]. Green manures from different plant sources are well known for improving soil structure, increasing water holding capacity, decreasing soil erosion, reducing weed proliferation and weed growth, reclamation of alkaline soils, controlling root knot Nematodes [4]; addition of Nitrogen and Phosphorous to the soil, increasing biochemical activity and crop yield [5].

Azadirachta indica, (Neem) and *Pongamia pinnata* (Karanj) are the major green inputs of Organic Margosa. Neem manure help to increase the nutrient content (N, P, K, S, K, Ca, etc.,) in the soil [6]. Azadiractin, an active Neem extract exhibits antifeedant, insect repellent and insect sterilization properties without developing insect resistance [7]. Neem products (Neem oils, extracts and cake, etc.) are used as insecticide, pesticide, pest fumigant, fertilizer, manure, compost, urea coating agent and soil conditioner [6]. *Pongamia pinnata* (Karanj) cake has 100% natural NPK content [8] and has been reported as useful organic manure, blending agent with nitrogenous fertilizers, insecticide and anti-nematode agent [9].

II. Material And Methodology

50 kg/hectare minimum basal dose of Organic Margosa can be used for exclusive organic farming. Top dressing can be done with Margosa and Urea/ Nitrogenous fertilizer in same ratio. For nursery work, it can be applied at the rate of 5 to 10 kg/mother bed before seed-sowing. Margosa powder can be used @ 5gm p/pot. For plantation work, Organic Margosa @ 50gm/pit will be preferred, however in more than one year old plants application rate at 100gm round the collar girth of the plants will be more preferred.

Various Quality control parameters were standardized in order to test the efficacy of Margosa:

- Quality testing parameters: Percent Coating, Dissolution Rate and Dustiness.
- Advance testing characterization protocol: SEM at magnifications of 50X and 500X.
- Maximize surface area exposure, while minimizing void space.
- Matching rate of coating application to rate of surface area exposure.
- Coating characterization evaluation:
    - Viscosity/temperature curve;
    - Spread ability during application.

III. Result And Discussion

Our aim is to restrict the frequent application of chemical fertilizers as Nitrogen source used by the farming community and replace it with innovative organic inputs like Margosa. Margosa is an ideal organic candidate for alkaline, acidic, black cotton, light soil and submerged conditions when applied with chemical fertilizers due to its natural pH mordant activities. Hydrophobic interaction of fine particles of Organic

[1]Ajay Kumar, is with the Department of Biotechnology, Mewar Institute of Management, Vasundhara, Ghaziabad, U.P. 201012 (INDIA) (phone: +919811179928; e-mail: ajaykmr1986@gmail.com).

[2]S. Solomon was with Department of Genetics and Plant Breeding, IARI, Pusa, New Delhi (INDIA). Presently he is with Siddhatec Agrovet, Pvt. Ltd., Bhubaneswar, Odisha, INDIA.

[3]Neetu Singh, is with the Department of Biotechnology, Mewar Institute of Management, Vasundhara, Ghaziabad, U.P. 201012 (INDIA).

[4]Sanjeev Mukherjee (MD), is with Siddhatec Agrovet, Pvt. Ltd., Bhubaneswar, INDIA.

Margosa on the surface of granulated chemical fertilizers reduces the leaching process in soil and thus enhances the nutrient availability to the initial developmental stage of the crops which results in maximum utilization and uptake of chemical fertilizers. Thus, ultimately reducing the cost of growing plants and proved to be a more sustainably and economically viable alternative. Active Reduction in leaching process was verified by: Flowability testing; moisture pickup estimation; size control analysis; compatibility testing; dust and abrasion estimation; Percent Coating; Dissolution Rate and Dustiness; Coating characterization evaluation: (Viscosity/temperature curve; Spread ability during application); Scanning Electron Microscopy (SEM) at magnifications of 50X and 500X. Organic Margosa significantly increases the NPK uptake and effectively managed the several insect/pests and plant-parasitic nematodes. Ibrahim *et al.*, (2013) [10] observed that the use of Organic fertilizers resulted in higher production of secondary metabolites and increased antioxidant activity as compared to the use of NPK 15:15:15 (Inorganic fertilizer), in case of *Labisia pumila*. Similar results were also applicable with Organic Margosa. The Flavonoids content in Organic Margosa are reported in higher ratio as compared to other commonly used Antioxidants. With multidimensional benefits it is a highly economical proposition for the farming community at large.

Crop plants tested with Organic Margosa powder for productivity and secondary metabolites includes Bajra (Hybrid ICMH-451; Comp. Pusa-23); Barley (Jyoti (K572/10); Azad); Black Gram (Pant U-35; Azad Urad-2); Cabbage (Cabbage Pride of India; Cabbage Golden Acre); Soybean (Pusa-16; Pusa-9712); Maize (Maize Cultivar PHEM-2; Maize Variety PC-4); Paddy (Pusa Basmati-I; Basmati-370); Sorghum (Hybrid CSH-9; Comp. C5V-15); Tomato (Tomato Karti Anupam; Tomato Rupali); Wheat (PBW-343; UP-2882) and Winter Maize (Shaktiman-1; KH-5991).

IV. Conclusion

Organic Margosa was tested successfully at ATMA, Odisha (India); International Testing Centre, Haryana (India); CommGrade (Testing & Certification Services from NCMSL), Mumbai, (India); IARI, NDLI (India); OUAT, Odisha (India) and SHIATS, Allahabad (India). After successful testing, Organic Margosa was also supplied to Rashtrapati Bhawan, New Delhi (India) and Krishi Vigyan Kendra, Odisha (India) for Floriculture and Horticulture purposes. Margosa is certified by the premier Organic certification Agency, USOCA (2014) and an Internationally acclaimed product (Acclaimed by the International organizations of repute in the 32nd International Agriculture, Water and Agro-industry Trade show, held at Riyadh, Saudi Arabia). Acceptance and validation of Organic Margosa as a natural ecofriendly nutrient supplement by such huge eminencies and centers of excellence laid a foundation stone towards appraisable beginning of an era of Organic farming and Sustainable agriculture practices.

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